

**T.C.
CUMHURBAŞKANLIĞI
SAVUNMA SANAYİİ BAŞKANLIĞI**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ
PATLAMA ÖNLEME ALT SİSTEMİ DÖNEM-I, AŞAMA-II
SÖZLEŞMESİ**

**EK-1
TEKNİK ŞARTNAME
(TECHNICAL SPECIFICATION)**

2024

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FIGURES

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DEFINITIONS and ABBREVIATIONS

DEFINITIONS

“Shall” Identifies a mandatory requirement.

“Should” Identifies a requirement expected to be followed unless good reasons are formally stated and accepted for not doing.

“May” Identifies a permissible behavior, action or option.

“Is/Are/To Be” Identifies explanatory statements.

Other definitions are given in Appendix-2 SOW.

ABBREVIATIONS

Abbreviations are given in Appendix-2 SOW.

SCOPE

The Project Technical Specification (TS) defines the technical requirements as part of the work defined in Appendix–2 SOW.

IMPORTANT NOTIFICATION: Please kindly note that the requirements inside the below spreadsheet will supersede the corresponding requirements given in Clause 3 Requirements section. Compliance will be traced from the below spreadsheet.



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1. APPLICABLE DOCUMENT AND REFERENCES

Applicable and reference standards/ handbooks for KAAN Project are given below. Applicable standards, guidelines and handbooks may be tailored with Turkish Aerospace approval. Contractor shall specify other standards that are applicable or reference to the KAAN Project. If the standard/handbook is found to be obsolete Contractor shall propose an equivalent standard/handbook. Unless specific revision is stated, latest and valid version at T0 will be valid.

Applicable Standards

Table 1 Applicable Standards

DOCUMENT	ISS	TITLE/CONTENT
TF-DOC-0001596	F	Electrical Power System (EPS) Electrical Load Analysis (ELA) Report
TF-DOC-0002498	A	HMS Generic Requirements
TF-DOC-0001377	D	Reliability and Maintainability Allocation Report
TFA000000031-DCUG	E	Environmental Handbook
TF-DOC-0005539	C	Placards and Markings Requirements Document
TF-DOC-0008125	B	Testability Allocation Report
TF-DOC-0008965	D	Specialty Engineering Analyses/ Assessments Dossier – E3 Analysis and Assessments Document

Reference Standards

Table 2 Reference Standards

DOCUMENT REFERENCE	ISS	TITLE/CONTENT
MIL-STD-704	F	Aircraft Electric Power Characteristics
MIL-STD-1472	G	Human Engineering
MIL-STD-2173	-	Reliability – Centered Maintenance Requirements for Naval Aircraft, Weapons Systems and Support Equipment
MIL-HDBK-470	A	Designing and Developing Maintainable Products and Systems
MIL-HDBK-2165	-	Testability Handbook for Systems and Equipments
MIL-STD-810	G	Environmental Engineering Considerations and Laboratory Tests
DO-160	G	Environmental Conditions and Test Procedures for Airborne Equipment
MIL-STD-461	G	Requirements for the Control of Electromagnetic Interface Characteristics of Subsystems and Equipment

DOCUMENT REFERENCE	ISS	TITLE/CONTENT
MIL-STD-464	C	Electromagnetic Environmental Effects, Requirements for Systems
Defence_Standart_59-113	-	Lightning Strike Protection Requirements for Service Aircraft
Defence_Standart_00-970	-	Requirements for the Design and Airworthiness of Composite Aircraft Structure
MIL-HDBK-338	B	Electronic Reliability Design Handbook
MIL-HDBK-516	C	Airworthiness Certification Criteria
MIL-STD-464	-	Electromagnetic Environmental Effects
MIL-STD-882	-	System Safety Program Requirements
JSSG 2009	-	Joint Services Specification Guide: Air Vehicle Subsystems
DEF STAN 00-60	-	Integrated Logistic Support
SAE-ARP-4761	-	Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment
SAE-ARP-4754	-	Guidelines for Development of Civil Aircraft and Systems
-	-	Philip T. Frohne; Sole, 2008, Quantitative Measurements for Logistics
-	-	James V. Jones, Integrated Logistics Support Handbook, 3rd Edition

2. SYSTEM OVERVIEW

The Explosion Prevention System consists of those systems, units, and components whose primary function is to pressurization and inerting of internal fuel tanks and pressurization of external fuel tanks in KAAN Platform. The inerting of internal fuel tanks is provided mainly with ASM, which is employed to separate the oxygen from the air flowing throughout the ASM, via a hollow fiber membrane (HFM), and generate a nitrogen-enriched air (NEA) flow. The internal fuel tanks inerting and pressurization is provided by NEA flow during normal ground and flight conditions.

3. EXPLOSION PREVENTION SYSTEM REQUIREMENTS

3.1 FUNCTIONAL AND PERFORMANCE REQUIREMENTS

TF-Req-00047861 / A / ExPS - Engine Start Inerting Performance :

Within 10 minutes after starting both engines, while air vehicle is on ground, with an internal fuel load of at least 95%, Explosion Prevention System shall reduce the volumetric oxygen concentration of the internal fuel tank ullage to below 9%.

TF-Req-00047862 / A / ExPS - AAR Inerting Performance :

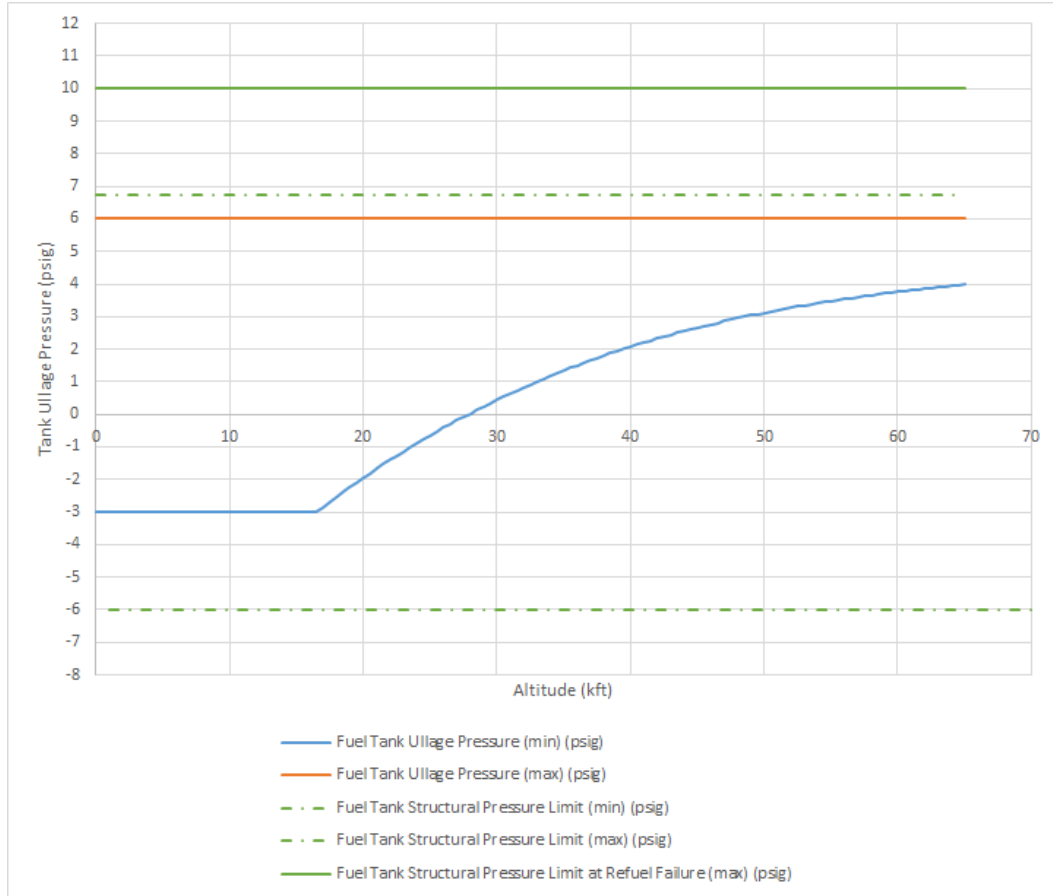
After completion of the air to air refueling in defined speed and altitude limits of the air vehicle to at least 95% of Total Internal Fuel Carrying Capacity within 10 minutes, while performing level flight, Explosion Prevention System shall reduce the volumetric oxygen concentration of the internal fuel tank ullage to below 9%.

TF-Req-00047863 / A / ExPS - Continuous Inert Gas Generation :

When an inert state is achieved within the internal fuel tank ullages, the Explosion Prevention System shall maintain that inert state throughout all flight phases.

TF-Req-00047864 / A / Copy of ExPS - Internal Fuel Tank Pressure Limits :

The Explosion Prevention System shall pressurize all the internal fuel tank ullage pressures within the limits as shown in below graph.



TF-Req-00047865 / A / ExPS - Pressurization Control :

The Explosion Prevention System shall be able to control and shut off the flow of pressurization air.

TF-Req-00047866 / A / ExPS Indications :

The Explosion Prevention System shall provide systems indicating data for display to the pilot.

TF-Req-00047867 / A / System Functional Duration :

The Explosion Prevention System shall perform its intended functions for at least 10 (ten) hours duration, from engine start-up to shut down.

TF-Req-00047868 / A / IBIT on the Ground :

On receipt of an IBIT command, the ExPS shall perform an IBIT.

TF-Req-00047869 / A / IBIT Perform :

Whilst IBIT is in progress, the ExPS shall provide the IBIT status.

TF-Req-00047870 / A / PBIT on the Ground :

The ExPS shall confirm serviceability by performing a systems Power On Built In Test(PBIT).

TF-Req-00047871 / A / PBIT Perform :

Whilst PBIT is in progress the ExPS shall provide the PBIT status.

TF-Req-00047872 / A / CBIT :

The ExPS shall perform constant monitoring of itself to confirm its operational status and to detect failures or degraded performance.

TF-Req-00047873 / A / ExPS - OEA Outboard :

The Explosion Prevention System shall be capable of venting overboard Oxygen Enriched Air that results from Nitrogen Enriched Air generation.

TF-Req-00047874 / A / ExPS - ECS Supplied Air Continuous Temperature :

The Explosion Prevention System shall be able to operate with supply air with continuous temperatures from 0°C to 40°C.

TF-Req-00047875 / A / ExPS - ECS Supplied Air Pressure :

The Explosion Prevention System shall be able to operate with supply air with pressures from 180kPag to 1000 kPag.

TF-Req-00047876 / A / ExPS - ECS Supplied Air Flowrate :

The Explosion Prevention System shall be able to perform its pressurization function with maximum 60 g/s supply air mass flowrate .

TF-Req-00047877 / A / ExPS NEA Failure :

The Explosion Prevention System shall continue to provide conditioned air to pressurize fuel tanks in case of an inert gas generation section failure.

TF-Req-00047878 / A / ExPS - External Fuel Tanks Pressurization :

The Explosion Prevention System shall provide conditioned air to pressurize external fuel tanks, when installed.

TF-Req-00047879 / A / Fuel Tank Ullage Temperature :

The Explosion Prevention System shall maintain supplied pressurization air and nitrogen enriched air temperature of internal and external fuel tanks below 70°C.

TF-Req-00083686 / A / Service Life :

The Explosion Prevention System shall have a Design Service Life of minimum 8000 flight hours.

3.2 PHYSICAL REQUIREMENTS

TF-Req-00047532 / A / Means to Prevent Fuel Ingress :

The Explosion Prevention System shall provide means to prevent fuel ingress into explosion prevention pipe lines.

TF-Req-00047533 / A / Weight :

The Explosion Prevention System weight shall not exceed 30 kg.

TF-Req-00047534 / A / ExPS Supply Air Contamination :

Explosion Prevention System shall be able to operate with pre-conditioned bleed air contamination levels defined in below table.

Table 3 Contamination Levels

Substance	PPM
Carbon Dioxide	5000
Carbon Monoxide	50
Ethanol	1000
Fluorine (as HF)	0.1
Hydrogen Peroxide	1
Aviation Fuels	250
Methyl Alcohol	200
Methyl Bromide	20
Nitrogen Oxides	5
Acrolein	0.1
Oil Breakdown Products (e.g. Aldehydes)	1
Ozone	0.1

TF-Req-00047535 / A / ExPS Burst Pressure :

The Explosion Prevention System components and piping (including venting system) shall be designed with a burst pressure of 1.5 times the proof pressure.

TF-Req-00047536 / A / ExPS Proof Pressure :

The Explosion Prevention System components and piping (including venting system) shall be designed with a proof pressure of two times the maximum operating pressure.

TF-Req-00047537 / A / ExPS Volume Budget :

The Explosion Prevention System's maximum dimensional envelope shall be of 785mm x 413.659 mm x 360 mm for NEA generation sub-system.

3.3 INTERFACE REQUIREMENTS

3.3.1 Electrical Interface Requirements

TF-Req-00047581 / A / Power Compatibility - System Electric Power Characteristics. :

The System shall comply with the electrical power characteristics specified in MIL-STD-704F (Aircraft Electric Power Characteristics) within the aircraft operating envelope.

TF-Req-00047582 / A / ExPS Maximum Power Budget :

The Explosion Prevention System continuous electrical power demand shall not exceed 1 kW.

TF-Req-00047583 / A / Aircraft Electrical Loads Supply Voltage :

Equipment that requires more than 560 Watt of DC power shall be configured to utilize 270VDC power.

TF-Req-00047584 / A / DC Power Supply Utilization :

The System shall be powered by primary 270VDC and/or secondary 28VDC power generation.

TF-Req-00049948 / A / Inrush Current Requirements (28 VDC and/or 115 VAC) :

When the nominal input voltage is abruptly applied, the peak inrush current shall be less than:

9 times the maximum steady state load for the first 3.0 milliseconds,

4 times the maximum steady state load up to 500 msec, and

2 times the maximum steady state load up to 2 seconds and nominal thereafter.

TF-Req-00049950 / A / 270 VDC Equipment Load Demand and Rate :

All equipment shall be designed to control load current demand during rated operation such that its magnitude does not exceed 150% of the equipment rated input current and the rate of change does not exceed 60 A/ms. (If applicable).

TF-Req-00049949 / A / Inrush Current Requirement (270 VDC) :

The instantaneous input current shall not exceed 4 times user equipment nominal full load input current, returning to equal or less than nominal full load input current within 10 ms. (If applicable).

3.3.2 Health Management Requirements

TF-Req-00047585 / A / Report detected failures and/or system degradation :

The System shall report detected failures and/or system degradation.

TF-Req-00047586 / A / Report remaining capability following a failure and/or system degradation :

The System shall report the remaining capability following a failure and/or system degradation.

TF-Req-00047587 / A / Provide IBIT data :

The System shall provide IBIT data following receipt of an Initiated Built in Test (IBIT) request.

TF-Req-00047588 / A / Provide PBIT data :

The System shall provide PBIT data following Power On Built in Test (PBIT) on power-up.

TF-Req-00047589 / A / Provide data for prognostic capability :

The System should provide data for recording to support development and operation of prognostic capability.

TF-Req-00047590 / A / Provide data for recording :

The System should provide data for recording in accordance with the table below.

Table 4 Data for Recording

Functionality (Purpose)	Description
Engineering investigations	This is the data which has been identified as being required in the event of an Engineering Investigation into a system.
Warranties	This is the data which has been identified as being required to understand/confirm how the system/equipment is being used through-life.
System Development	This is the data identified as being useful to monitor the through-life performance of the system.
Troubleshooting and HM system development	This is the data which has been identified as supporting development of the diagnostics and fault isolation routines in the system.
Life & Usage Management	This is the data which has been identified as supporting monitoring equipments which have been identified with known or potential life & usage tracking requirements.

3.4 SAFETY REQUIREMENTS

TF-Req-00047538 / A / Common Mode :

No common mode failure shall lead to a catastrophic failure condition.

TF-Req-00047539 / A / External Event :

No single external event to the system shall lead to a catastrophic failure condition

TF-Req-00047540 / A / Single Point Failure :

No single point failure shall lead to a catastrophic effect.

TF-Req-00047542 / A / Single Failure combined with latent failures :

No single failure combined with latent failures shall result in a Catastrophic event.

TF-Req-00047543 / A / Combinations of hidden (latent) failures :

Combinations of hidden (latent) failures shall not lead to a catastrophic effect.

TF-Req-00047544 / A / Catastrophic Failure Condition :

A Catastrophic Failure Condition caused by systems shall have a failure occurrence probability smaller or equal to 10^{-8} per flight hour.

TF-Req-00047545 / A / Hazardous Failure Condition :

A Hazardous Failure Condition caused by systems shall have a failure occurrence probability smaller or equal to 1×10^{-6} per flight hour.

TF-Req-00047546 / A / Failure Occurance Probability :

Quantitative analysis for major conditions related to complex and non-redundant systems shall have a failure occurrence probability smaller or equal to 10^{-5} per flight hour.

3.5 RMST REQUIREMENTS

3.5.1 Reliability Requirements

TF-Req-00047591 / A / Explosion Prevention System MFHBF :

The Explosion Prevention System shall exceed a minimum Mean Flight Hours Between Failures (MFHBF) of 633 Hours.

TF-Req-00047592 / A / Explosion Prevention System MFHBCF :

The Explosion Prevention System shall exceed a minimum Mean Flight Hours Between Critical Failures (MFHBCF) of 905 Hours.

TF-Req-00077752 / A / Weighted Mission Critical Items for Explosion Prevention System :

Explosion Prevention System Mission Critical Items should have no less than weighted allocated Explosion Prevention System MFHBCF.

3.5.2 Maintainability Requirements

TF-Req-00047600 / A / Scheduled maintenance events :

Scheduled maintenance need should be avoided by design. If this is not possible, scheduled maintenance tasks shall be defined to be compatible with aircraft maintenance program as follows:

- Group 1: Repetitive inspections shall not be required prior to 150 FH or 6 months.
 - Group 2: Repetitive servicing/lubrication tasks and operational/functional checks shall not be required prior to
 - 300 FH or 1 Year if system design allows the process to be performed on A/C.
 - 600 FH or 2 Years if system/equipment design features require removal of item from A/C
 - Group 3: Restoration/overhaul tasks shall not be required prior to 1500 FH or 5 Year.
 - Group 4: Item shall not have a life time. If mandatory, item life shall not be less than 3000 FH or 10 Years.
- Group 1&2 task frequencies shall be compatible with each other (i.e. multiples of each other).

TF-Req-00047601 / A / Incorrect installation :

Incorrect installation of any equipment, structural item, pipe, connector etc. should be made impossible by design. Sufficient physical provisions (size/shape of component, fastener type/size, different connector types, assymmetrically shaped keyways, geometrical aspects, mounting brackets design etc.) shall be provided in order to prevent incorrect installation or cross connection.

TF-Req-00047602 / A / In case of incorrect assembly :

Where incorrect assembly is possible, error reduction means (like permanent color coding, permanent indication of flow direction, functional design precautions (e.g: BIT warning/error indication of a system failure during installation itself or check-out tests), symbology/markings on equipment located in cockpit area and used directly by flight crew, etc.) shall be used in design.

TF-Req-00047605 / A / Avoiding manual Calibration, Adjustment, Alignment and Rigging :

The system should be designed to avoid manual Calibration, Adjustment, Alignment and Rigging after replacement of any item.

TF-Req-00047606 / A / Handling Weight :

Design, handling and hoist lug provisions of an item with respect to weight consideration shall be as follows;

a-Items over 16,8 kgs (37 pounds) should be designed for two person handling.

b-Ensure hoist lugs or other provisions considering for installation/removal/transportation via a GSE are provided for assemblies over 40,8 kilograms (90 pounds).

c- Adequate handling provisions on all units weighing more than 4,5 kilograms (10 pounds) should be provided.

d. Handling provisions should be provided for units weighing less than 4,5 kilograms (10 pounds) if they might otherwise be difficult to grasp, remove, or hold.

TF-Req-00047610 / A / Limiting maintenance equipment :

Use of tools /wrenching, test probes and other service or test equipment (if any) shall not be prevented physically by equipment's own design.

TF-Req-00047611 / A / Hand-manipulated connectors :

Electrical connectors should be hand-manipulated, self-locking, preferably requiring no tools or only common hand tools.

TF-Req-00047615 / A / WCA Labels :

Warning/caution/advisory labels shall be provided where necessary and visible when equipment/structural item is installed on air vehicle.

TF-Req-00047616 / A / Special Tools :

Special Tools should not be required to perform O-level maintenance activities.

TF-Req-00047618 / A / Servicing with CBRN clothing :

The system shall be designed to enable routine servicing by ground personnel wearing CBRN protective clothing.

TF-Req-00047622 / A / Organizational Maintenance - Cleaning :

The system should enable to complete each Organizational Level scheduled Cleaning activity within 2 hours.

TF-Req-00047623 / A / Organizational Level Maintenance - Servicing Activities :

The system should enable to complete each Organizational Level Servicing Activities within the 2 hours.

TF-Req-00047626 / A / Maintainer Anthropometric Data for Maintenance Operations :

The system should be designed to enable aircraft Maintenance Operations performed by 5th percentile to 95th percentile Turkish Male Maintainer Anthropometric Data.

TF-Req-00047631 / A / Maintainer Anthropometric Data for Ground Operations :

The system shall be designed to enable Pre-flight Inspection/Checks, Thru-flight Inspection/Checks, Post-flight Inspection/Checks, Maintainer Inspection/Checks, Servicing operations performed by 5th percentile to 95th percentile Turkish Male Maintainer Anthropometric Data.

TF-Req-00085997 / A / Integral Bonding Features :

Fuel System should contain integral bonding features for all its plumbing connections and fittings.

3.5.3 Supportability Requirements

TF-Req-00047634 / A / Identification, markings, cautions, and directions :

All identification, markings, cautions, and directions should be placed 360 degrees around the tube or duct if pipework or connector interfaces are not keyed for a specific orientation.

TF-Req-00047635 / A / Torque-limiting connections :

The system should contain torque set or torque-limiting connections for its all equipment installation points (screws).

TF-Req-00047636 / A / Pre-flight, Post-flight and Thru-flight :

The system should not require any preventative maintenance at Pre-Flight, Thru-Flight and Post-Flight inspection/checks.

TF-Req-00047638 / A / Placards and Marking :

All placards and markings on the each system for caution and warning should be both in Turkish and English languages.

TF-Req-00047639 / A / Prioritization of Language for Placards and Marking :

In the event of limited space for placards and markings, Turkish language shall be deleted or letter size can be adjusted to smaller value without causing poor visibility.

TF-Req-00047640 / A / Locations of Placards and Markings :

The system shall have placards or markings for warning, cautions, operation and maintenance points

3.5.4 Testability Requirements

TF-Req-00047641 / A / Testability-Fault Isolation (ambiguity group) [for Non-Electrical intensive] :

The System shall isolate $\geq 92\%$ of detected Faults to an ambiguity group of three or fewer Line Replaceable Units (LRU)/Line Replaceable Module (LRM).

TF-Req-00047643 / A / Testability-Fault Isolation (one LRU) [for Non-Electrical intensive] :

The System shall isolate $\geq 70\%$ of detected Faults to One Line Replaceable Unit (LRU)/Line Replaceable Module (LRM).

TF-Req-00047642 / A / Testability-Fault Detection [for Non-Electrical intensive] :

The System shall detect $\geq 95\%$ of all occurred Faults.

TF-Req-00077762 / A / Explosion Prevention System MFHBFA for Block 30-40 :

Explosion Prevention System shall exceed a minimum Mean Flight Hours Between False Alarms (MFHBFA) of 2715 Flight Hours.

TF-Req-00077767 / A / Explosion Prevention System MFHBFA for Block 10-20 :

Explosion Prevention System shall exceed a minimum Mean Flight Hours Between False Alarms (MFHBFA) of 2262 Flight Hours.

3.6 ENVIRONMENTAL REQUIREMENTS

3.6.1 Environmental Handbook Requirements

3.6.1.1 Air Separator Module Environmental Handbook Requirements

TF-Req-00047648 / A / EHDBK-LOW PRESSURE-TRANSPORT :

Equipment shall be capable of functioning after transportation at 57,2 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 1 or equivalent standard.

P1, ambient pressure.

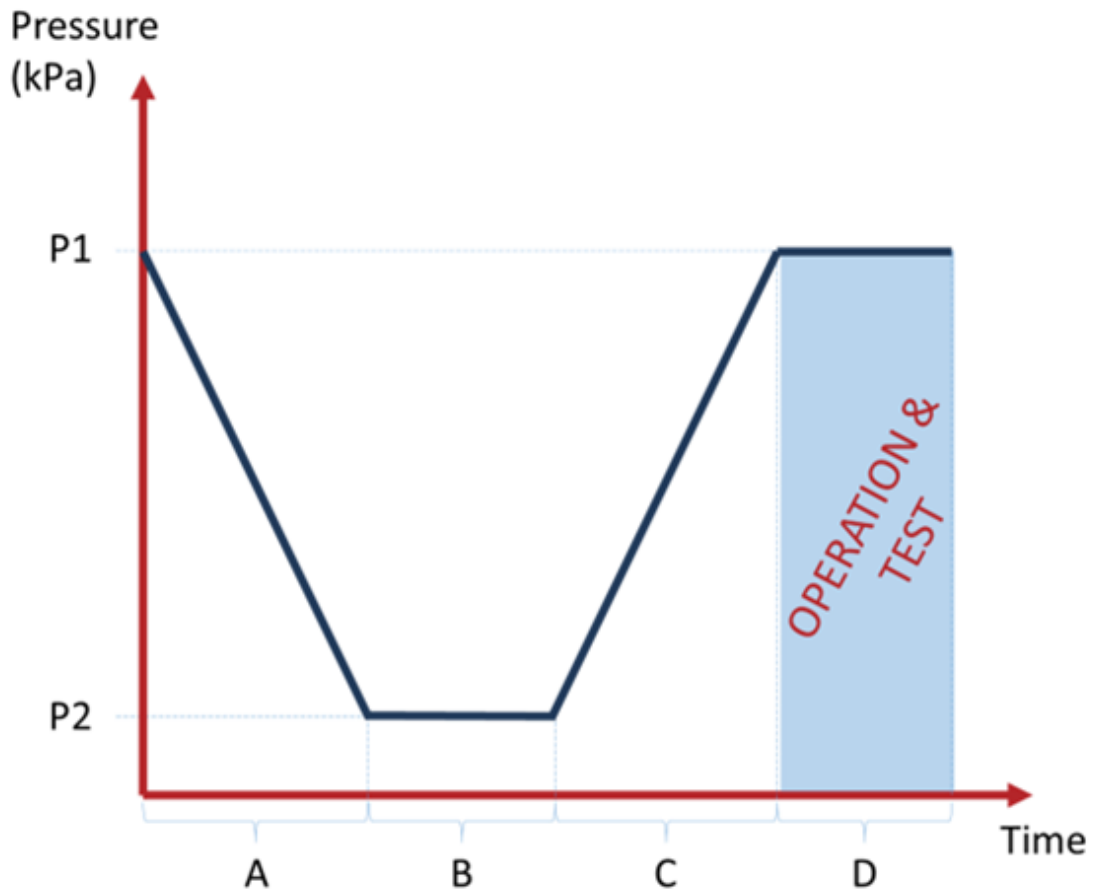
P2, lowest pressure of storage, that defined in related requirement.

A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, pressure increasing time, not greater than 0,125 kPa/sec.

D, turn-on and operational check time, required time for fully verify equipment functionality.



TF-Req-00047647 / A / EHDBK-LOW PRESSURE-OPERATE :

Equipment shall be capable of functioning at 7,9 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 2 or equivalent standard.

P1, ambient pressure.

P2, lowest pressure of operation, that defined in related requirement.

A, turn-on and pressure decreasing time, not greater than 0,125 kPa/sec.

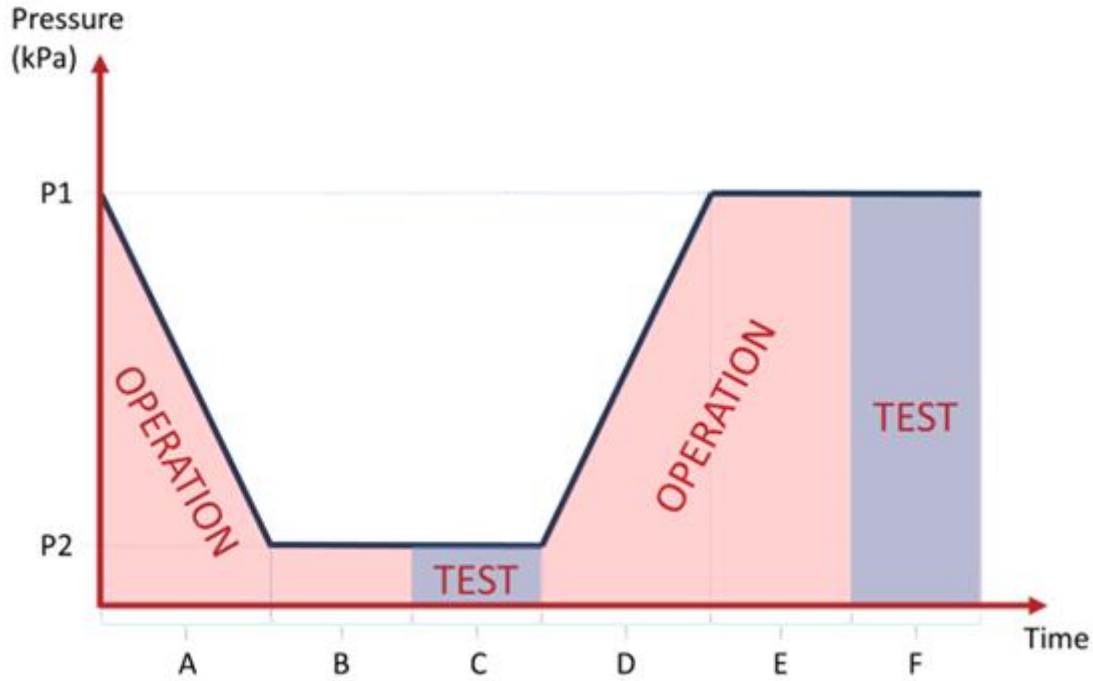
B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, pressure increasing time, not greater than 0,125 kPa/sec.

E, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

F, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.



TF-Req-00047680 / A / EHDBK-LOW PRESSURE-RAPID-DECOMP-1 :

Equipment shall be capable of withstanding to the rapid decompression between 75,2 kPa to 41,9 kPa in not more than 15 seconds according to MIL-STD-810G W/Change 1 500.6 Procedure 3 or equivalent standard.

P1, ambient pressure.

P2, high pressure level of decompression, that defined in related requirement.

P3, low pressure level of decompression, that defined in related requirement.

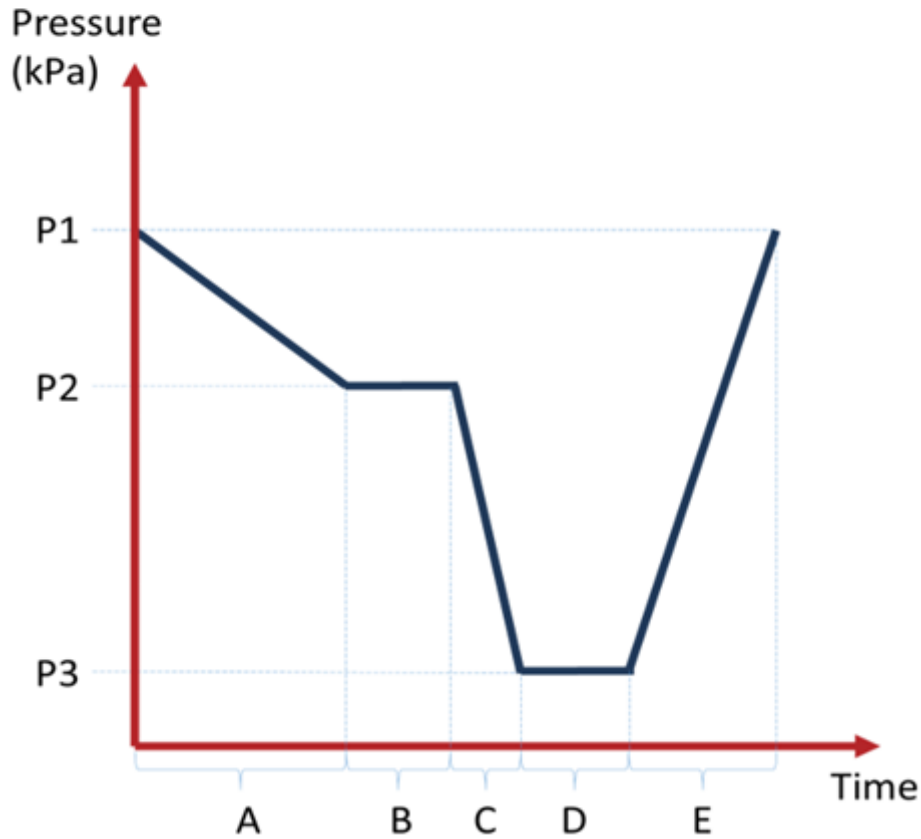
A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 10 min. (Unless otherwise specified).

C, decompression time, for rapid decompression 15 sec., for explosive decompression 0,1 sec.

D, pressure stabilization time, at least 10 min. (Unless otherwise specified).

E, pressure increasing time, not greater than 0,125 kPa/sec.



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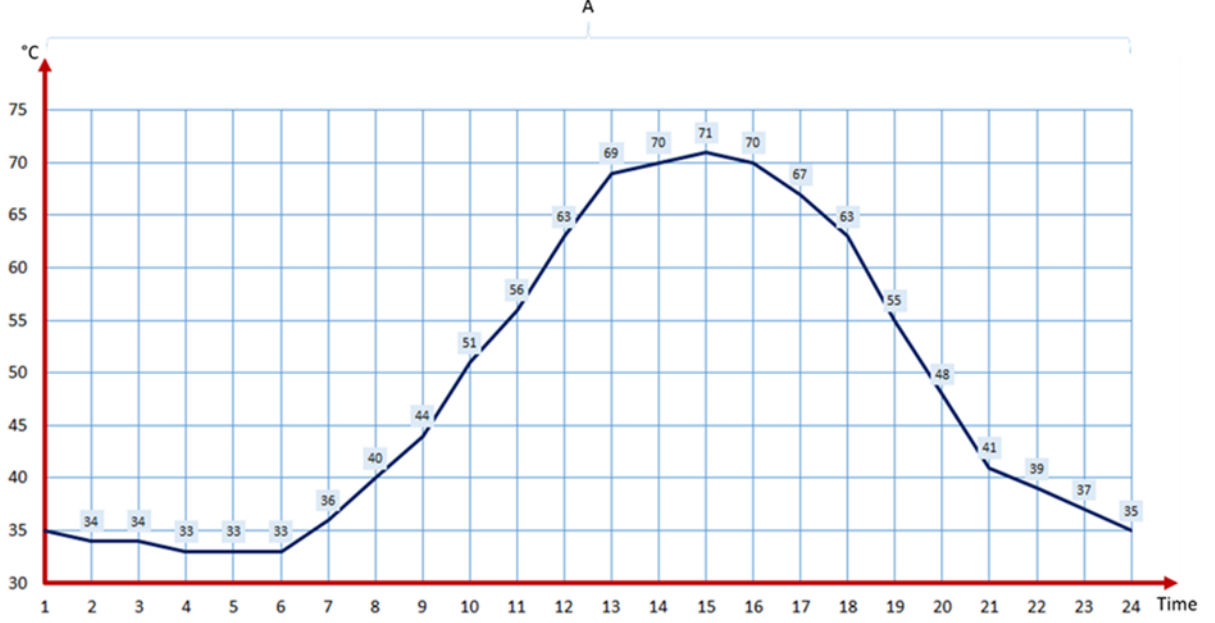
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TF-Req-00047652 / A / EHDBK-HIGH TEMP-STORAGE :

Equipment shall be capable of functioning after exposure seven cycles of A1 climatic category storage condition according to MIL-STD-810G W/Change 1 501.6 Procedure 1 or equivalent standard.

A, cycle number, 7 cycles. (unless otherwise specified).

After 7 cycles, operational check should be done.



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TF-Req-00077799 / A / EHDBK-HIGH TEMP-INT OPERATE 9 :

Equipment shall be continue to function intermittently at 105°C temperature for 15 minutes duration.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, highest operational temperature, that defined for related zone.

T3, intermittent operation temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, turn-on and operational temperature stabilization time, minimum 2 hours.

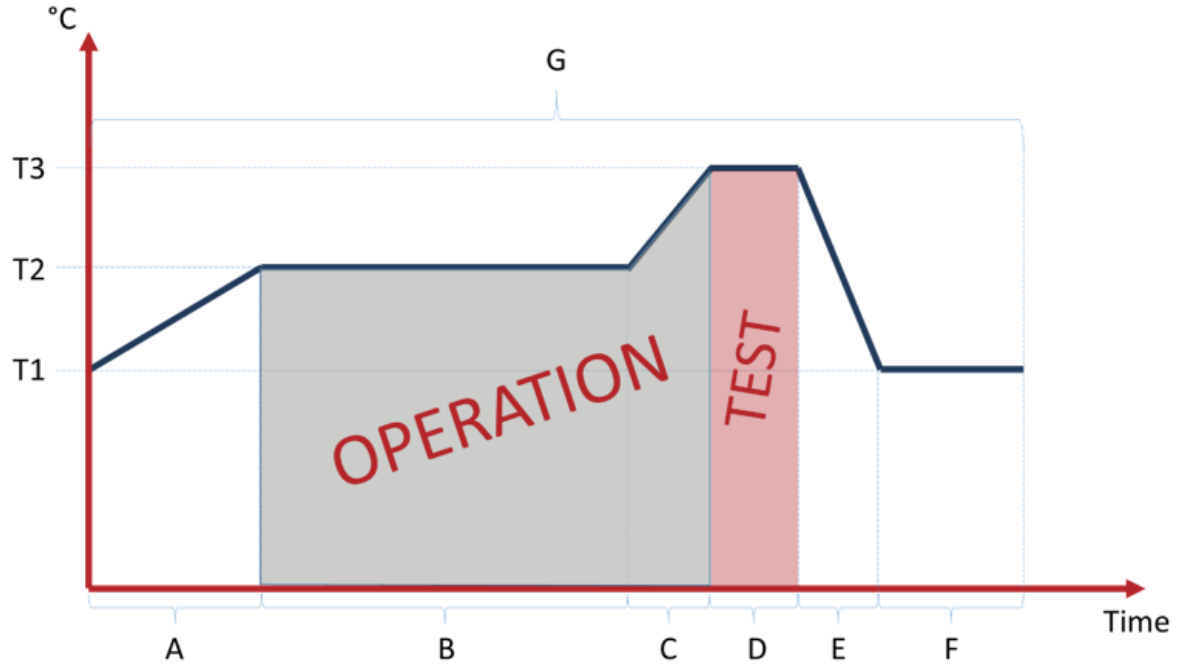
C, temperature increasing time, quickly as possible.

D, intermittent operational check time, that defined in related requirement.

E, turn-off and temperature decreasing time, $(T3-T1)/E$ is not greater than $3^\circ\text{C}/\text{min}$

F, cool down time, minimum 2 hours. (unless otherwise specified)

G, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077796 / A / EHDBK-HIGH TEMP-CONT OPERATE 2 :

Equipment shall be capable of functioning continuously and withstanding at 85°C temperature according to MIL-STD-810G W/Change 1 501.6 Procedure 2 or equivalent standard.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, highest operational temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

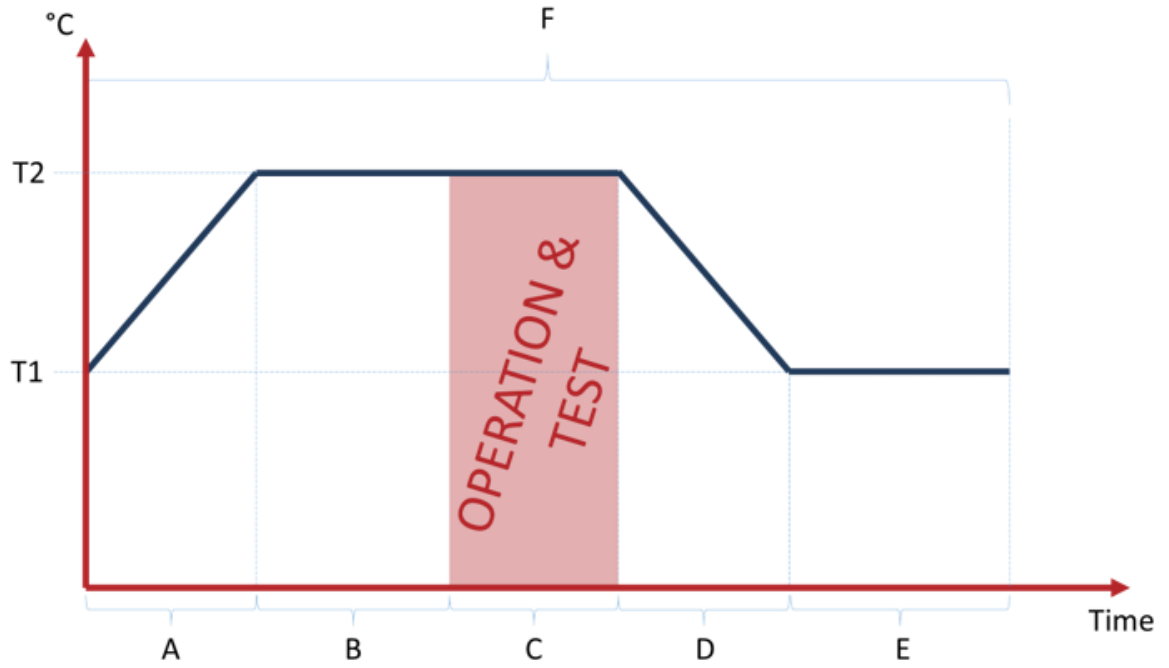
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, temperature decreasing time, same value with A. (Unless otherwise specified)

E, cool down time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00047657 / A / EHDBK-LOW TEMP-STORAGE :

Equipment shall be capable of functioning after exposure -54°C temperature storage/transport condition according to MIL-STD-810G W/Change 1 502.6 Procedure 1 or equivalent standard.

T1, test starting temperature, 23±2°C unless otherwise specified.

T2, lowest storage temperature, that defined in related requirement.

A, temperature decreasing time, (T1-T2)/A is not greater than 3°C/min.

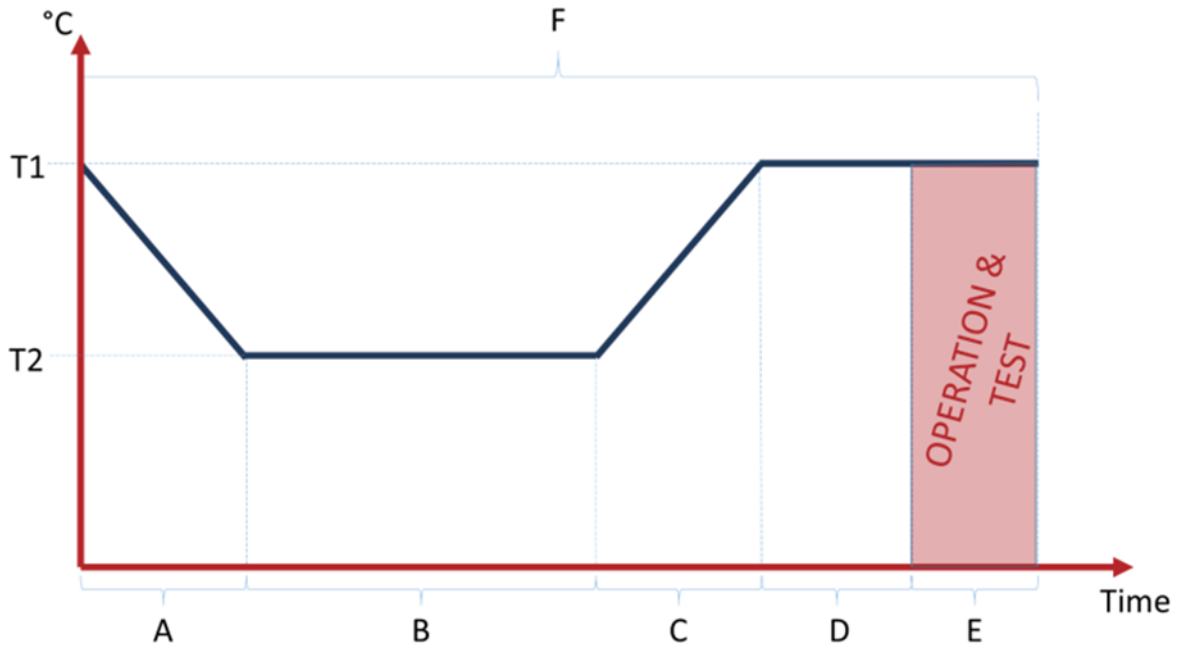
B, storage temperature stabilization time, minimum 24 hours.

C, temperature increasing time, same value with A. (unless otherwise specified)

D, heat up time, minimum 2 hours.

E, turn-on and operational check time, required time for fully verify equipment functionality.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00047659 / A / EHDBK-LOW TEMP-OPERATE 2 :

Equipment shall be capable of functioning continuously at -46°C temperature according to MIL-STD-810G W/Change 1 502.6 Procedure 2 or equivalent standard.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, lowest operational temperature, that defined in related requirement.

A, temperature decreasing time, $(T1-T2)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

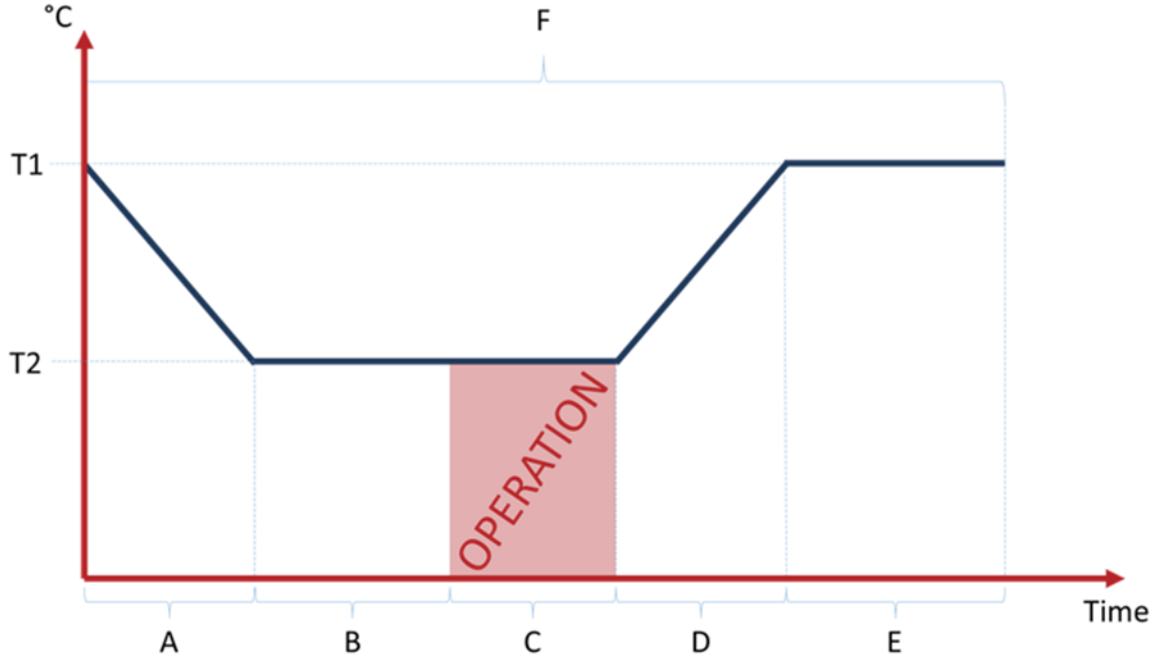
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and temperature stabilization and operational check time, minimum 2 hours. (Unless otherwise specified)

D, temperature increasing time, same value with A. (Unless otherwise specified)

E, heat up time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077797 / A / EHDBK-TEMP SHOCK 8 :

Equipment shall be capable of functioning after temperature shock between -46°C to 85°C according to MIL-STD-810G W/Change 1 503.6 Procedure 1B or equivalent standard.

T1, high temperature extreme, that defined in related requirement.

T2, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T3, low temperature extreme, that defined in related requirement

A, temperature decreasing time, $(T2-T3)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, low temperature extreme stabilization time, minimum 2 hours.

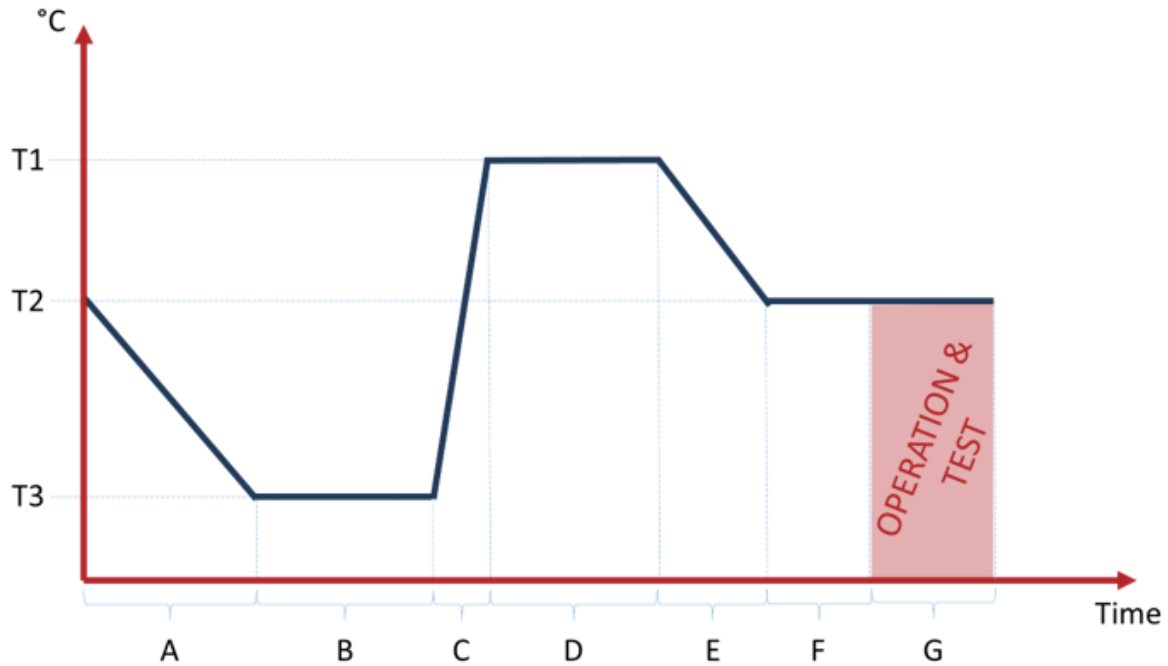
C, transfer time, 1-minute max.

D, high temperature extreme stabilization time, minimum 2 hours.

E, temperature increasing time, $(T1-T2)/E$ is not greater than $3^\circ\text{C}/\text{min}$.

F, temperature stabilization time, minimum 2 hours

G, turn-on and operational check time, required time for fully verify equipment functionality.



TF-Req-00047684 / A / EHDBK-CONTAMINATION 4 :

Equipment shall be made of materials that are resistant to cleaning fluids according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

TF-Req-00047683 / A / EHDBK-CONTAMINATION 2 :

Equipment shall be made of materials that are resistant to hydraulic oils according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

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TF-Req-00047663 / A / EHDBK-RAIN-DRIP :

Equipment shall be capable of functioning after exposure dripping water condition that defined in related standard according to MIL-STD-810G W/Change 1 506.6 Procedure 3 or equivalent standard.

TF-Req-00047665 / A / EHDBK-HUMIDITY :

Equipment shall be capable of functioning and withstanding against the ten cycles of aggravated temperature-humidity cycle according to MIL-STD-810G W/Change 1 507.6 Procedure 2 or equivalent standard.

TF-Req-00047666 / A / EHDBK-FUNGUS :

Equipment shall be made of fungus-inert materials that are resistant to fungal growth according to MIL-STD-810G W/Change 1 508.7 or equivalent standard.

TF-Req-00047669 / A / EHDBK-EXP ATMOSPHERE-CAT E :

Equipment that installed in "Flammable Leakage Zone" and designed as unsealed shall be qualified against MIL-STD-810G w/change 1 511.6 Procedure 1 or DO-160G Section 9 CAT E.

Ek-1 Teknik Şartname

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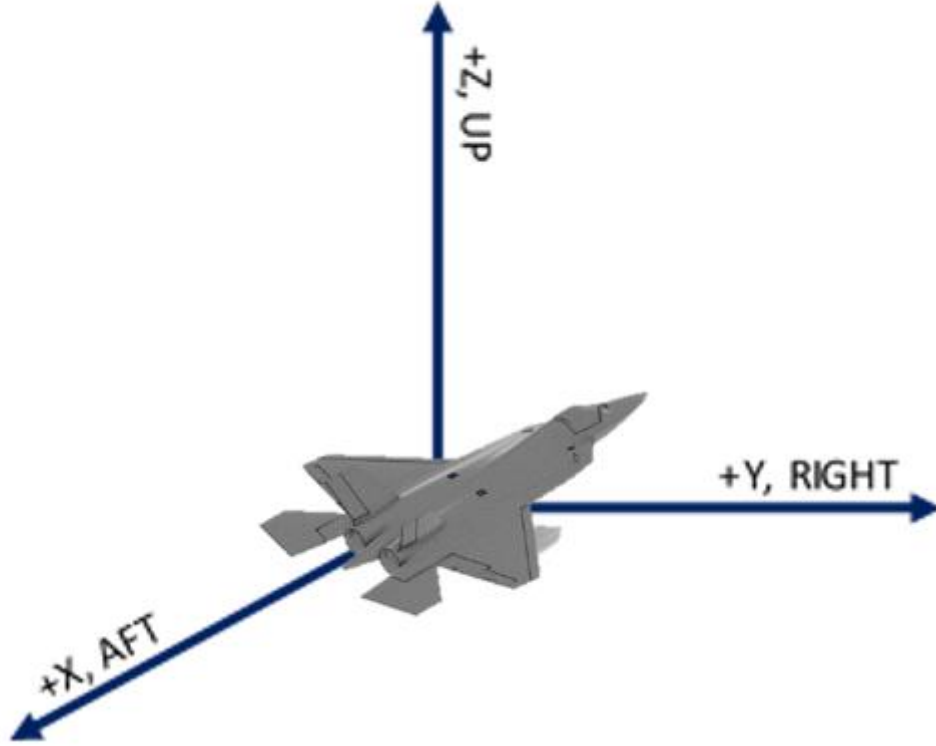
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TF-Req-00077794 / A / EHDBK-ACCELERATION-OPERATIONAL 4 :

Equipment shall be capable of functioning during the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 2 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
3,0	2,5	11,5	5,1	5,3	5,3



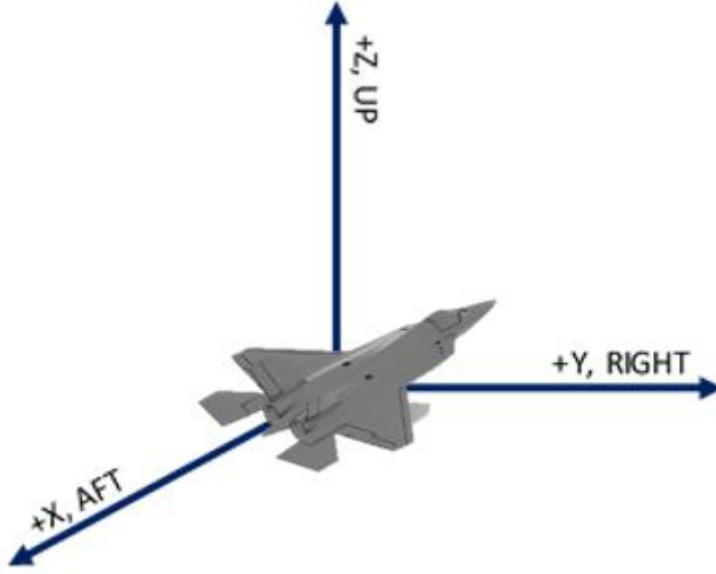
Ek-1 Teknik Şartname

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TF-Req-00077798 / A / EHDBK-ACCELERATION-STRUCTURAL 4 :

Equipment shall be capable of functioning and structurally withstand after the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 1 or equivalent standard.

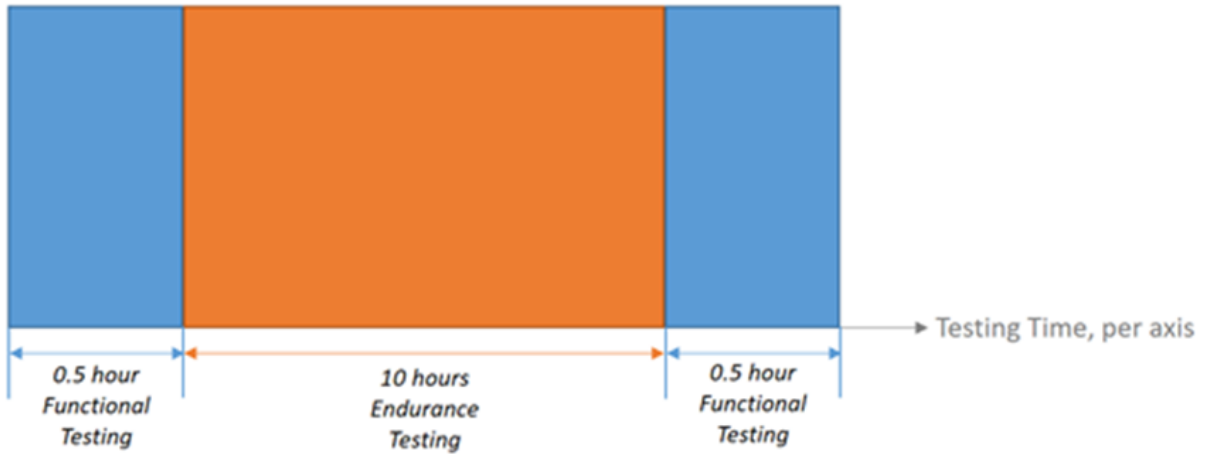
Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
4,4	3,8	17,2	7,6	8,0	8,0



TF-Req-00049974 / A / EHDBK-VIBRATION-OPERATION CAT5 :

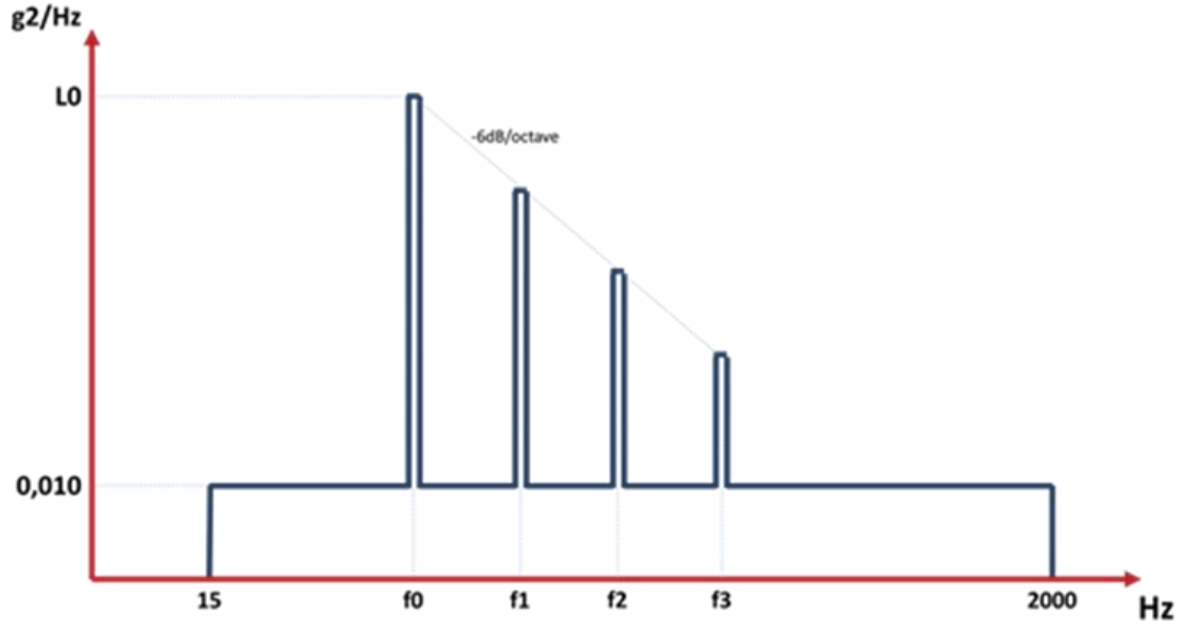
Equipment shall be capable of functioning during functional vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.

	Functional	
	f (Hz)	PSD (g ² /Hz)
Vibration Testing Profile	15	0.04
	60	0.04
	80	0.129
	995	0.129
	2000	0.051
Overall GRMS (g)	14.18	



TF-Req-00047672 / A / EHDBK-VIBRATION-AIRWAY TRANSPORT :

Equipment shall be capable of functioning after exposure to the airway transportation at least 1 Hour/axis according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



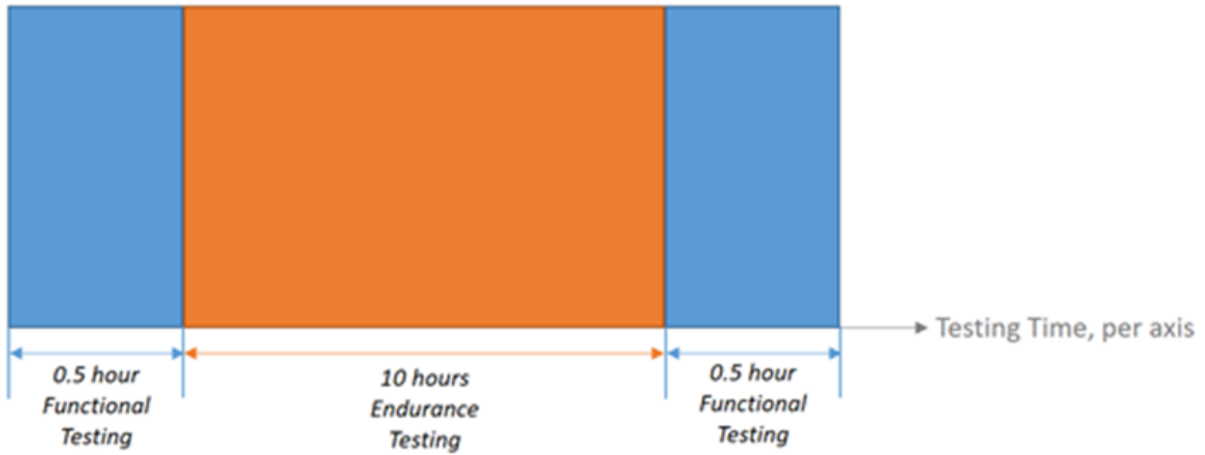
L0 (g2/Hz)	f0 (Hz)	f1(Hz)	f2(Hz)	f3(Hz)	DURATION
0,3	115*	230*	345*	460*	1 Hour per Each Axis

*Given frequencies are the middle point. For frequency increasing and decreasing point please apply ± 5 Hz.

TF-Req-00049979 / A / EHDBK-VIBRATION-ENDURANCE CAT5 :

Equipment shall be capable of functioning after exposure to endurance vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.

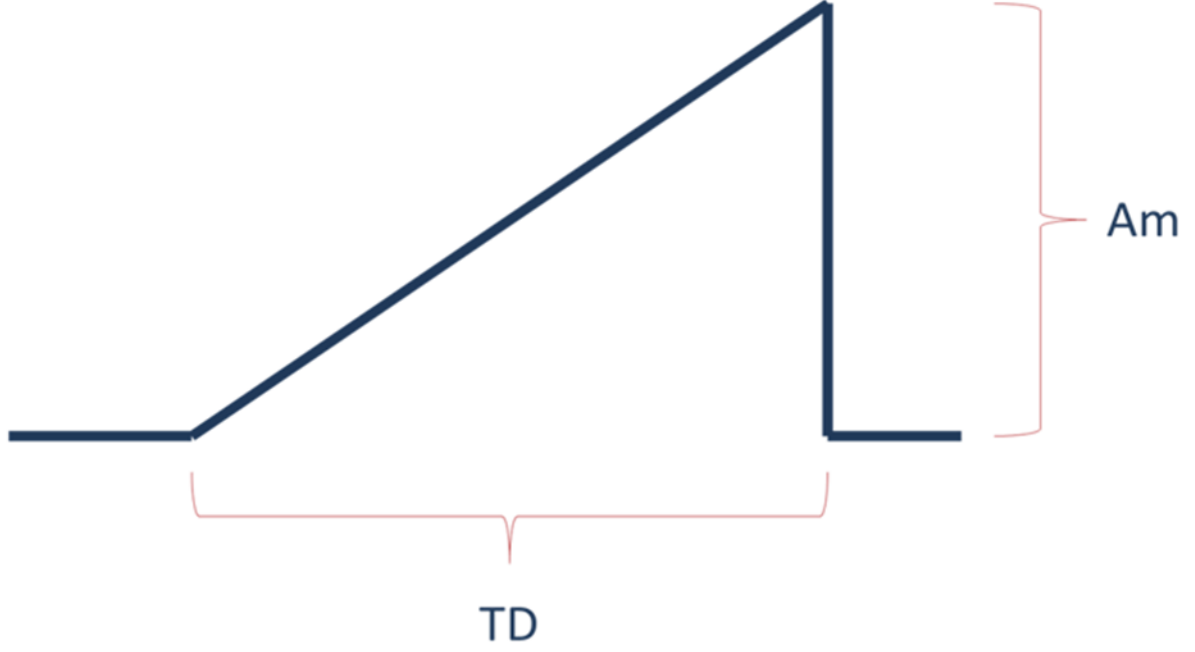
	Endurance	
	f (Hz)	PSD (g ² /Hz)
Vibration Testing Profile	15	0.072
	60	0.072
	80	0.287
	995	0.287
	2000	0.108
Overall GRMS (g)	23.08	



TF-Req-00047673 / A / EHDBK-SHOCK-OPERATION :

Equipment shall be capable of functioning during functional shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 1 or equivalent standard.

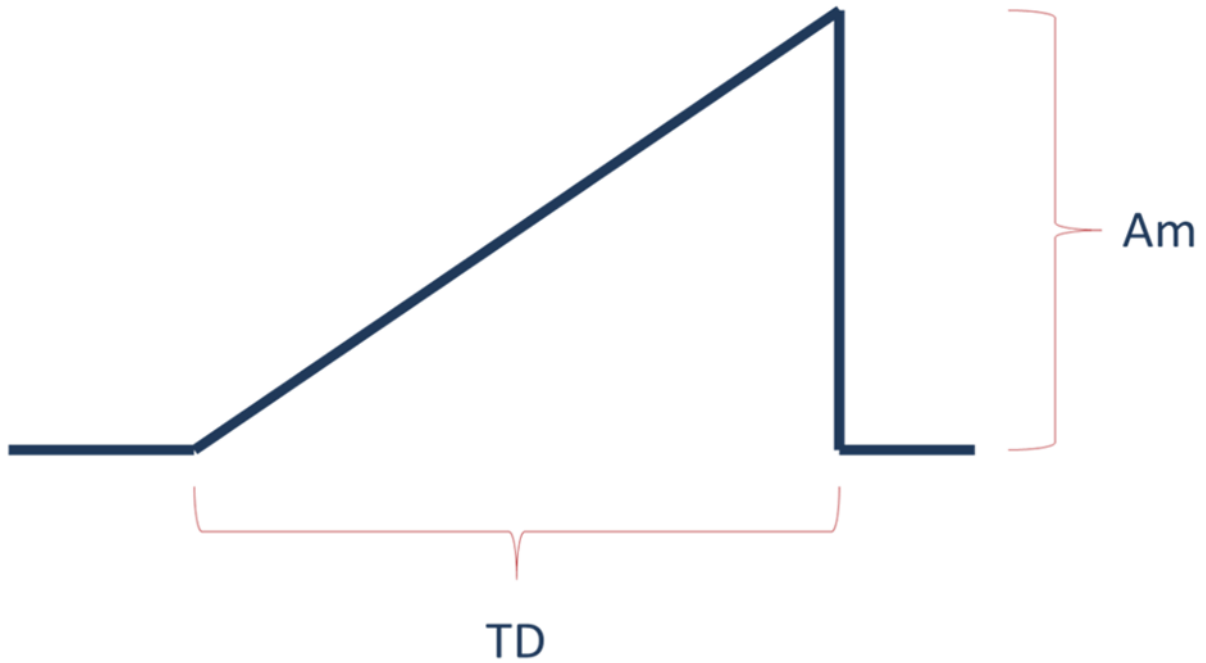
Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
20	11	3 shocks per axis



TF-Req-00047674 / A / EHDBK-SHOCK-TRANSPORT :

Equipment shall be capable of functioning after exposure to transportation shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 2 or equivalent standard.

Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
5,1	11	42 shocks per axis
6,4	11	21 shocks per axis
7,6	11	3 shocks per axis



TF-Req-00047675 / A / EHDBK-SHOCK-HANDLING :

Equipment shall be capable of functioning after exposure to bench handling shock according to MIL-STD-810G W/Change 1 516.7 Procedure 6 or equivalent standard.

TF-Req-00047696 / A / EHDBK-FLAMMABILITY-CABLES :

Sub-Component (fittings, wiring, tubing, connectors, seal etc.) that pass through different zones shall be made of flame proof material that are resist to propagation of flame according to DO-160G Section 26 Cat C or equivalent standard.

TF-Req-00047679 / A / EHDBK-SOF :

The following Environmental Effects Requirements shall be verified for all equipment that installed in/on Air Vehicle before first flight.

- Low Pressure Requirements
 - o Operational
 - o Decompression
 - o Overpressure
- High Temperature Requirements
 - o Storage
 - o Operational
- Low Temperature Requirements
 - o Storage
 - o Operational
- Temperature Shock Requirements
- Explosive Atmosphere Requirements
- Acceleration Requirements
 - o Operational
 - o Crash
- Vibration Requirements
 - o Functional
- Shock Requirements
 - o Operational
 - o Crash
- Fire, Flammability Requirements
- Gunfire Vibration (If Gunfire performed)
- Icing (only for Safety/Flight critical equipment)
- Rain (only for Safety/Flight critical equipment)
- E3 Requirements
 - o Intra_System Electromagnetic Compatibility
 - o Qualification Requirements
 - o Operation of EUT
 - o DC Bonding Levels
 - o Maximum Internal EME Levels
 - o Bonding Provisions Upon Pipes
 - o Protection of Bonding Areas
 - o Bonding in Fuel Tanks

3.6.1.2 Non-Return With Flow Restriction Valve (Aft, F1, F2 And Fft) Environmental Handbook Requirements

TF-Req-00077876 / A / EHDBK-LOW PRESSURE-TRANSPORT :

Equipment shall be capable of functioning after transportation at 57,2 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 1 or equivalent standard.

P1, ambient pressure.

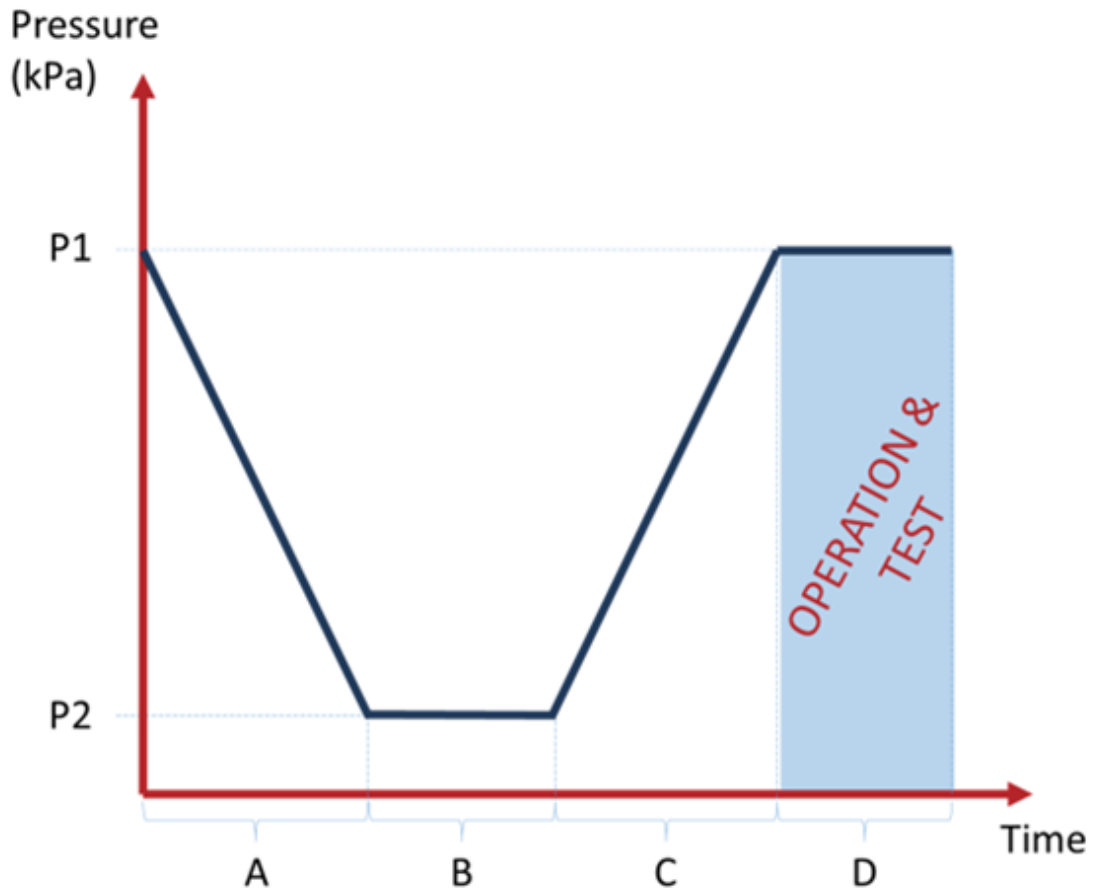
P2, lowest pressure of storage, that defined in related requirement.

A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, pressure increasing time, not greater than 0,125 kPa/sec.

D, turn-on and operational check time, required time for fully verify equipment functionality.



TF-Req-00077874 / A / EHDBK-LOW PRESSURE-OPERATE :

Equipment shall be capable of functioning at 7,9 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 2 or equivalent standard.

P1, ambient pressure.

P2, lowest pressure of operation, that defined in related requirement.

A, turn-on and pressure decreasing time, not greater than 0,125 kPa/sec.

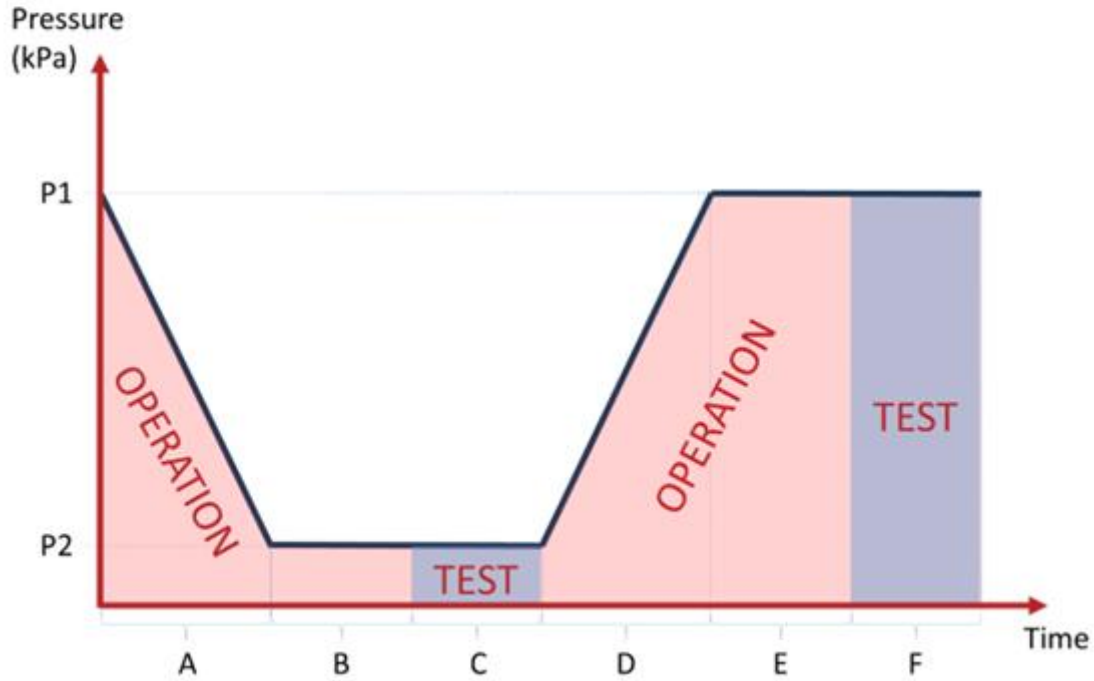
B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, pressure increasing time, not greater than 0,125 kPa/sec.

E, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

F, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.



TF-Req-00077877 / A / EHDBK-LOW PRESSURE-RAPID-DECOMP-1 :

Equipment shall be capable of withstanding to the rapid decompression between 75,2 kPa to 41,9 kPa in not more than 15 seconds according to MIL-STD-810G W/Change 1 500.6 Procedure 3 or equivalent standard.

P1, ambient pressure.

P2, high pressure level of decompression, that defined in related requirement.

P3, low pressure level of decompression, that defined in related requirement.

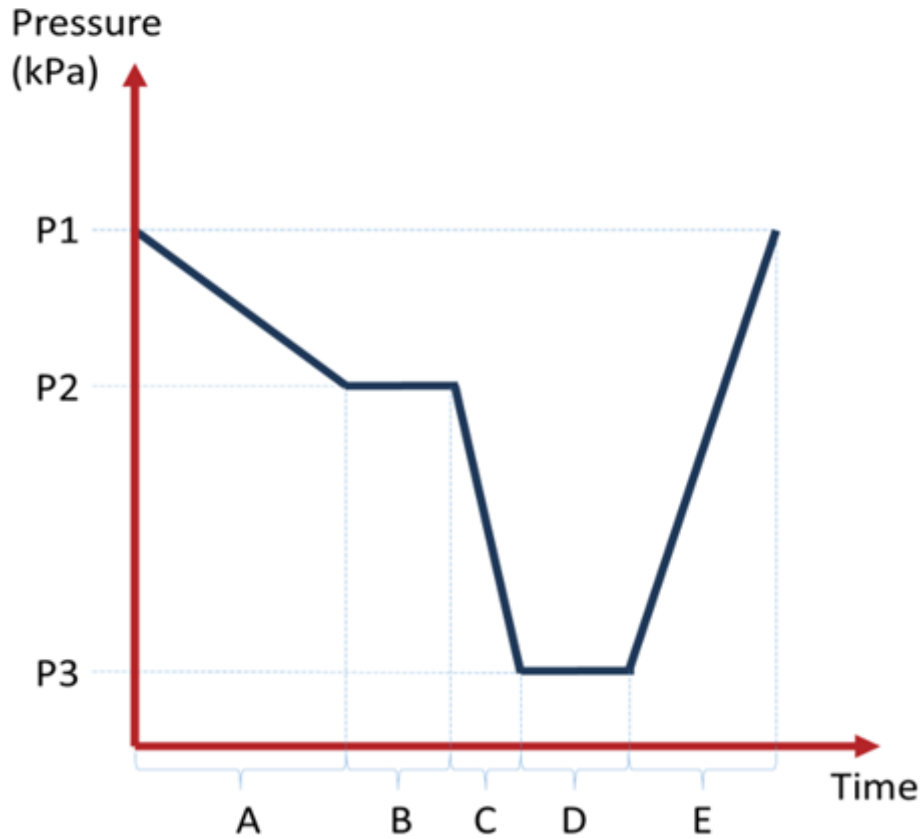
A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 10 min. (Unless otherwise specified).

C, decompression time, for rapid decompression 15 sec., for explosive decompression 0,1 sec.

D, pressure stabilization time, at least 10 min. (Unless otherwise specified).

E, pressure increasing time, not greater than 0,125 kPa/sec.



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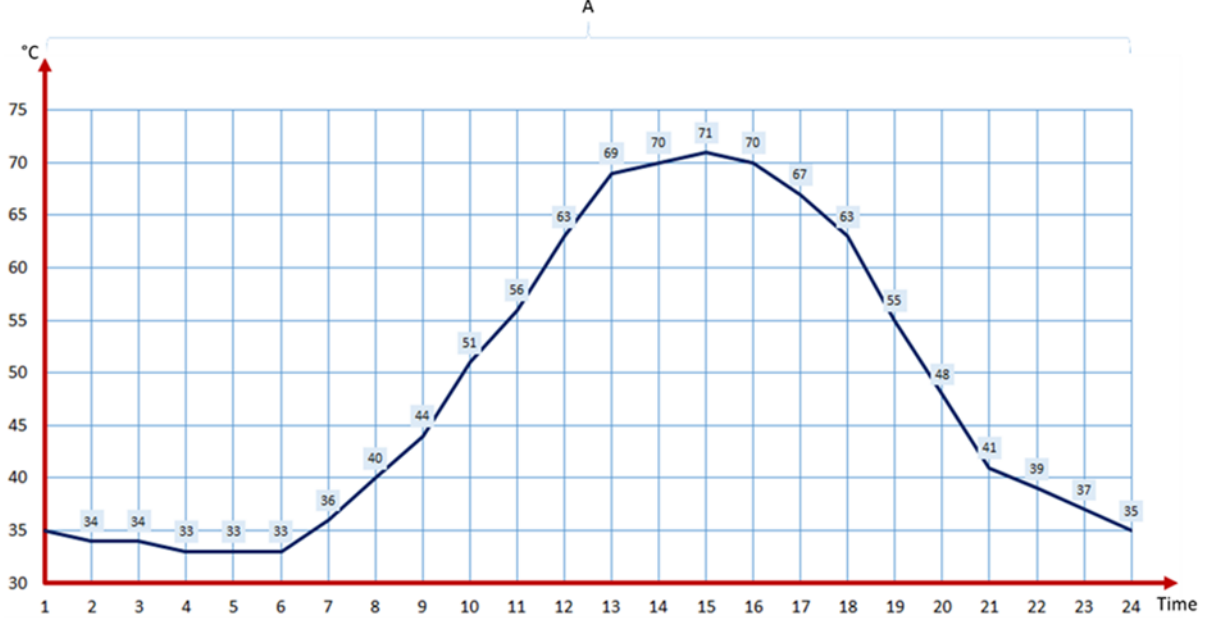
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TF-Req-00077871 / A / EHDBK-HIGH TEMP-STORAGE :

Equipment shall be capable of functioning after exposure seven cycles of A1 climatic category storage condition according to MIL-STD-810G W/Change 1 501.6 Procedure 1 or equivalent standard.

A, cycle number, 7 cycles. (unless otherwise specified).

After 7 cycles, operational check should be done.



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TF-Req-00047649 / A / EHDBK-HIGH TEMP-CONT OPERATE 1 :

Equipment shall be capable of functioning continuously and withstanding at 70°C temperature according to MIL-STD-810G W/Change 1 501.6 Procedure 2 or equivalent standard.

T1, test starting temperature, 23±2°C unless otherwise specified.

T2, highest operational temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than 3°C/min.

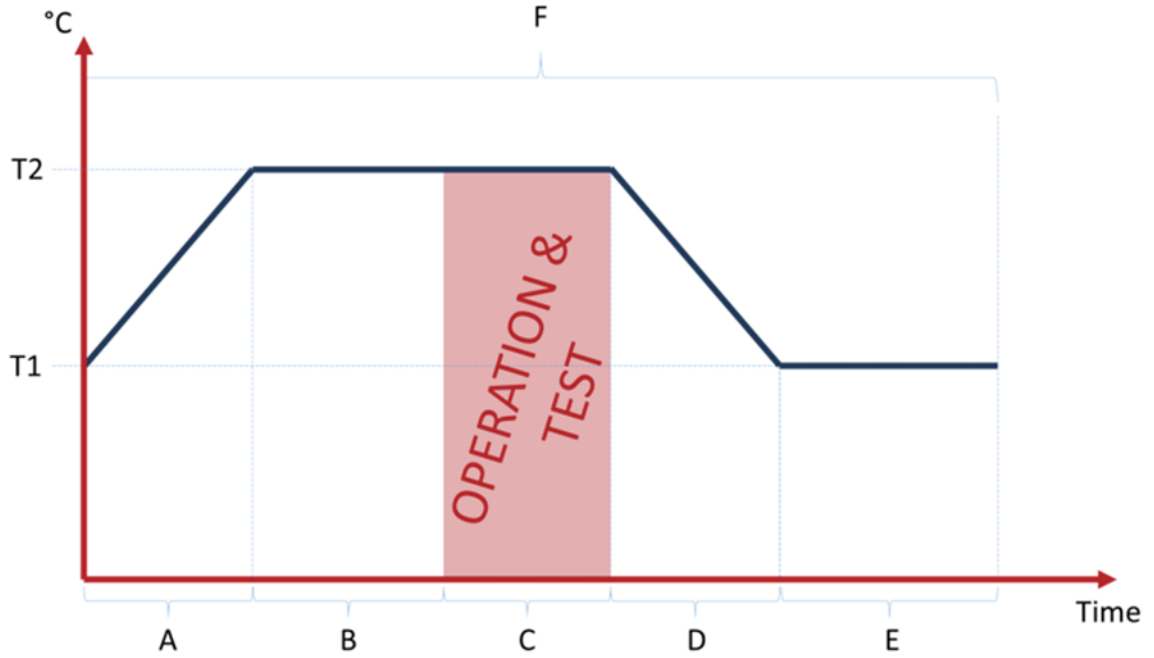
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, temperature decreasing time, same value with A. (Unless otherwise specified)

E, cool down time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00047681 / A / EHDBK-HIGH TEMP-INT OPERATE 7 :

Equipment shall be continue to function intermittently at 80°C temperature for 15 minutes duration.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, highest operational temperature, that defined for related zone.

T3, intermittent operation temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, turn-on and operational temperature stabilization time, minimum 2 hours.

C, temperature increasing time, quickly as possible.

D, intermittent operational check time, that defined in related requirement.

E, turn-off and temperature decreasing time, $(T3-T1)/E$ is not greater than $3^\circ\text{C}/\text{min}$

F, cool down time, minimum 2 hours. (unless otherwise specified)

G, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077872 / A / EHDBK-LOW TEMP-STORAGE :

Equipment shall be capable of functioning after exposure -54°C temperature storage/transport condition according to MIL-STD-810G W/Change 1 502.6 Procedure 1 or equivalent standard.

T1, test starting temperature, 23±2°C unless otherwise specified.

T2, lowest storage temperature, that defined in related requirement.

A, temperature decreasing time, (T1-T2)/A is not greater than 3°C/min.

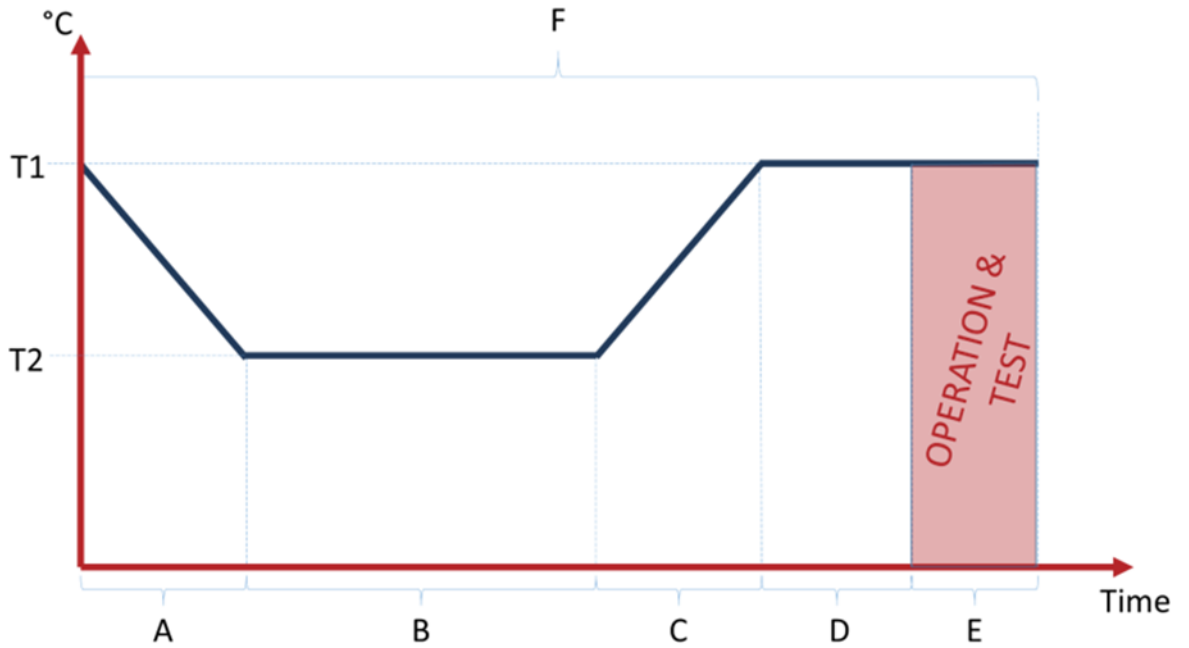
B, storage temperature stabilization time, minimum 24 hours.

C, temperature increasing time, same value with A. (unless otherwise specified)

D, heat up time, minimum 2 hours.

E, turn-on and operational check time, required time for fully verify equipment functionality.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077878 / A / EHDBK-LOW TEMP-OPERATE 2 :

Equipment shall be capable of functioning continuously at -46°C temperature according to MIL-STD-810G W/Change 1 502.6 Procedure 2 or equivalent standard.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, lowest operational temperature, that defined in related requirement.

A, temperature decreasing time, $(T1-T2)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

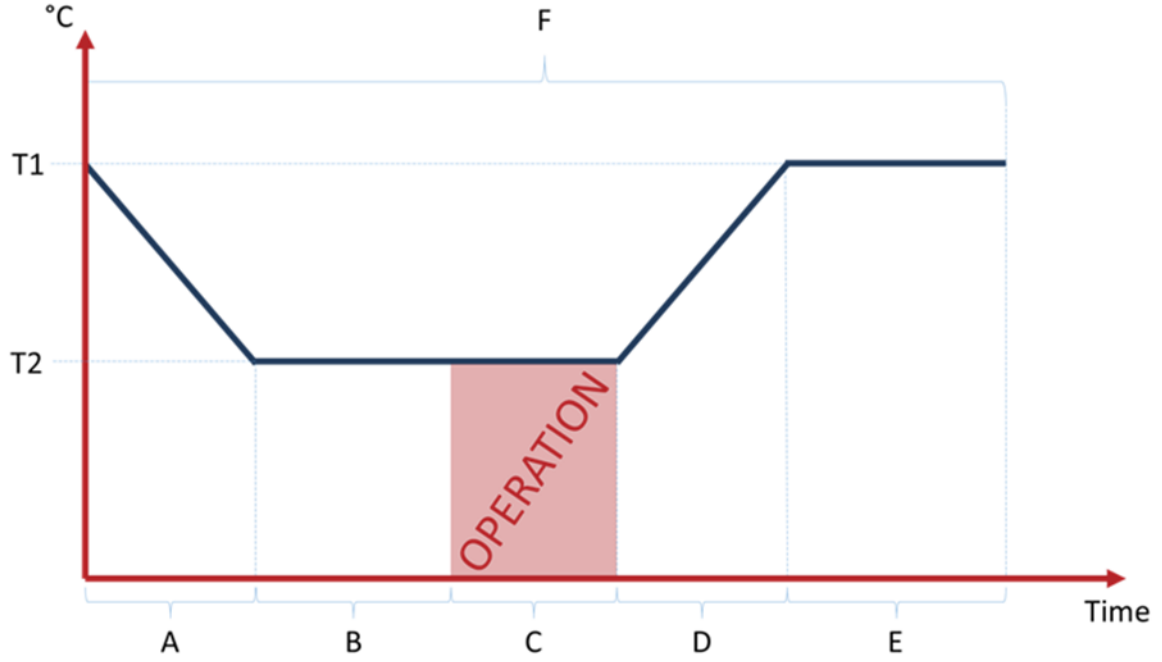
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and temperature stabilization and operational check time, minimum 2 hours. (Unless otherwise specified)

D, temperature increasing time, same value with A. (Unless otherwise specified)

E, heat up time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00047682 / A / EHDBK-TEMP SHOCK 4 :

Equipment shall be capable of functioning after temperature shock between -46°C to 70°C vice versa according to MIL-STD-810G W/Change 1 503.6 Procedure 1B or equivalent standard.

T1, high temperature extreme, that defined in related requirement.

T2, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T3, low temperature extreme, that defined in related requirement

A, temperature decreasing time, $(T2-T3)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, low temperature extreme stabilization time, minimum 2 hours.

C, transfer time, 1-minute max.

D, high temperature extreme stabilization time, minimum 2 hours.

E, transfer time, 1-minute max.

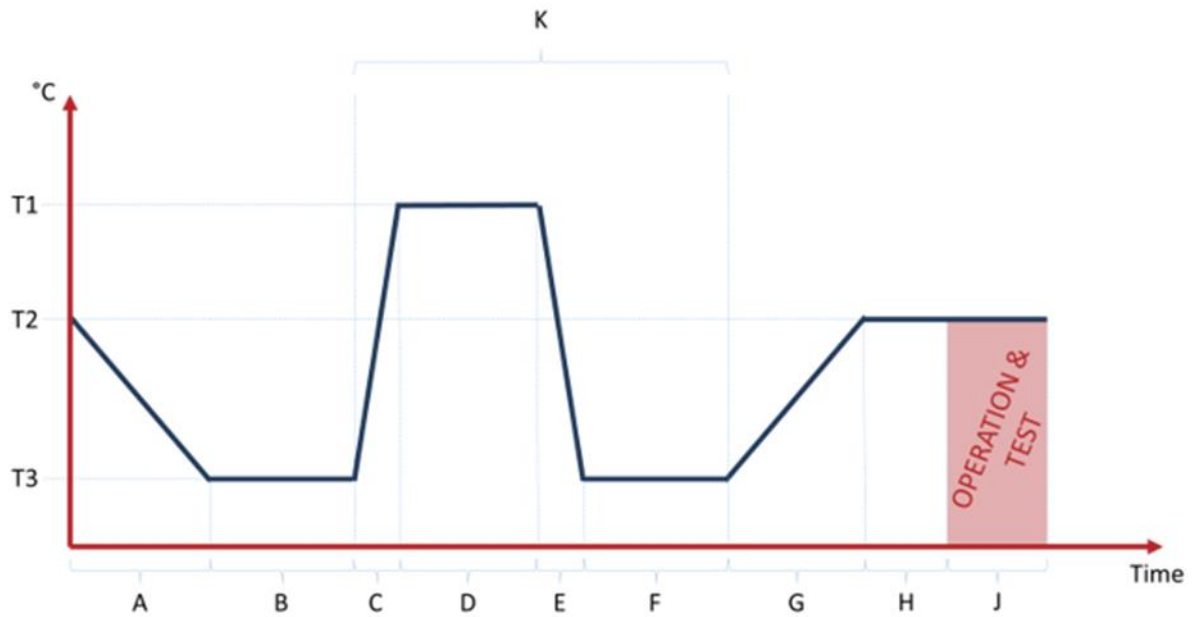
F, low temperature extreme stabilization time, minimum 2 hours.

G, temperature increasing time, same value with A. (unless otherwise specified)

H, temperature stabilization time, minimum 2 hours

J, turn-on and operational check time, required time for fully verify equipment functionality.

K, cycle number, that defined in related requirement.



TF-Req-00077884 / A / EHDBK-CONTAMINATION 4 :

Equipment shall be made of materials that are resistant to cleaning fluids according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

TF-Req-00047661 / A / EHDBK-CONTAMINATION 1 :

Equipment shall be made of materials that are resistant to fuel according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

TF-Req-00077879 / A / EHDBK-RAIN-DRIP :

Equipment shall be capable of functioning after exposure dripping water condition that defined in related standard according to MIL-STD-810G W/Change 1 506.6 Procedure 3 or equivalent standard.

TF-Req-00077873 / A / EHDBK-HUMIDITY :

Equipment shall be capable of functioning and withstanding against the ten cycles of aggravated temperature-humidity cycle according to MIL-STD-810G W/Change 1 507.6 Procedure 2 or equivalent standard.

TF-Req-00077875 / A / EHDBK-FUNGUS :

Equipment shall be made of fungus-inert materials that are resistant to fungal growth according to MIL-STD-810G W/Change 1 508.7 or equivalent standard.

TF-Req-00049957 / A / EHDBK-EXP ATMOSPHERE-CAT A :

Equipment that installed in "Flammable Zone" shall be qualified against MIL-STD-810 w/Change 1 511.6 Procedure 2 or DO-160G Section 9 CAT A .

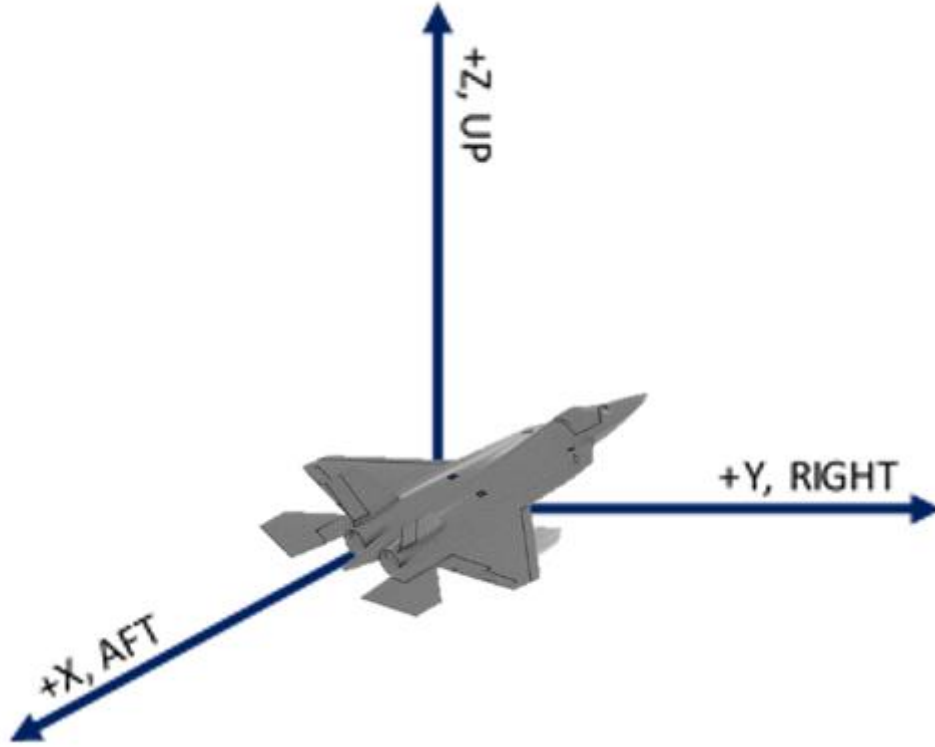
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TF-Req-00077853 / A / EHDBK-ACCELERATION-OPERATIONAL 5 :

Equipment shall be capable of functioning during the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 2 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
3,3	3,1	12,9	8,7	11,3	11,3



Ek-1 Teknik Şartname

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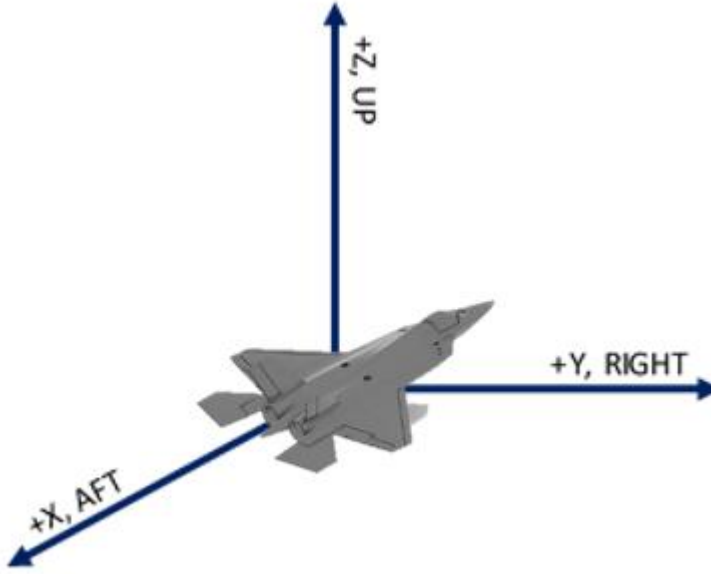
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TF-Req-00077852 / A / EHDBK-ACCELERATION-STRUCTURAL 5 :

Equipment shall be capable of functioning and structurally withstand after the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 1 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
5,0	4,6	19,4	13,0	16,9	16,9

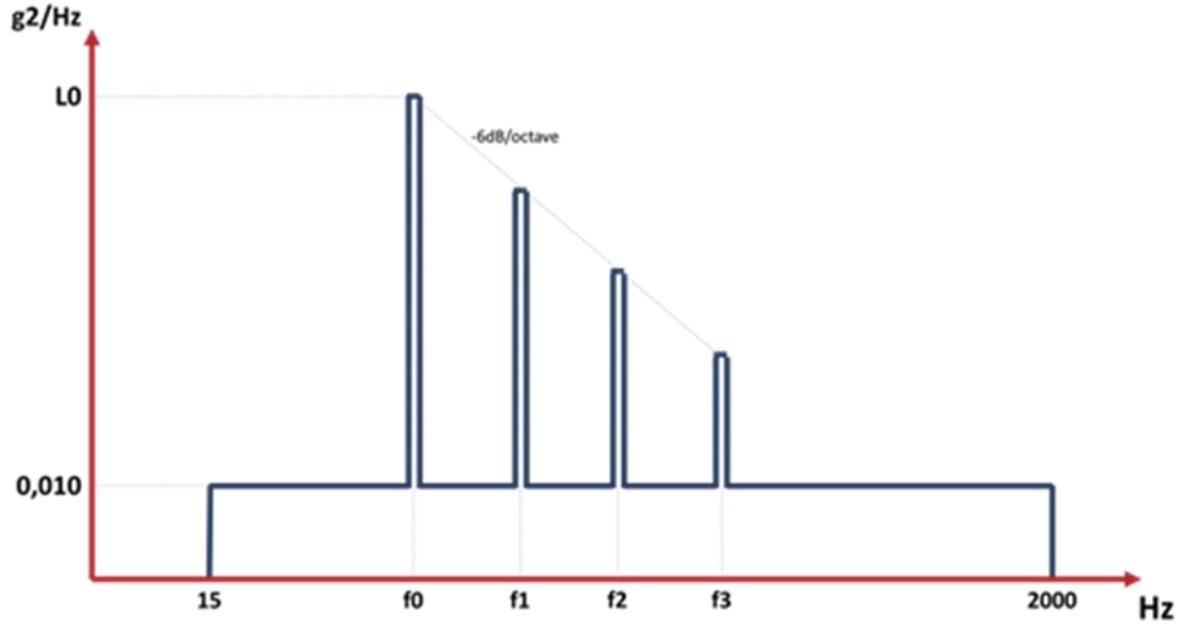


Ek-1 Teknik Şartname

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TF-Req-00077880 / A / EHDBK-VIBRATION-AIRWAY TRANSPORT :

Equipment shall be capable of functioning after exposure to the airway transportation at least 1 Hour/axis according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.

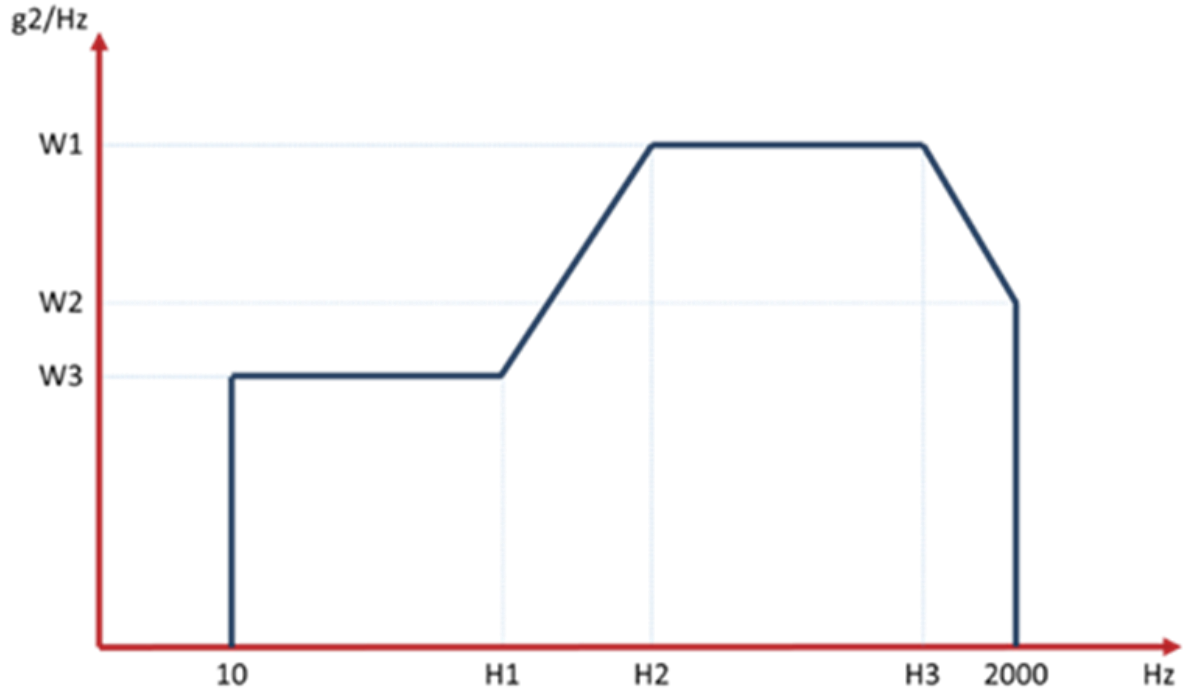


L0 (g2/Hz)	f0 (Hz)	f1(Hz)	f2(Hz)	f3(Hz)	DURATION
0,3	115*	230*	345*	460*	1 Hour per Each Axis

*Given frequencies are the middle point. For frequency increasing and decreasing point please apply ± 5 Hz.

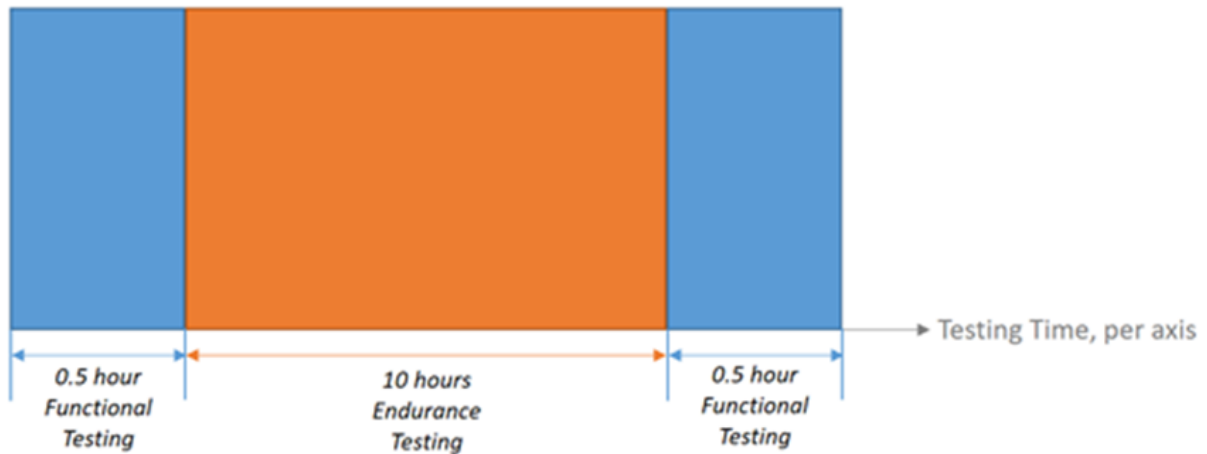
TF-Req-00047694 / A / EHDBK-VIBRATION-ENDURANCE CAT6 :

Equipment shall be capable of functioning after exposure to endurance vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



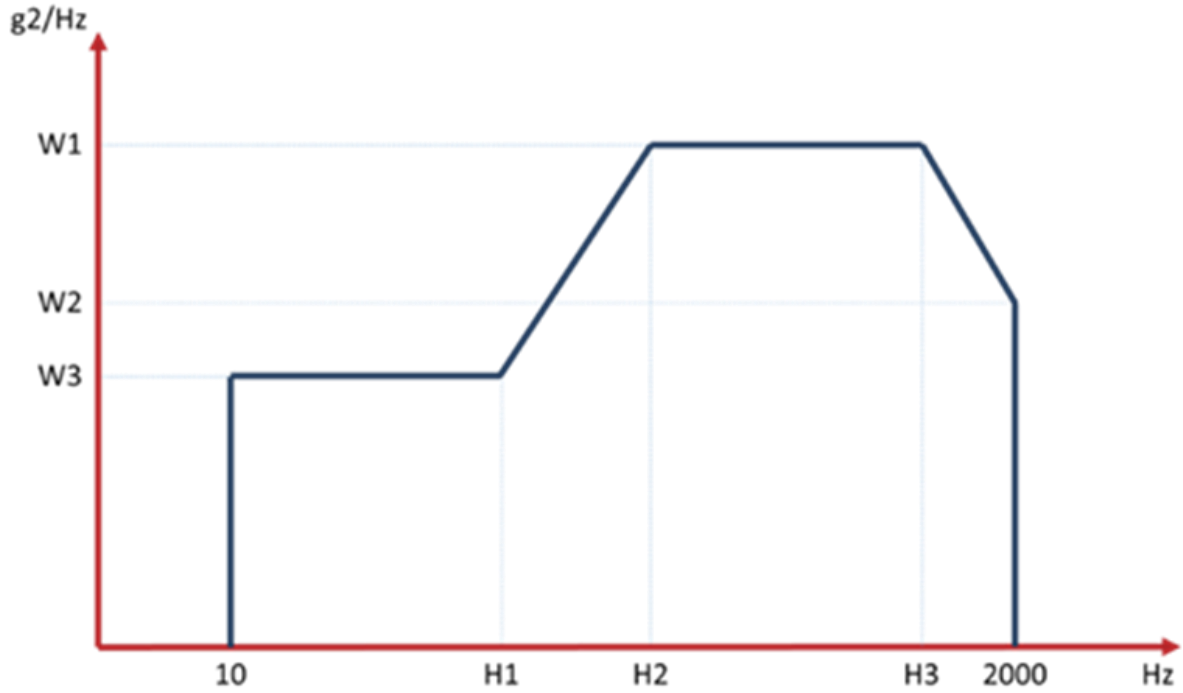
H1 (Hz)	H2 (Hz)	H3(Hz)	W1 (g^2/Hz)	W2 (g^2/Hz)	W3 (g^2/Hz)
50	80	1000	$0,22 \cdot WF$	$0,1 \cdot WF$	0,05

WF: WEIGHT FACTOR
WF= 1 for materiel mounted on vibration isolators and materiel weighing less than 36.3 kg.
WF= $10^{(0,6-W/60)}$ for equipment weighing between 36.3 and 72.6 kg. (W = weight in kg.)
WF= 0,25 for equipment weighing 72.6 kg or more.



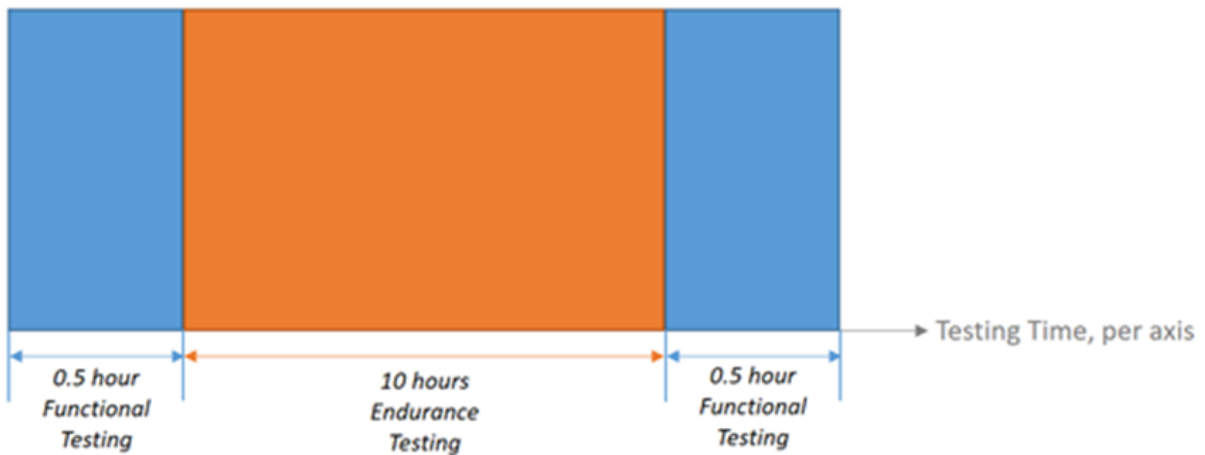
TF-Req-00047691 / A / EHDBK-VIBRATION-OPERATION CAT6 :

Equipment shall be capable of functioning during functional vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



H1 (Hz)	H2 (Hz)	H3(Hz)	W1 (g²/Hz)	W2 (g²/Hz)	W3 (g²/Hz)
50	80	1000	0,15*WF	0,07*WF	0,04

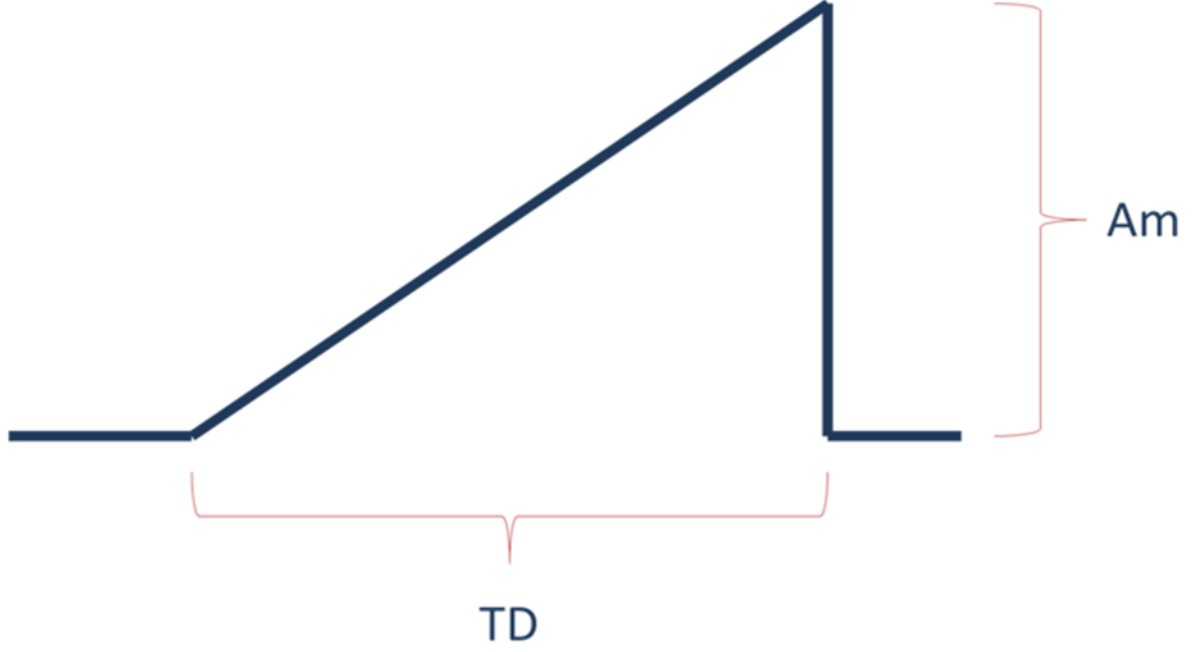
WF: WEIGHT FACTOR
 WF= 1 for materiel mounted on vibration isolators and materiel weighing less than 36.3 kg.
 WF= $10^{(0,6-W/60)}$ for equipment weighing between 36.3 and 72.6 kg. (W = weight in kg.)
 WF= 0,25 for equipment weighing 72.6 kg or more.



TF-Req-00077881 / A / EHDBK-SHOCK-OPERATION :

Equipment shall be capable of functioning during functional shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 1 or equivalent standard.

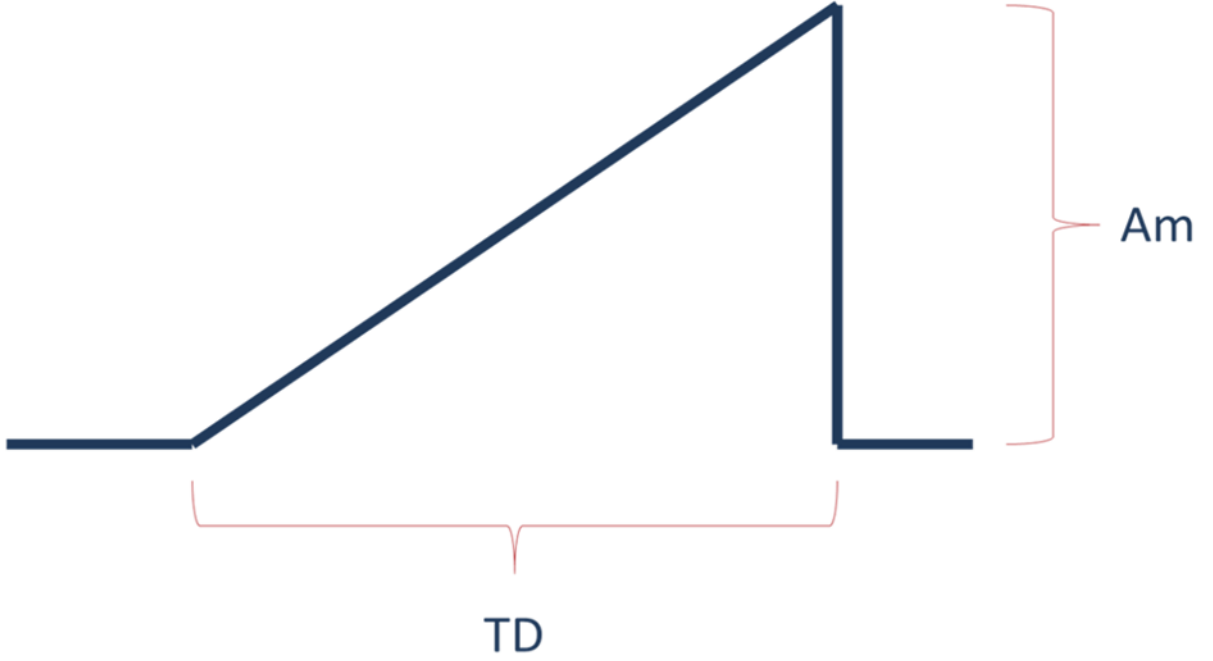
Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
20	11	3 shocks per axis



TF-Req-00077885 / A / EHDBK-SHOCK-TRANSPORT :

Equipment shall be capable of functioning after exposure to transportation shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 2 or equivalent standard.

Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
5,1	11	42 shocks per axis
6,4	11	21 shocks per axis
7,6	11	3 shocks per axis



TF-Req-00077883 / A / EHDBK-SHOCK-HANDLING :

Equipment shall be capable of functioning after exposure to bench handling shock according to MIL-STD-810G W/Change 1 516.7 Procedure 6 or equivalent standard.

TF-Req-00047695 / A / EHDBK-GUNFIRE CAT2 :

Equipment shall be capable of functioning during gunfire vibration environment given below according to MIL-STD-810G W/Change 1 519.7 or equivalent standard.

PROFILE 2	
f (Hz)	PSD (g ² /Hz)
18	1,943
22	1,943
22	0,046
30	0,046
38	0,068
38	1,943
42	1,943
42	0,082
57	0,125
57	2,146
63	2,146
63	0,142
76	0,182
76	2,370
84	2,370
84	0,202
300	0,837
600	2,479
700	2,479
2000	0,046
TEST DURATION 1 HOUR/AXIS	

TF-Req-00077886 / A / EHDBK-FLAMMABILITY-CABLES :

Sub-Component (fittings, wiring, tubing, connectors, seal etc.) that pass through different zones shall be made of flame proof material that are resist to propagation of flame according to DO-160G Section 26 Cat C or equivalent standard.

TF-Req-00077882 / A / EHDBK-SOF :

The following Environmental Effects Requirements shall be verified for all equipment that installed in/on Air Vehicle before first flight.

- Low Pressure Requirements
 - o Operational
 - o Decompression
 - o Overpressure
- High Temperature Requirements
 - o Storage
 - o Operational
- Low Temperature Requirements
 - o Storage
 - o Operational
- Temperature Shock Requirements
- Explosive Atmosphere Requirements
- Acceleration Requirements
 - o Operational
 - o Crash
- Vibration Requirements
 - o Functional
- Shock Requirements
 - o Operational
 - o Crash
- Fire, Flammability Requirements
- Gunfire Vibration (If Gunfire performed)
- Icing (only for Safety/Flight critical equipment)
- Rain (only for Safety/Flight critical equipment)
- E3 Requirements
 - o Intra_System Electromagnetic Compatibility
 - o Qualification Requirements
 - o Operation of EUT
 - o DC Bonding Levels
 - o Maximum Internal EME Levels
 - o Bonding Provisions Upon Pipes
 - o Protection of Bonding Areas
 - o Bonding in Fuel Tanks

3.6.1.3 Non-Return With Flow Restriction Valve (For Lw Tip, Lw Root, Rw Tip And Rw Root) Environmental Handbook Requirements

TF-Req-00077982 / A / EHDBK-CONTAMINATION 1 :

Equipment shall be made of materials that are resistant to fuel according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

TF-Req-00077990 / A / EHDBK-TEMP SHOCK 4 :

Equipment shall be capable of functioning after temperature shock between -46°C to 70°C vice versa according to MIL-STD-810G W/Change 1 503.6 Procedure 1B or equivalent standard.

T1, high temperature extreme, that defined in related requirement.

T2, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T3, low temperature extreme, that defined in related requirement

A, temperature decreasing time, $(T2-T3)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, low temperature extreme stabilization time, minimum 2 hours.

C, transfer time, 1-minute max.

D, high temperature extreme stabilization time, minimum 2 hours.

E, transfer time, 1-minute max.

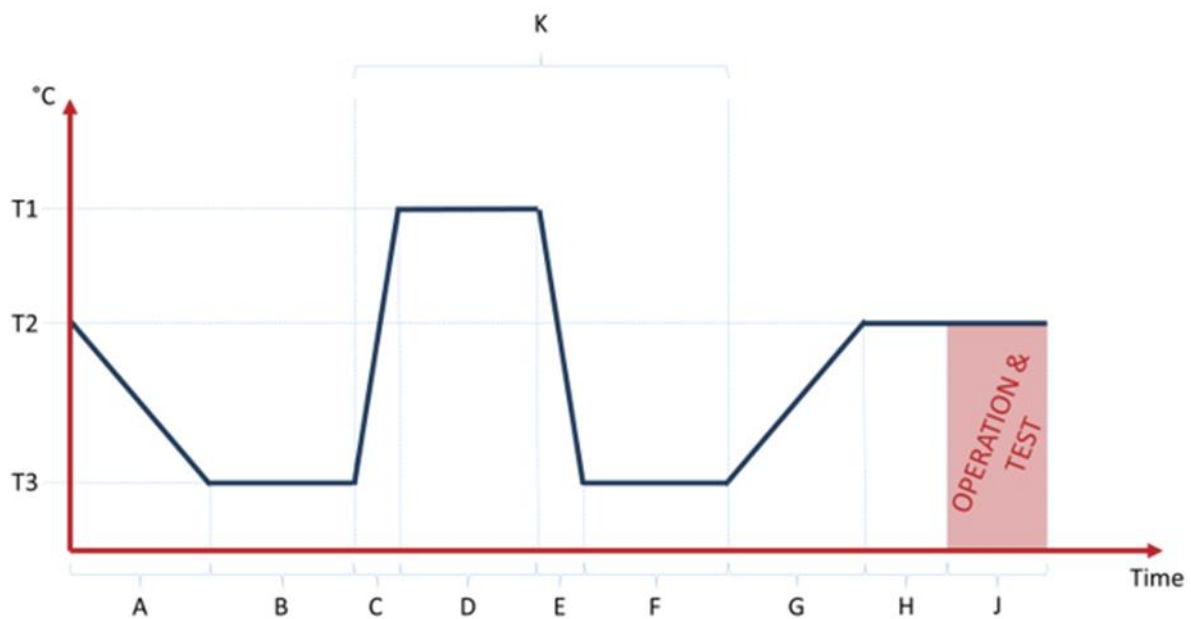
F, low temperature extreme stabilization time, minimum 2 hours.

G, temperature increasing time, same value with A. (unless otherwise specified)

H, temperature stabilization time, minimum 2 hours

J, turn-on and operational check time, required time for fully verify equipment functionality.

K, cycle number, that defined in related requirement.



TF-Req-00078001 / A / EHDBK-HUMIDITY :

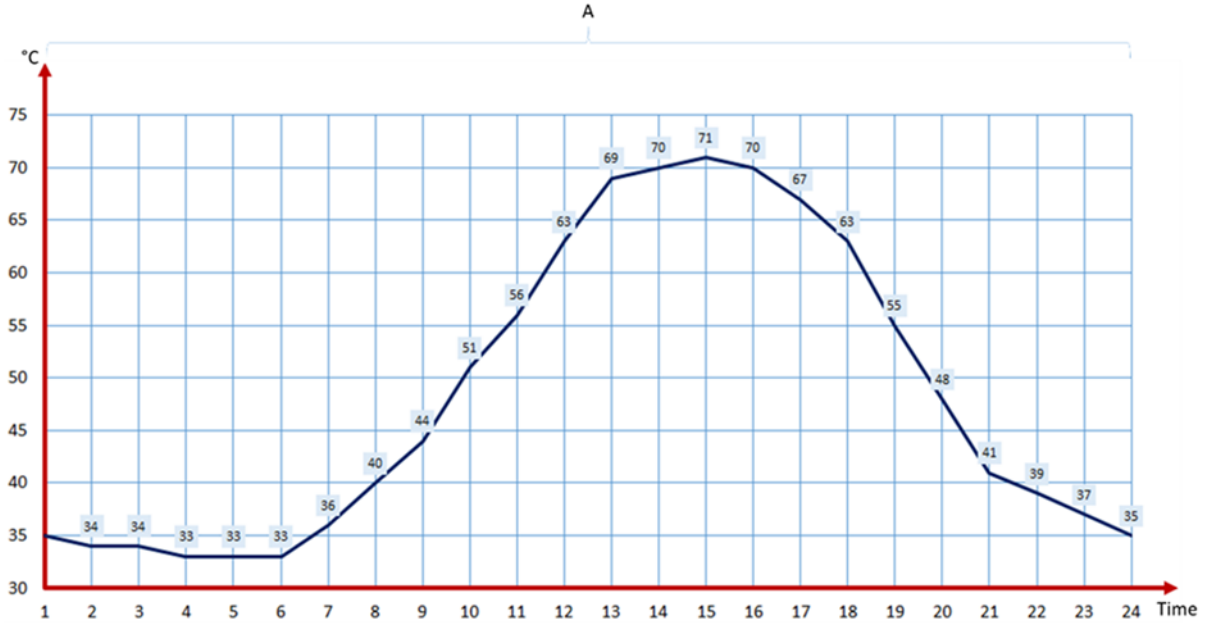
Equipment shall be capable of functioning and withstanding against the ten cycles of aggravated temperature-humidity cycle according to MIL-STD-810G W/Change 1 507.6 Procedure 2 or equivalent standard.

TF-Req-00077983 / A / EHDBK-HIGH TEMP-STORAGE :

Equipment shall be capable of functioning after exposure seven cycles of A1 climatic category storage condition according to MIL-STD-810G W/Change 1 501.6 Procedure 1 or equivalent standard.

A, cycle number, 7 cycles. (unless otherwise specified).

After 7 cycles, operational check should be done.



TF-Req-00077987 / A / EHDBK-LOW TEMP-STORAGE :

Equipment shall be capable of functioning after exposure -54°C temperature storage/transport condition according to MIL-STD-810G W/Change 1 502.6 Procedure 1 or equivalent standard.

T1, test starting temperature, 23±2°C unless otherwise specified.

T2, lowest storage temperature, that defined in related requirement.

A, temperature decreasing time, (T1-T2)/A is not greater than 3°C/min.

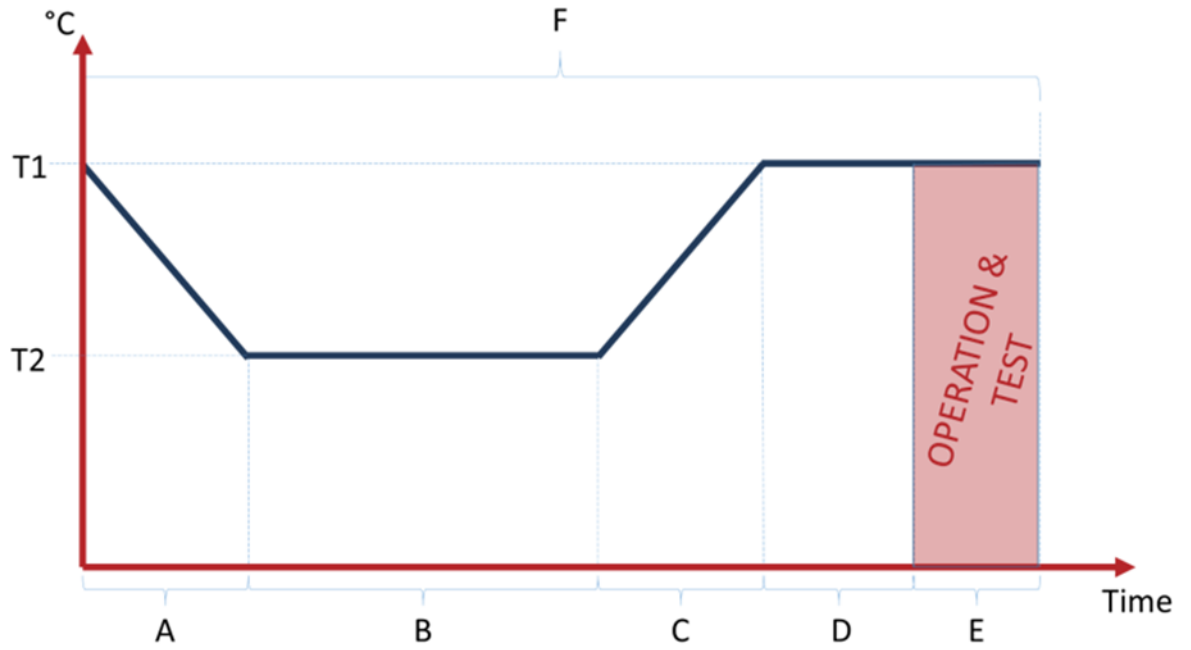
B, storage temperature stabilization time, minimum 24 hours.

C, temperature increasing time, same value with A. (unless otherwise specified)

D, heat up time, minimum 2 hours.

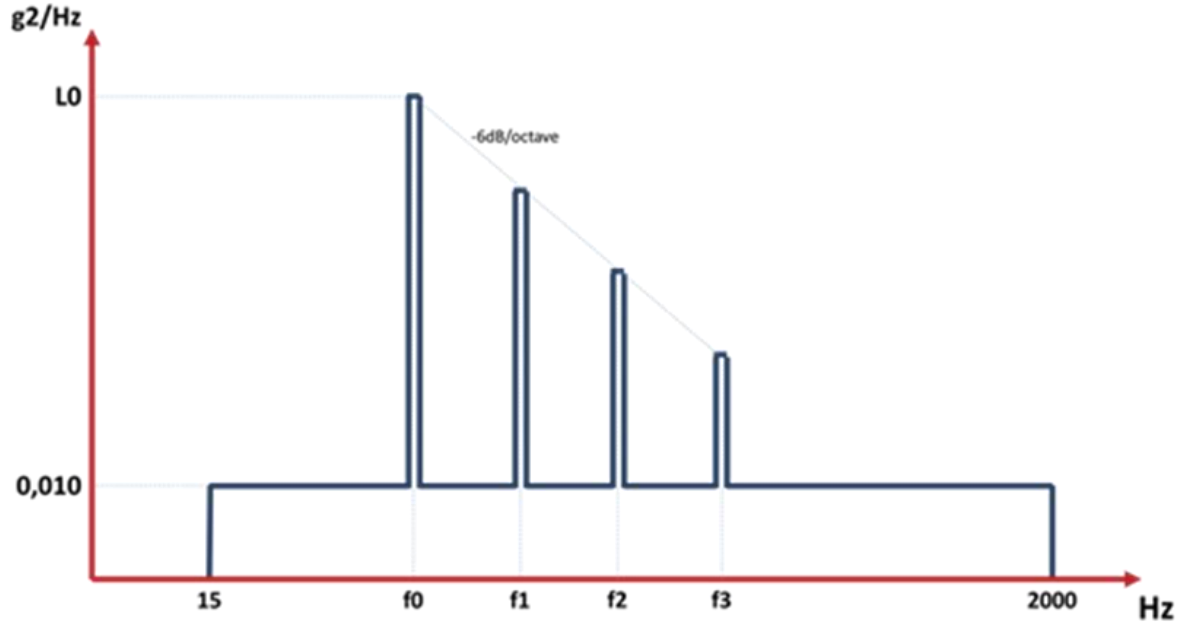
E, turn-on and operational check time, required time for fully verify equipment functionality.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00078007 / A / EHDBK-VIBRATION-AIRWAY TRANSPORT :

Equipment shall be capable of functioning after exposure to the airway transportation at least 1 Hour/axis according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



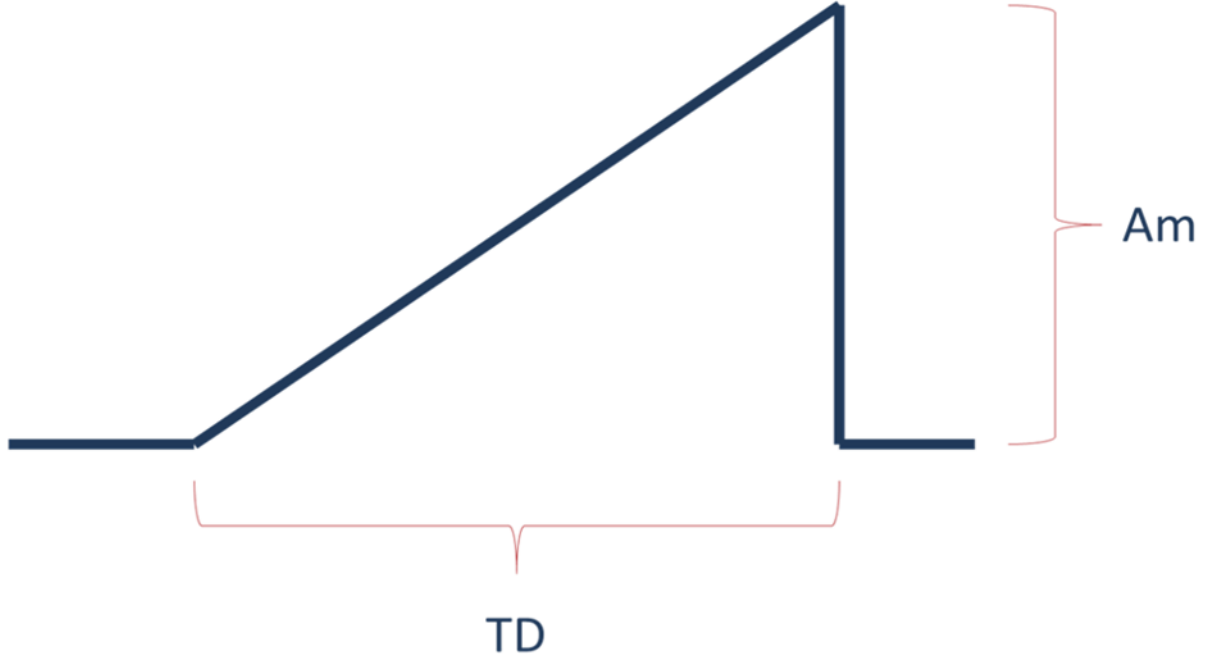
L0 (g2/Hz)	f0 (Hz)	f1(Hz)	f2(Hz)	f3(Hz)	DURATION
0,3	115*	230*	345*	460*	1 Hour per Each Axis

*Given frequencies are the middle point. For frequency increasing and decreasing point please apply ± 5 Hz.

TF-Req-00078004 / A / EHDBK-SHOCK-TRANSPORT :

Equipment shall be capable of functioning after exposure to transportation shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 2 or equivalent standard.

Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
5,1	11	42 shocks per axis
6,4	11	21 shocks per axis
7,6	11	3 shocks per axis



TF-Req-00077992 / A / EHDBK-SHOCK-HANDLING :

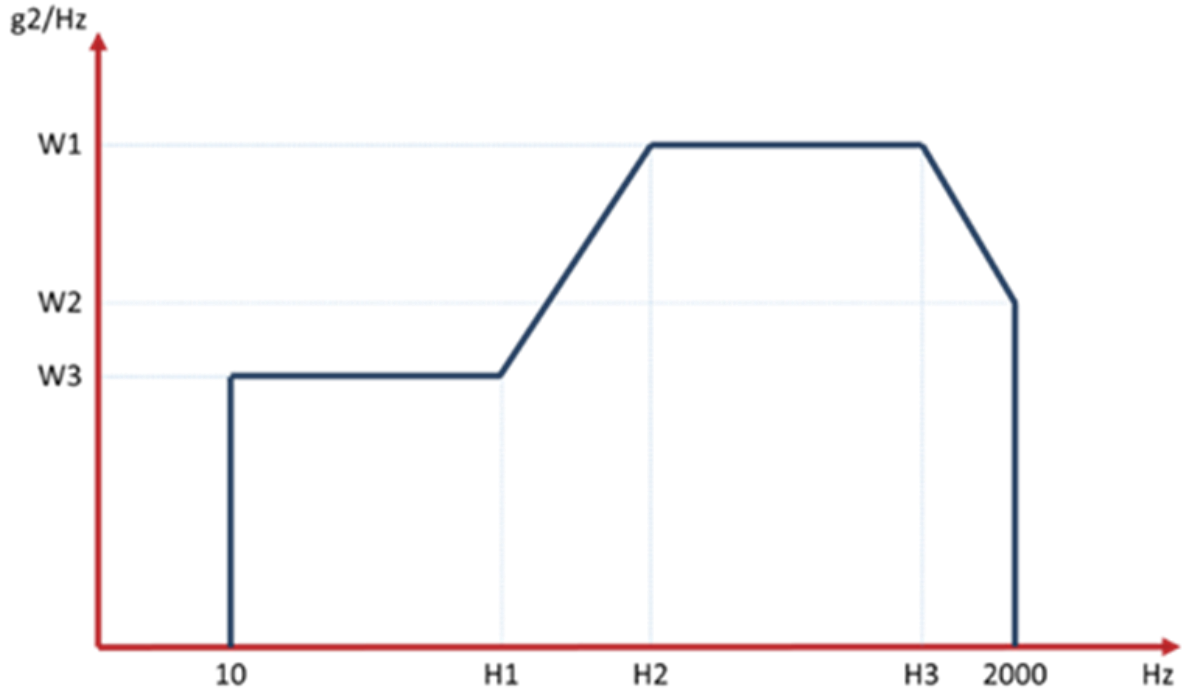
Equipment shall be capable of functioning after exposure to bench handling shock according to MIL-STD-810G W/Change 1 516.7 Procedure 6 or equivalent standard.

TF-Req-00078006 / A / EHDBK-CONTAMINATION 4 :

Equipment shall be made of materials that are resistant to cleaning fluids according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

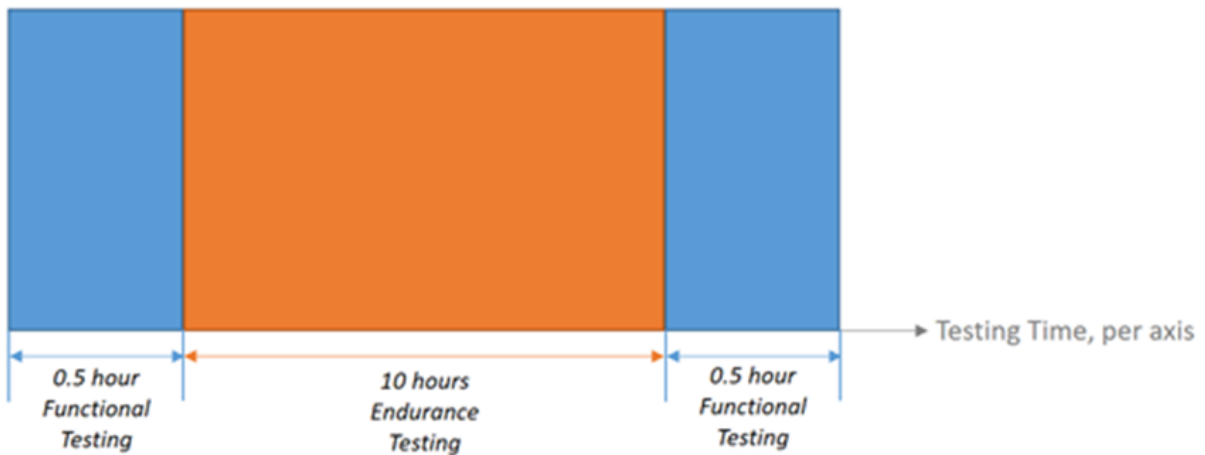
TF-Req-00078005 / A / EHDBK-VIBRATION-OPERATION CAT6 :

Equipment shall be capable of functioning during functional vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



H1 (Hz)	H2 (Hz)	H3(Hz)	W1 (g^2/Hz)	W2 (g^2/Hz)	W3 (g^2/Hz)
50	80	1000	$0,15 \cdot WF$	$0,07 \cdot WF$	0,04

WF: WEIGHT FACTOR
 WF= 1 for materiel mounted on vibration isolators and materiel weighing less than 36.3 kg.
 WF= $10^{(0,6-W/60)}$ for equipment weighing between 36.3 and 72.6 kg. (W = weight in kg.)
 WF= 0,25 for equipment weighing 72.6 kg or more.



TF-Req-00077994 / A / EHDBK-GUNFIRE CAT2 :

Equipment shall be capable of functioning during gunfire vibration environment given below according to MIL-STD-810G W/Change 1 519.7 or equivalent standard.

PROFILE 2	
f (Hz)	PSD (g ² /Hz)
18	1,943
22	1,943
22	0,046
30	0,046
38	0,068
38	1,943
42	1,943
42	0,082
57	0,125
57	2,146
63	2,146
63	0,142
76	0,182
76	2,370
84	2,370
84	0,202
300	0,837
600	2,479
700	2,479
2000	0,046
TEST DURATION 1 HOUR/AXIS	

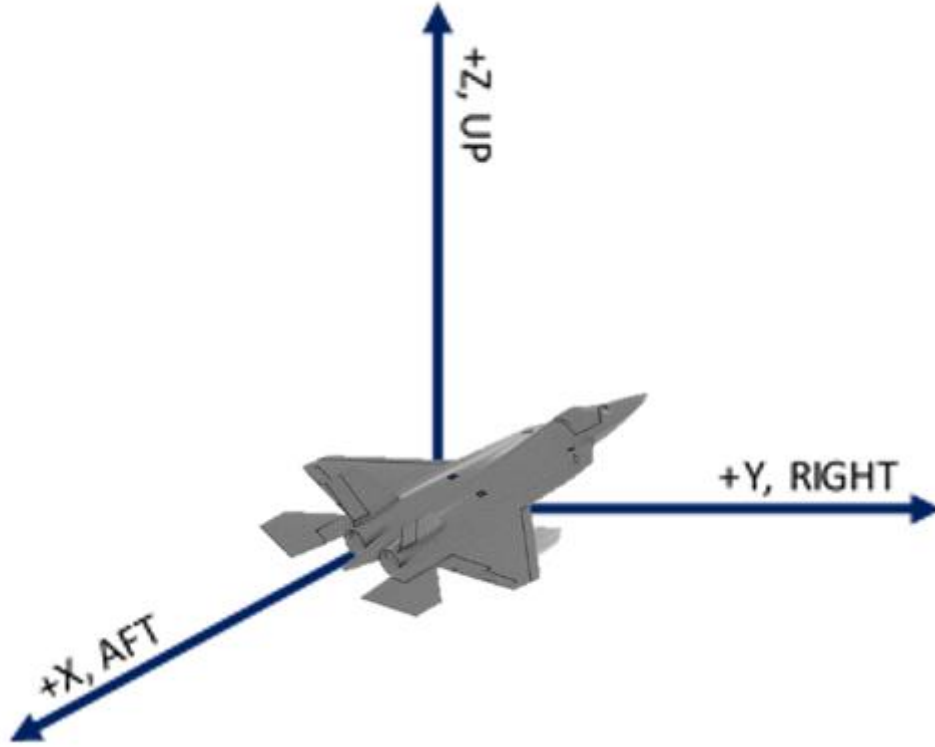
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TF-Req-00077993 / A / EHDBK-ACCELERATION-OPERATIONAL 5 :

Equipment shall be capable of functioning during the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 2 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
3,3	3,1	12,9	8,7	11,3	11,3



RESTRICTED

Ek-1 Teknik Şartname

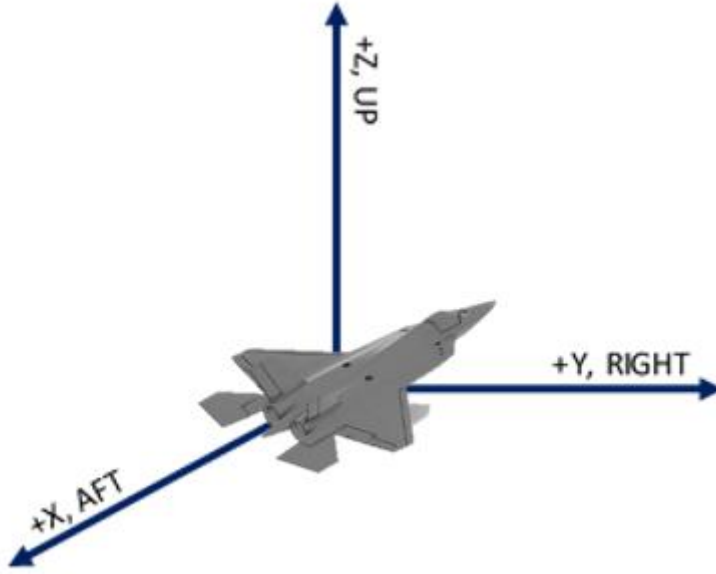
RESTRICTED

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TF-Req-00077998 / A / EHDBK-ACCELERATION-STRUCTURAL 5 :

Equipment shall be capable of functioning and structurally withstand after the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 1 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
5,0	4,6	19,4	13,0	16,9	16,9

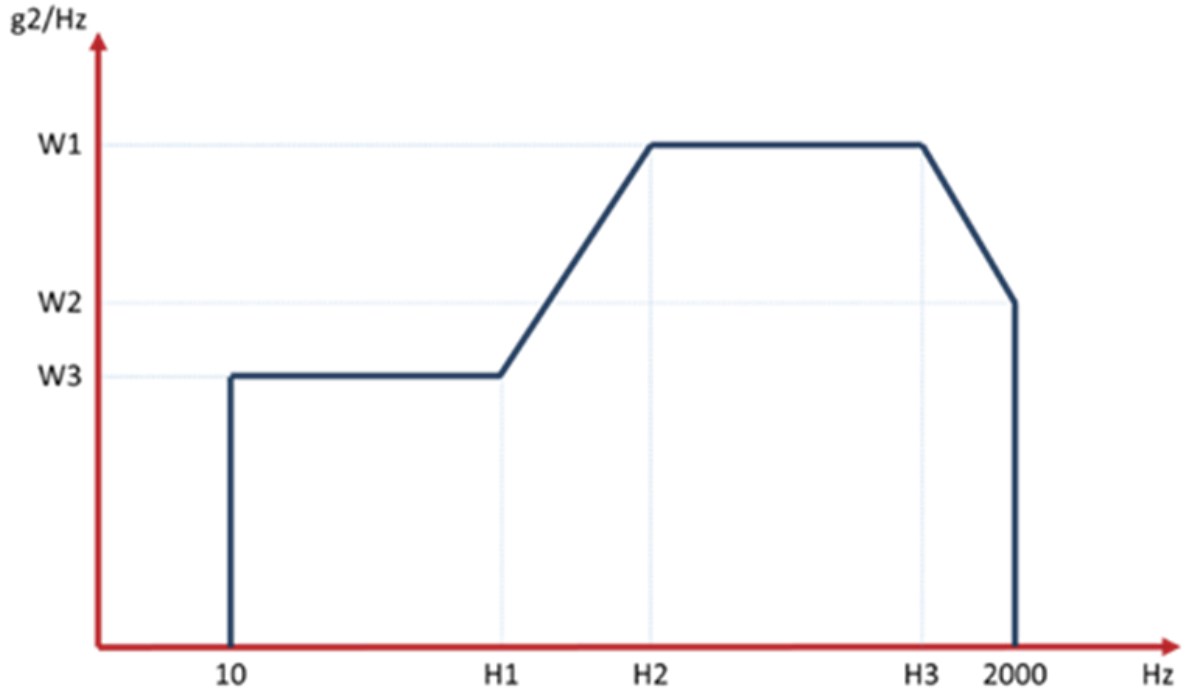


Ek-1 Teknik Şartname

RESTRICTED

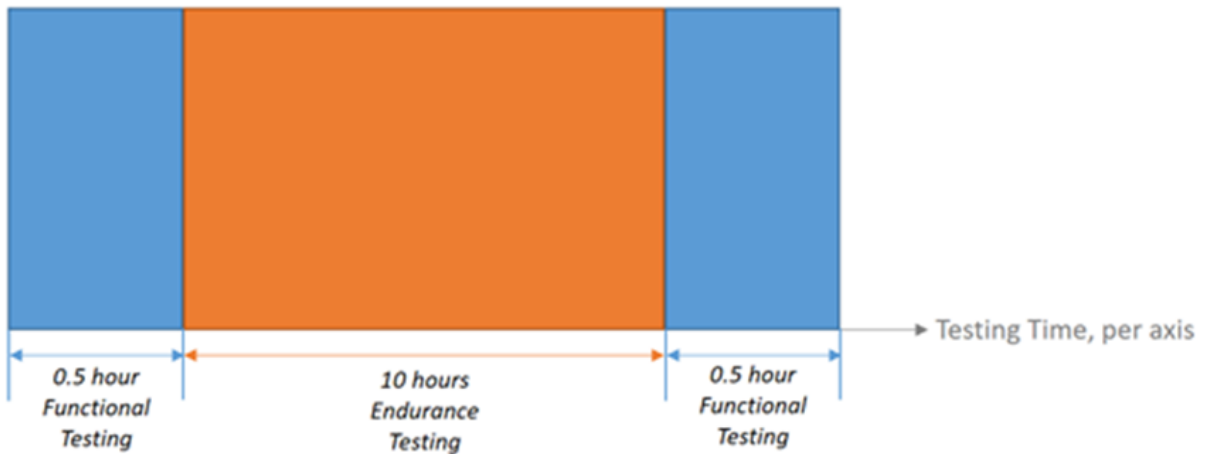
TF-Req-00078003 / A / EHDBK-VIBRATION-ENDURANCE CAT6 :

Equipment shall be capable of functioning after exposure to endurance vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



H1 (Hz)	H2 (Hz)	H3(Hz)	W1 (g^2/Hz)	W2 (g^2/Hz)	W3 (g^2/Hz)
50	80	1000	$0,22 \cdot WF$	$0,1 \cdot WF$	0,05

WF: WEIGHT FACTOR
WF= 1 for materiel mounted on vibration isolators and materiel weighing less than 36.3 kg.
WF= $10^{(0,6-W/60)}$ for equipment weighing between 36.3 and 72.6 kg. (W = weight in kg.)
WF= 0,25 for equipment weighing 72.6 kg or more.



TF-Req-00078002 / A / EHDBK-HIGH TEMP-INT OPERATE 7 :

Equipment shall be continue to function intermittently at 80°C temperature for 15 minutes duration.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, highest operational temperature, that defined for related zone.

T3, intermittent operation temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, turn-on and operational temperature stabilization time, minimum 2 hours.

C, temperature increasing time, quickly as possible.

D, intermittent operational check time, that defined in related requirement.

E, turn-off and temperature decreasing time, $(T3-T1)/E$ is not greater than $3^\circ\text{C}/\text{min}$

F, cool down time, minimum 2 hours. (unless otherwise specified)

G, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077995 / A / EHDBK-HIGH TEMP-CONT OPERATE 1 :

Equipment shall be capable of functioning continuously and withstanding at 70°C temperature according to MIL-STD-810G W/Change 1 501.6 Procedure 2 or equivalent standard.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, highest operational temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

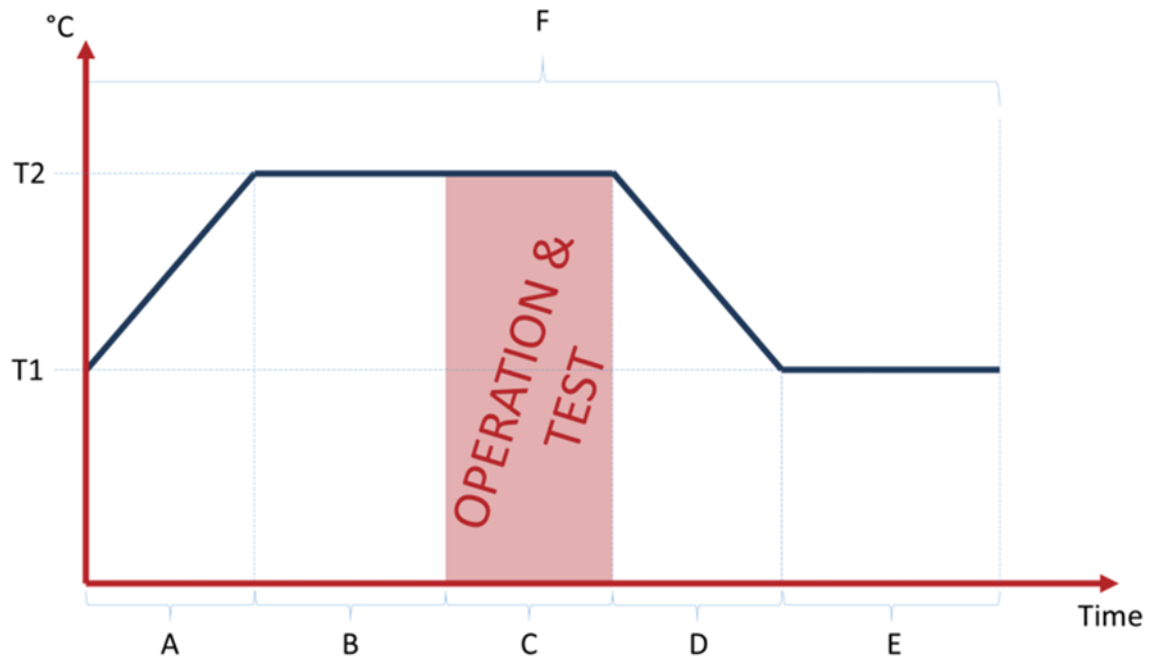
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, temperature decreasing time, same value with A. (Unless otherwise specified)

E, cool down time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



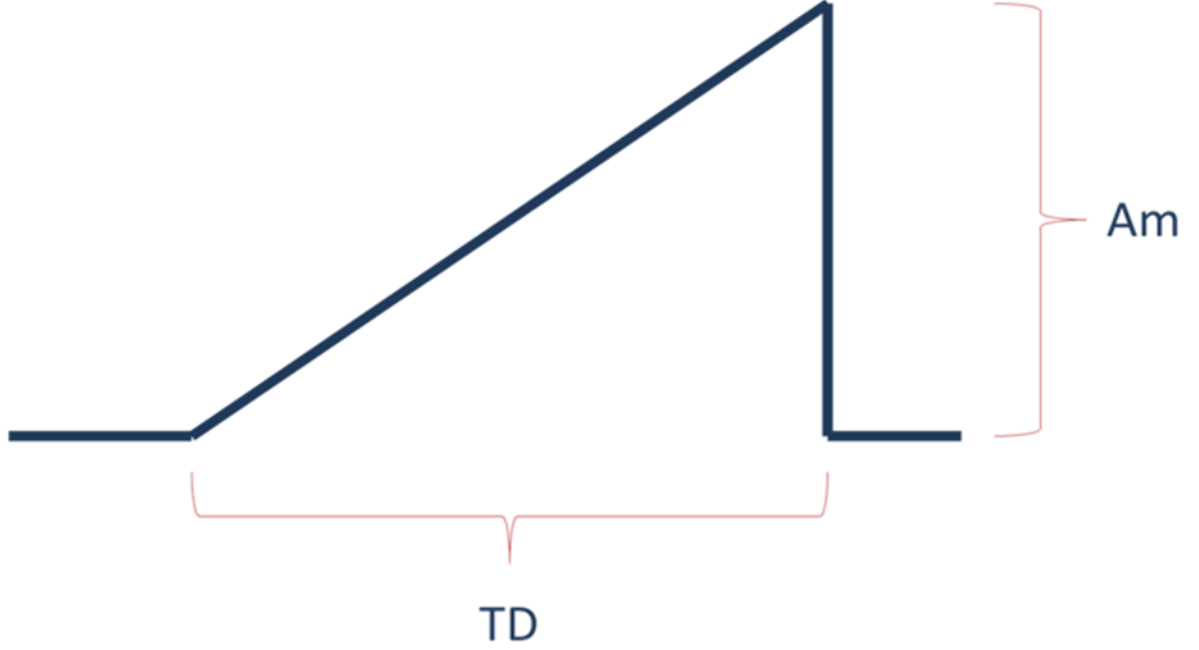
TF-Req-00077999 / A / EHDBK-FLAMMABILITY-CABLES :

Sub-Component (fittings, wiring, tubing, connectors, seal etc.) that pass through different zones shall be made of flame proof material that are resist to propagation of flame according to DO-160G Section 26 Cat C or equivalent standard.

TF-Req-00077991 / A / EHDBK-SHOCK-OPERATION :

Equipment shall be capable of functioning during functional shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 1 or equivalent standard.

Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
20	11	3 shocks per axis



TF-Req-00078000 / A / EHDBK-FUNGUS :

Equipment shall be made of fungus-inert materials that are resistant to fungal growth according to MIL-STD-810G W/Change 1 508.7 or equivalent standard.

TF-Req-00077985 / A / EHDBK-RAIN-DRIP :

Equipment shall be capable of functioning after exposure dripping water condition that defined in related standard according to MIL-STD-810G W/Change 1 506.6 Procedure 3 or equivalent standard.

TF-Req-00077984 / A / EHDBK-LOW PRESSURE-TRANSPORT :

Equipment shall be capable of functioning after transportation at 57,2 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 1 or equivalent standard.

P1, ambient pressure.

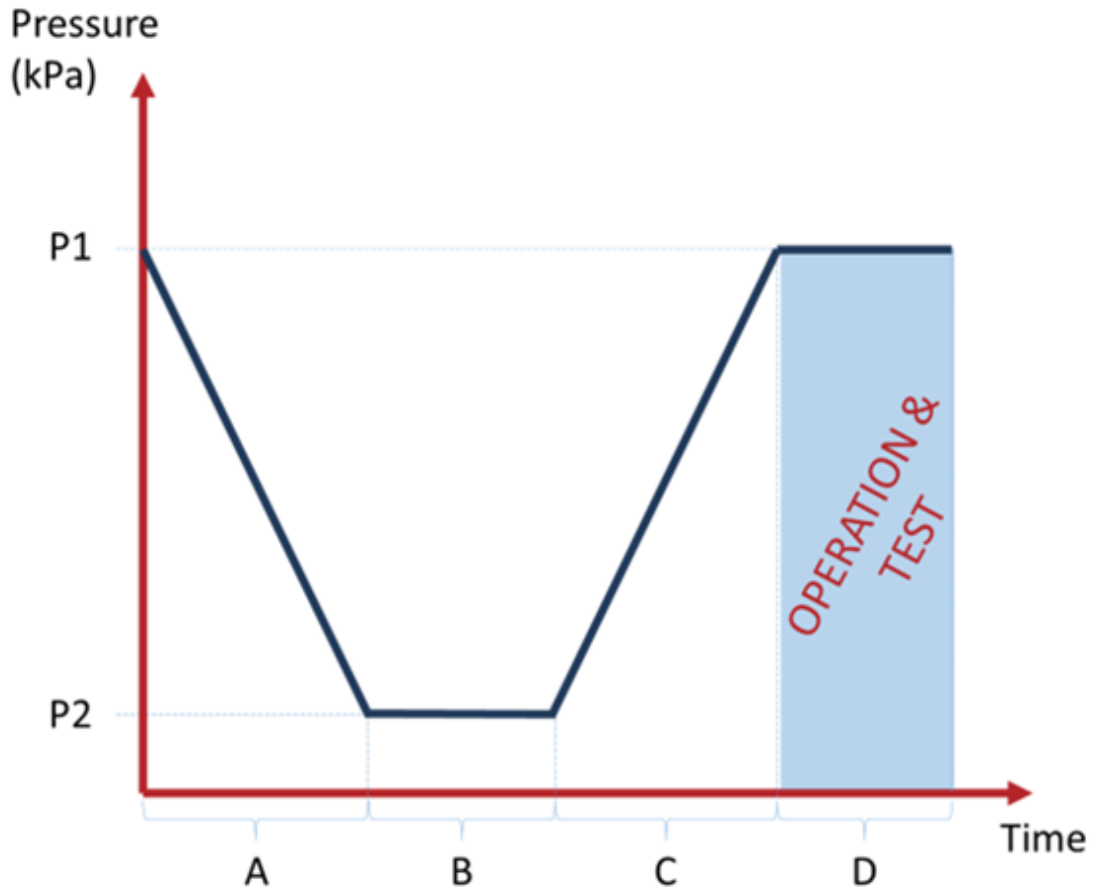
P2, lowest pressure of storage, that defined in related requirement.

A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, pressure increasing time, not greater than 0,125 kPa/sec.

D, turn-on and operational check time, required time for fully verify equipment functionality.



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TF-Req-00077986 / A / EHDBK-LOW PRESSURE-OPERATE :

Equipment shall be capable of functioning at 7,9 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 2 or equivalent standard.

P1, ambient pressure.

P2, lowest pressure of operation, that defined in related requirement.

A, turn-on and pressure decreasing time, not greater than 0,125 kPa/sec.

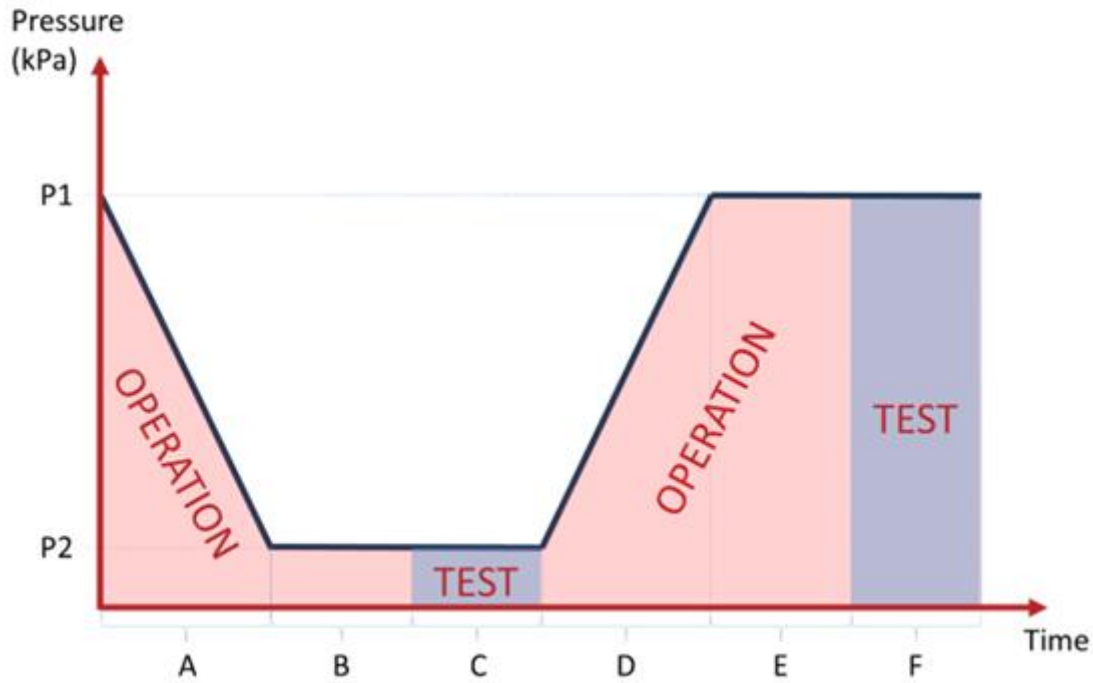
B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, pressure increasing time, not greater than 0,125 kPa/sec.

E, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

F, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.



TF-Req-00077988 / A / EHDBK-EXP ATMOSPHERE-CAT A :

Equipment that installed in "Flammable Zone" shall be qualified against MIL-STD-810 w/Change 1 511.6 Procedure 2 or DO-160G Section 9 CAT A .

RESTRICTED

Ek-1 Teknik Şartname

TF-Req-00077989 / A / EHDBK-SOF :

The following Environmental Effects Requirements shall be verified for all equipment that installed in/on Air Vehicle before first flight.

- Low Pressure Requirements
 - o Operational
 - o Decompression
 - o Overpressure
- High Temperature Requirements
 - o Storage
 - o Operational
- Low Temperature Requirements
 - o Storage
 - o Operational
- Temperature Shock Requirements
- Explosive Atmosphere Requirements
- Acceleration Requirements
 - o Operational
 - o Crash
- Vibration Requirements
 - o Functional
- Shock Requirements
 - o Operational
 - o Crash
- Fire, Flammability Requirements
- Gunfire Vibration (If Gunfire performed)
- Icing (only for Safety/Flight critical equipment)
- Rain (only for Safety/Flight critical equipment)
- E3 Requirements
 - o Intra_System Electromagnetic Compatibility
 - o Qualification Requirements
 - o Operation of EUT
 - o DC Bonding Levels
 - o Maximum Internal EME Levels
 - o Bonding Provisions Upon Pipes
 - o Protection of Bonding Areas
 - o Bonding in Fuel Tanks

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KAAN Projesi, Patlama Önleme Alt Sistemi, Dönem-I, Aşama-II Sözleşmesi

TF-Req-00077997 / A / EHDBK-LOW PRESSURE-RAPID-DECOMP-1 :

Equipment shall be capable of withstanding to the rapid decompression between 75,2 kPa to 41,9 kPa in not more than 15 seconds according to MIL-STD-810G W/Change 1 500.6 Procedure 3 or equivalent standard.

P1, ambient pressure.

P2, high pressure level of decompression, that defined in related requirement.

P3, low pressure level of decompression, that defined in related requirement.

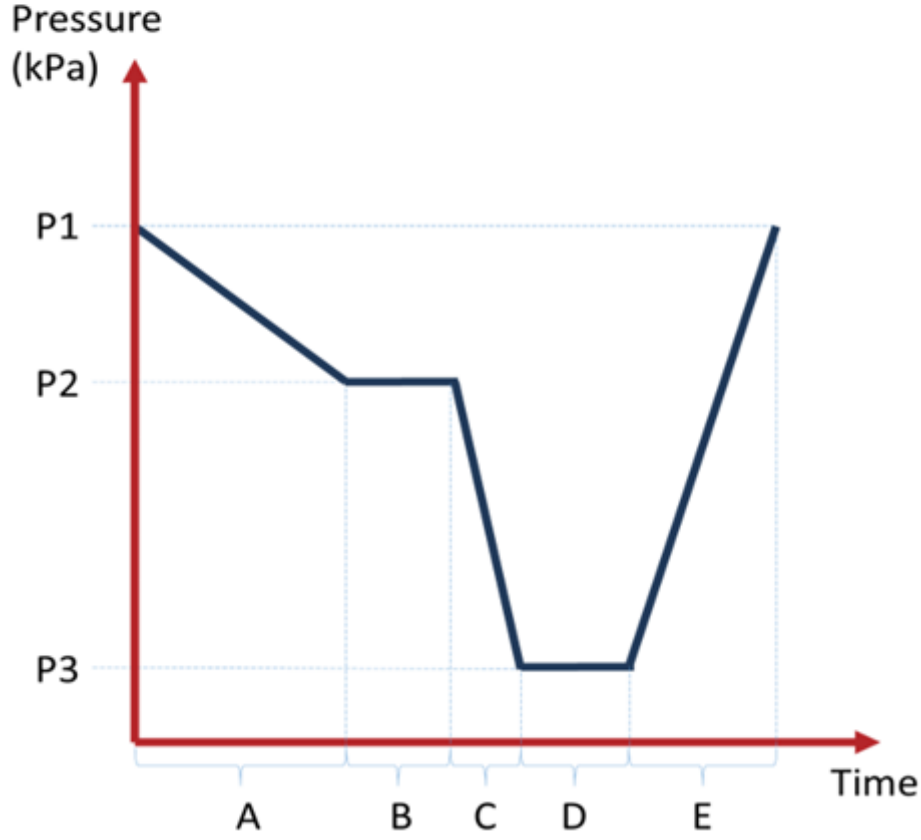
A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 10 min. (Unless otherwise specified).

C, decompression time, for rapid decompression 15 sec., for explosive decompression 0,1 sec.

D, pressure stabilization time, at least 10 min. (Unless otherwise specified).

E, pressure increasing time, not greater than 0,125 kPa/sec.



Ek-1 Teknik Şartname

RESTRICTED

TF-Req-00077996 / A / EHDBK-LOW TEMP-OPERATE 2 :

Equipment shall be capable of functioning continuously at -46°C temperature according to MIL-STD-810G W/Change 1 502.6 Procedure 2 or equivalent standard.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, lowest operational temperature, that defined in related requirement.

A, temperature decreasing time, $(T1-T2)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

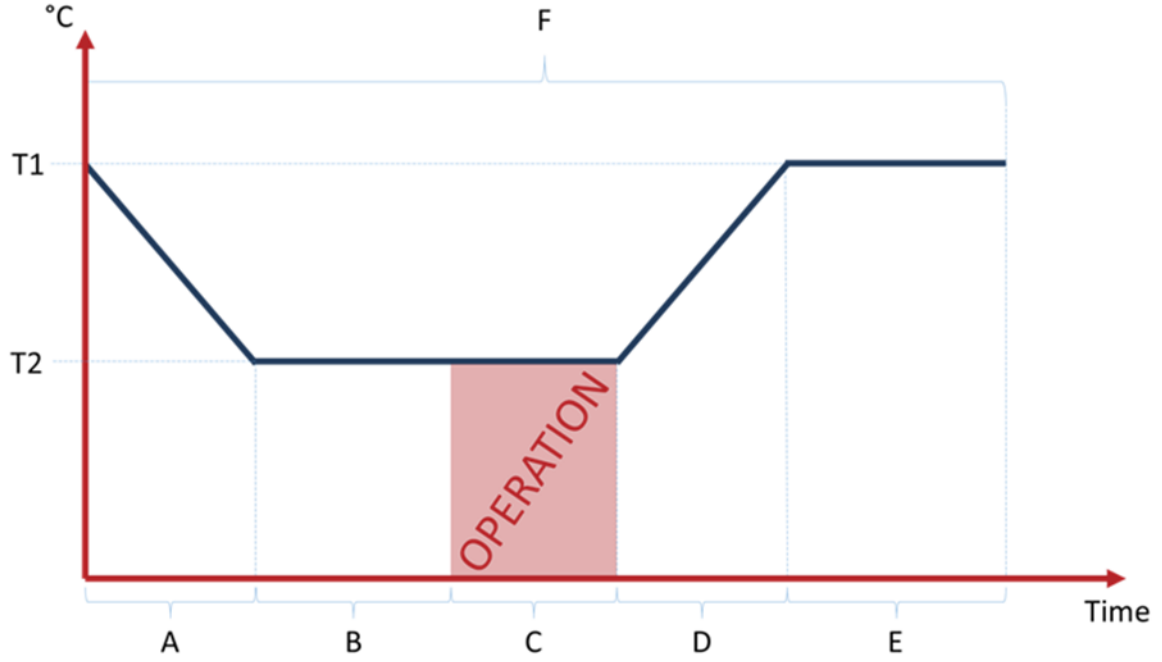
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and temperature stabilization and operational check time, minimum 2 hours. (Unless otherwise specified)

D, temperature increasing time, same value with A. (Unless otherwise specified)

E, heat up time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)

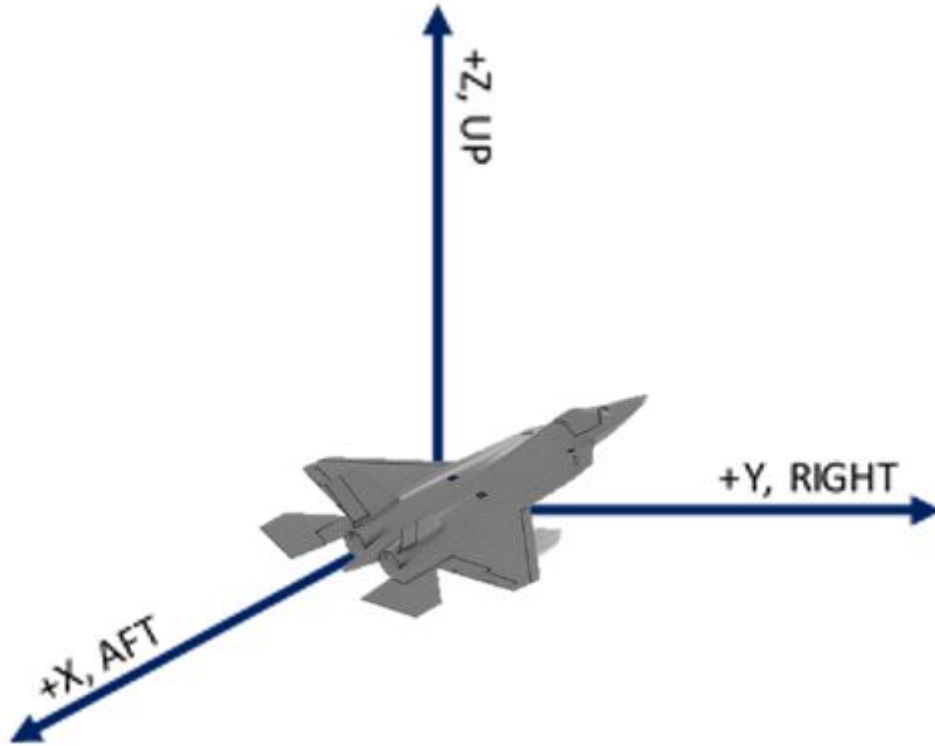


3.6.1.4 Non-Return With Flow Restriction Valve (For External Tanks) Environmental Handbook Requirements

TF-Req-00077957 / A / EHDBK-ACCELERATION-OPERATIONAL 5 :

Equipment shall be capable of functioning during the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 2 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
3,3	3,1	12,9	8,7	11,3	11,3



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TF-Req-00077958 / A / EHDBK-LOW PRESSURE-OPERATE :

Equipment shall be capable of functioning at 7,9 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 2 or equivalent standard.

P1, ambient pressure.

P2, lowest pressure of operation, that defined in related requirement.

A, turn-on and pressure decreasing time, not greater than 0,125 kPa/sec.

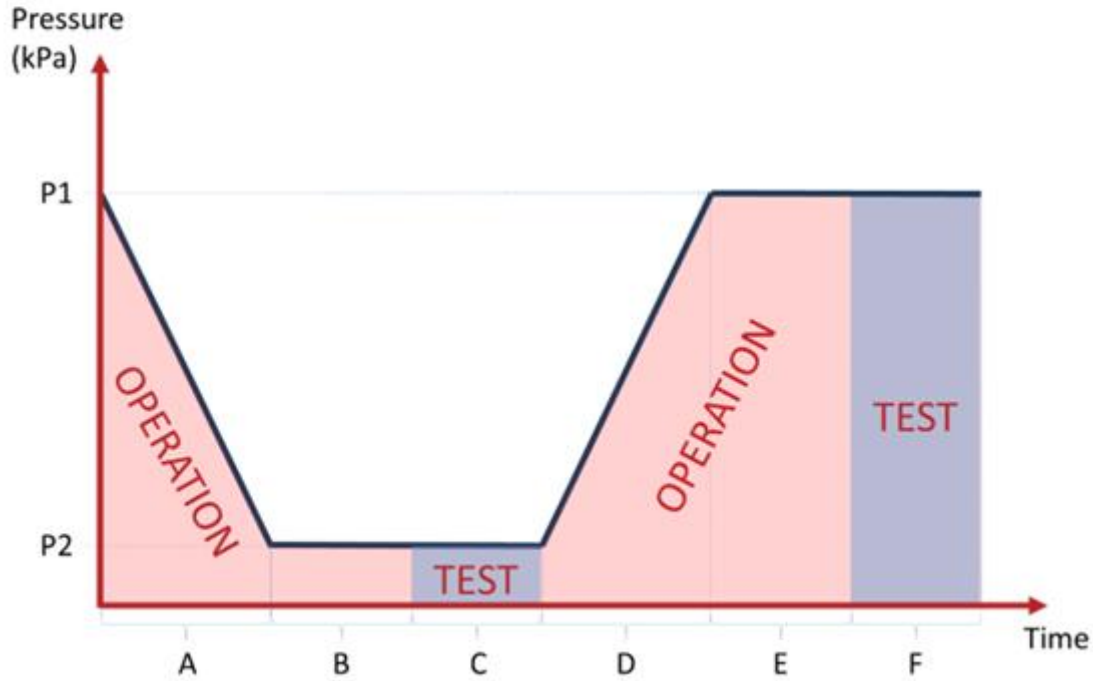
B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

C, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, pressure increasing time, not greater than 0,125 kPa/sec.

E, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

F, operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.



RESTRICTED

Ek-1 Teknik Şartname

TF-Req-00077965 / A / EHDBK-HIGH TEMP-CONT OPERATE 1 :

Equipment shall be capable of functioning continuously and withstanding at 70°C temperature according to MIL-STD-810G W/Change 1 501.6 Procedure 2 or equivalent standard.

T1, test starting temperature, 23±2°C unless otherwise specified.

T2, highest operational temperature, that defined in related requirement.

A, temperature increasing time, (T2-T1)/A is not greater than 3°C/min.

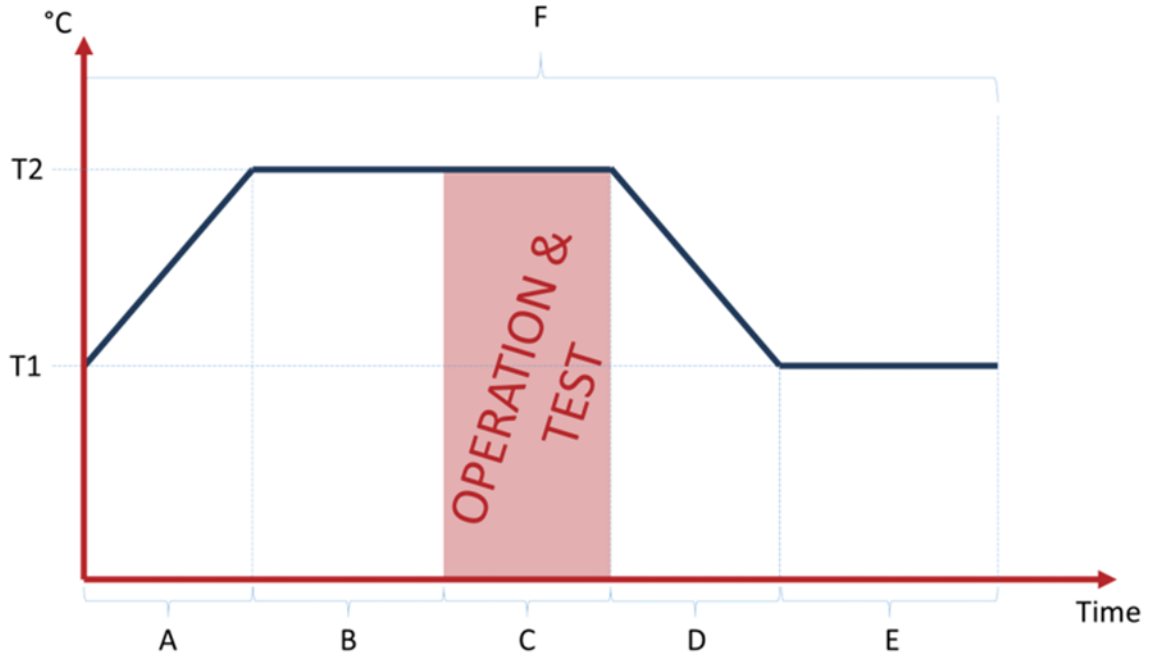
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and operational check time, minimum 2 hours or fully verify equipment functionality, whichever is greater.

D, temperature decreasing time, same value with A. (Unless otherwise specified)

E, cool down time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077961 / A / EHDBK-RAIN-DRIP :

Equipment shall be capable of functioning after exposure dripping water condition that defined in related standard according to MIL-STD-810G W/Change 1 506.6 Procedure 3 or equivalent standard.

RESTRICTED

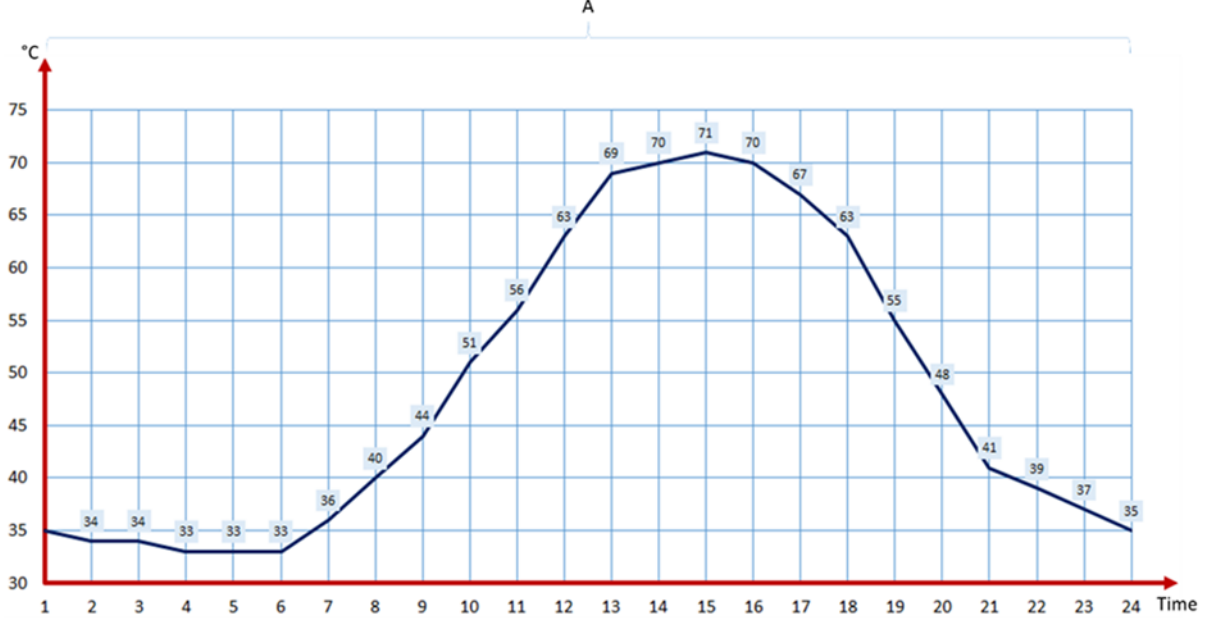
KAAN Projesi, Patlama Önleme Alt Sistemi, Dönem-I, Aşama-II Sözleşmesi

TF-Req-00077968 / A / EHDBK-HIGH TEMP-STORAGE :

Equipment shall be capable of functioning after exposure seven cycles of A1 climatic category storage condition according to MIL-STD-810G W/Change 1 501.6 Procedure 1 or equivalent standard.

A, cycle number, 7 cycles. (unless otherwise specified).

After 7 cycles, operational check should be done.



RESTRICTED

Ek-1 Teknik Şartname

TF-Req-00077972 / A / EHDBK-GUNFIRE CAT2 :

Equipment shall be capable of functioning during gunfire vibration environment given below according to MIL-STD-810G W/Change 1 519.7 or equivalent standard.

PROFILE 2	
f (Hz)	PSD (g ² /Hz)
18	1,943
22	1,943
22	0,046
30	0,046
38	0,068
38	1,943
42	1,943
42	0,082
57	0,125
57	2,146
63	2,146
63	0,142
76	0,182
76	2,370
84	2,370
84	0,202
300	0,837
600	2,479
700	2,479
2000	0,046
TEST DURATION 1 HOUR/AXIS	

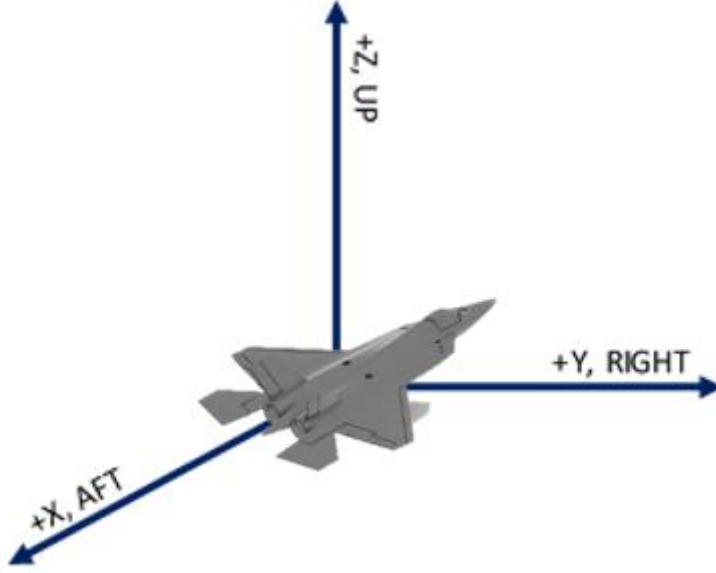
RESTRICTED

KAAN Projesi, Patlama Önleme Alt Sistemi, Dönem-I, Aşama-II Sözleşmesi

TF-Req-00077962 / A / EHDBK-ACCELERATION-STRUCTURAL 5 :

Equipment shall be capable of functioning and structurally withstand after the g forces induced by in-service environment that given below according to MIL-STD-810G W/Change 1 513.7 Procedure 1 or equivalent standard.

Test Directions and Test Levels (g's)					
Fore	Aft	Up	Down	Left	Right
5,0	4,6	19,4	13,0	16,9	16,9



TF-Req-00077960 / A / EHDBK-FUNGUS :

Equipment shall be made of fungus-inert materials that are resistant to fungal growth according to MIL-STD-810G W/Change 1 508.7 or equivalent standard.

RESTRICTED

Ek-1 Teknik Şartname

TF-Req-00077963 / A / EHDBK-SOF :

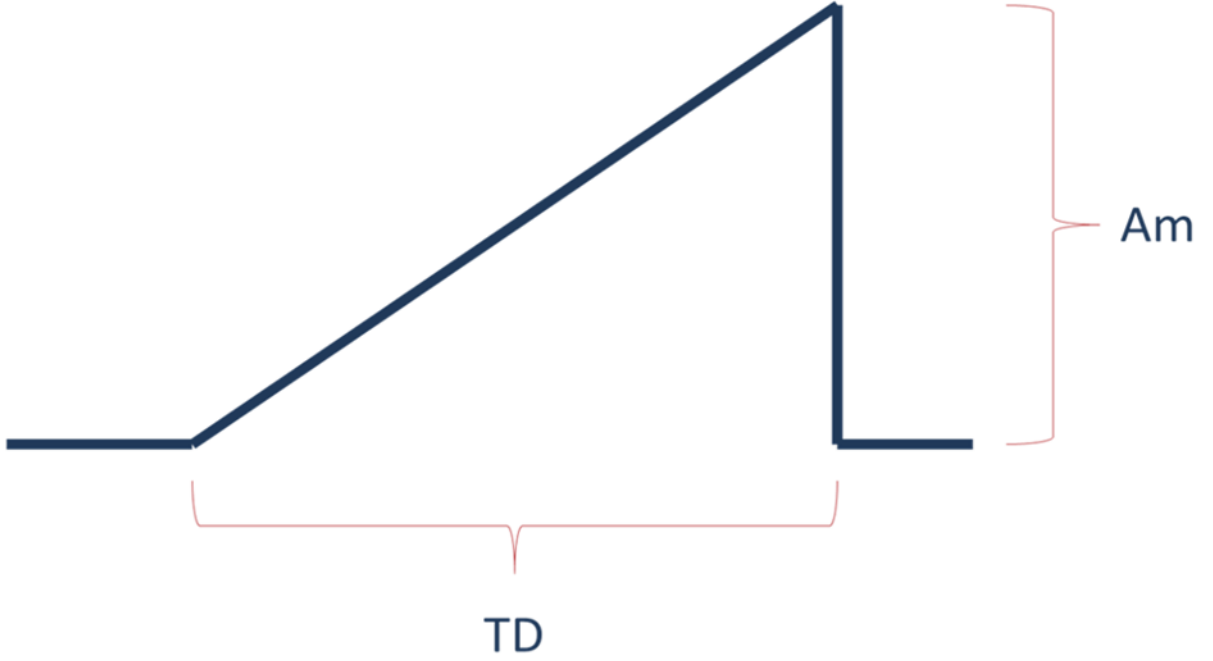
The following Environmental Effects Requirements shall be verified for all equipment that installed in/on Air Vehicle before first flight.

- Low Pressure Requirements
 - o Operational
 - o Decompression
 - o Overpressure
- High Temperature Requirements
 - o Storage
 - o Operational
- Low Temperature Requirements
 - o Storage
 - o Operational
- Temperature Shock Requirements
- Explosive Atmosphere Requirements
- Acceleration Requirements
 - o Operational
 - o Crash
- Vibration Requirements
 - o Functional
- Shock Requirements
 - o Operational
 - o Crash
- Fire, Flammability Requirements
- Gunfire Vibration (If Gunfire performed)
- Icing (only for Safety/Flight critical equipment)
- Rain (only for Safety/Flight critical equipment)
- E3 Requirements
 - o Intra_System Electromagnetic Compatibility
 - o Qualification Requirements
 - o Operation of EUT
 - o DC Bonding Levels
 - o Maximum Internal EME Levels
 - o Bonding Provisions Upon Pipes
 - o Protection of Bonding Areas
 - o Bonding in Fuel Tanks

TF-Req-00077966 / A / EHDBK-SHOCK-TRANSPORT :

Equipment shall be capable of functioning after exposure to transportation shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 2 or equivalent standard.

Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
5,1	11	42 shocks per axis
6,4	11	21 shocks per axis
7,6	11	3 shocks per axis



TF-Req-00077964 / A / EHDBK-LOW TEMP-OPERATE 2 :

Equipment shall be capable of functioning continuously at -46°C temperature according to MIL-STD-810G W/Change 1 502.6 Procedure 2 or equivalent standard.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, lowest operational temperature, that defined in related requirement.

A, temperature decreasing time, $(T1-T2)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

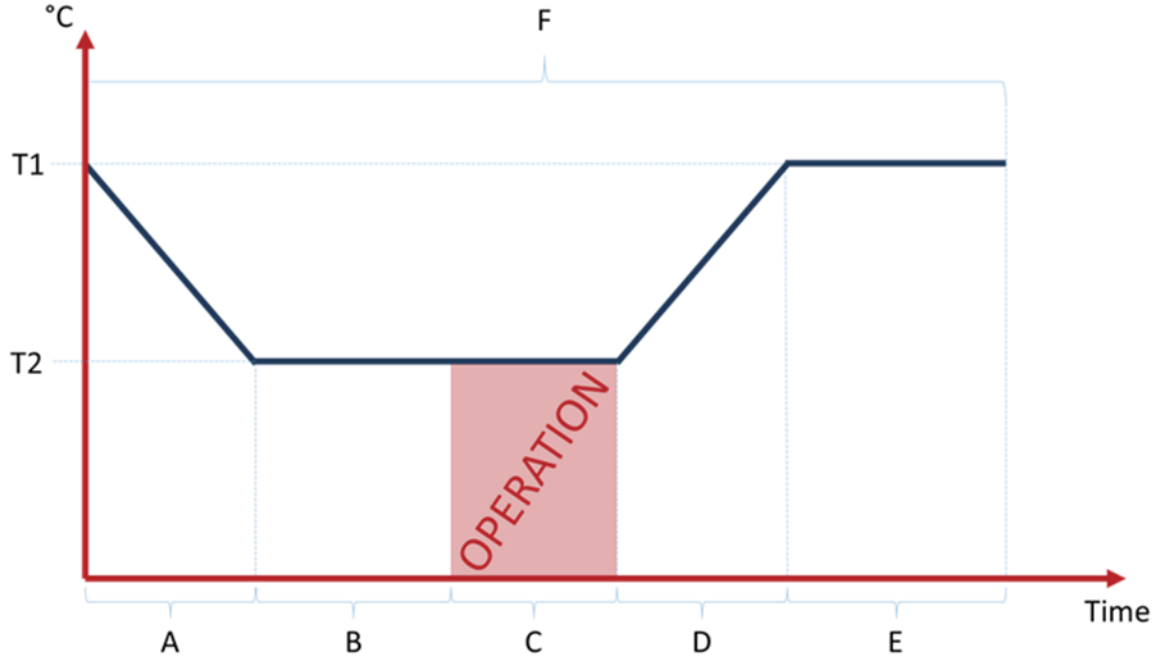
B, operational temperature stabilization time, minimum 2 hours.

C, turn-on and temperature stabilization and operational check time, minimum 2 hours. (Unless otherwise specified)

D, temperature increasing time, same value with A. (Unless otherwise specified)

E, heat up time, minimum 2 hours.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077959 / A / EHDBK-CONTAMINATION 1 :

Equipment shall be made of materials that are resistant to fuel according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

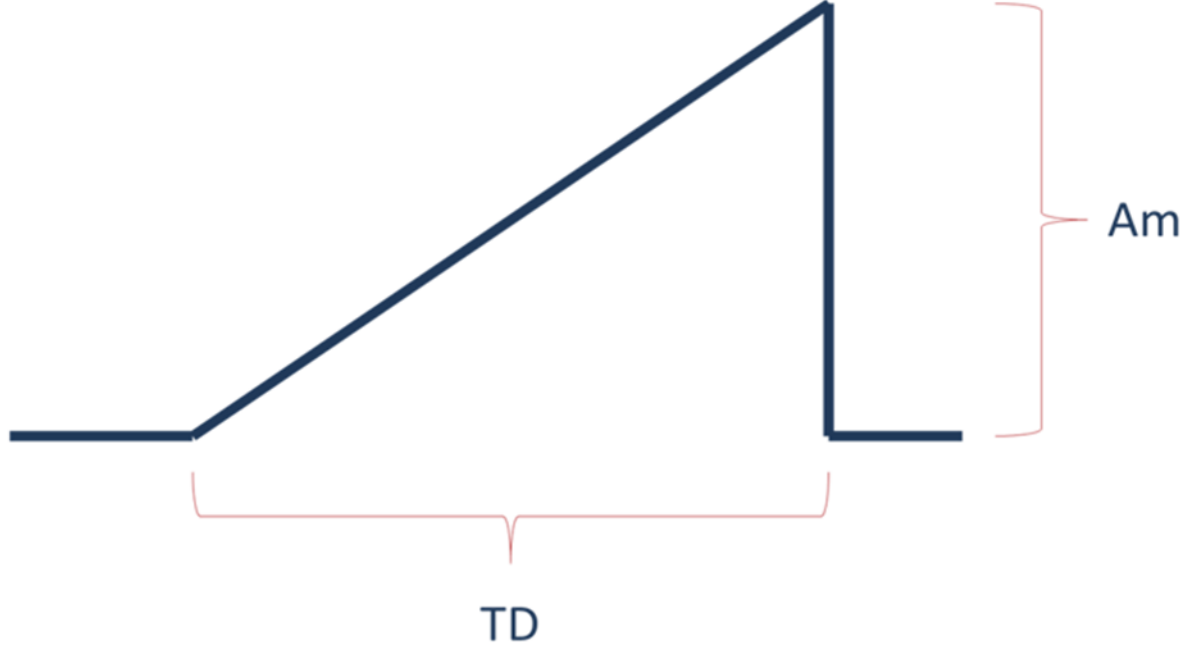
TF-Req-00077967 / A / EHDBK-CONTAMINATION 4 :

Equipment shall be made of materials that are resistant to cleaning fluids according to MIL-STD-810G W/Change 1 504.2 Procedure 1 or equivalent standard.

TF-Req-00077970 / A / EHDBK-SHOCK-OPERATION :

Equipment shall be capable of functioning during functional shock environment according to MIL-STD-810G W/Change 1 516.7 Procedure 1 or equivalent standard.

Minimum Peak Value – Am (g)	Nominal Duration – TD (ms.)	Number of Shocks for each Orthogonal Axis (positive and negative)
20	11	3 shocks per axis



TF-Req-00077969 / A / EHDBK-HUMIDITY :

Equipment shall be capable of functioning and withstanding against the ten cycles of aggravated temperature-humidity cycle according to MIL-STD-810G W/Change 1 507.6 Procedure 2 or equivalent standard.

TF-Req-00077971 / A / EHDBK-EXP ATMOSPHERE-CAT A :

Equipment that installed in "Flammable Zone" shall be qualified against MIL-STD-810 w/Change 1 511.6 Procedure 2 or DO-160G Section 9 CAT A .

TF-Req-00077973 / A / EHDBK-FLAMMABILITY-CABLES :

Sub-Component (fittings, wiring, tubing, connectors, seal etc.) that pass through different zones shall be made of flame proof material that are resist to propagation of flame according to DO-160G Section 26 Cat C or equivalent standard.

TF-Req-00077974 / A / EHDBK-TEMP SHOCK 4 :

Equipment shall be capable of functioning after temperature shock between -46°C to 70°C vice versa according to MIL-STD-810G W/Change 1 503.6 Procedure 1B or equivalent standard.

T1, high temperature extreme, that defined in related requirement.

T2, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T3, low temperature extreme, that defined in related requirement

A, temperature decreasing time, $(T2-T3)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, low temperature extreme stabilization time, minimum 2 hours.

C, transfer time, 1-minute max.

D, high temperature extreme stabilization time, minimum 2 hours.

E, transfer time, 1-minute max.

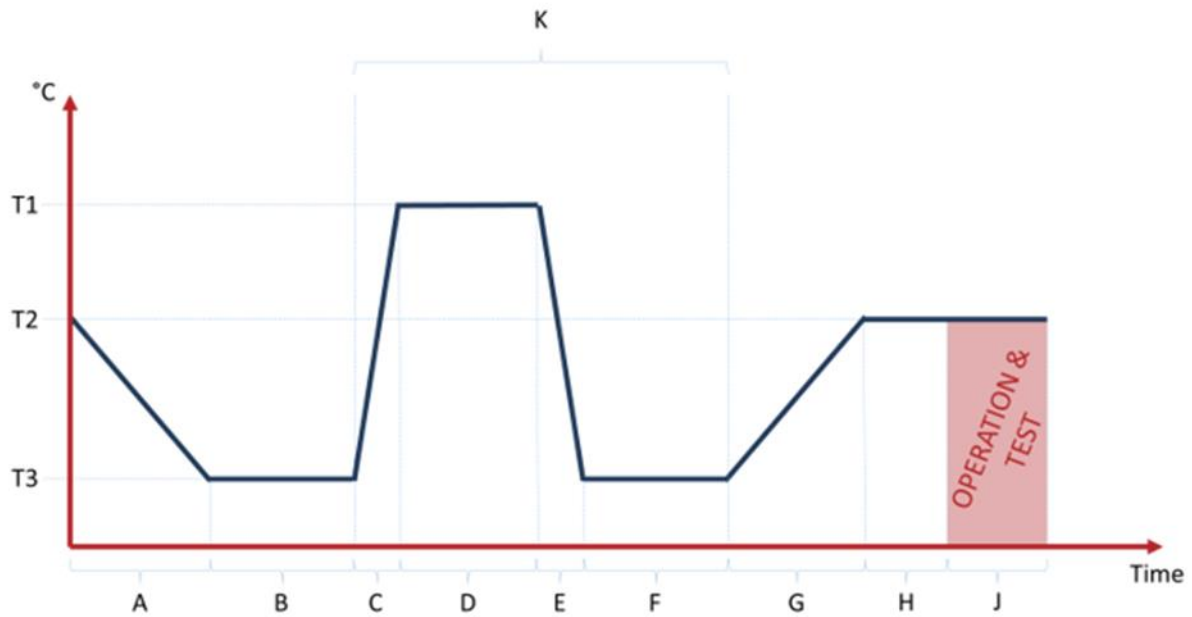
F, low temperature extreme stabilization time, minimum 2 hours.

G, temperature increasing time, same value with A. (unless otherwise specified)

H, temperature stabilization time, minimum 2 hours

J, turn-on and operational check time, required time for fully verify equipment functionality.

K, cycle number, that defined in related requirement.

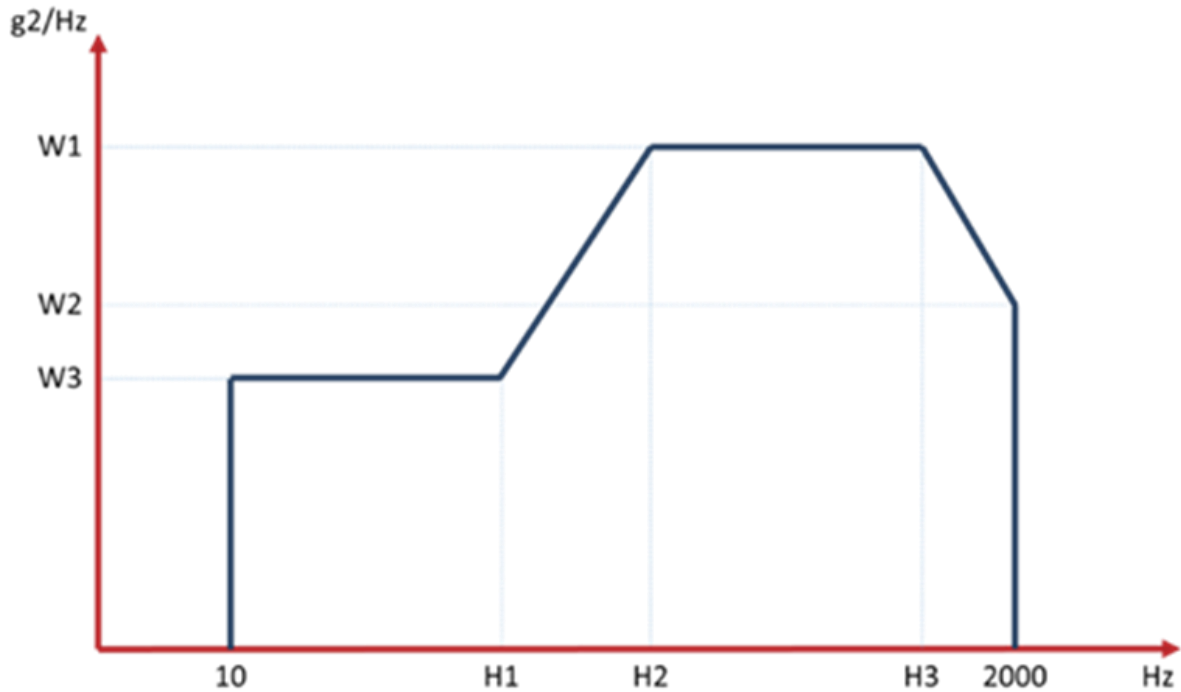


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KAAN Projesi, Patlama Önleme Alt Sistemi, Dönem-I, Aşama-II Sözleşmesi

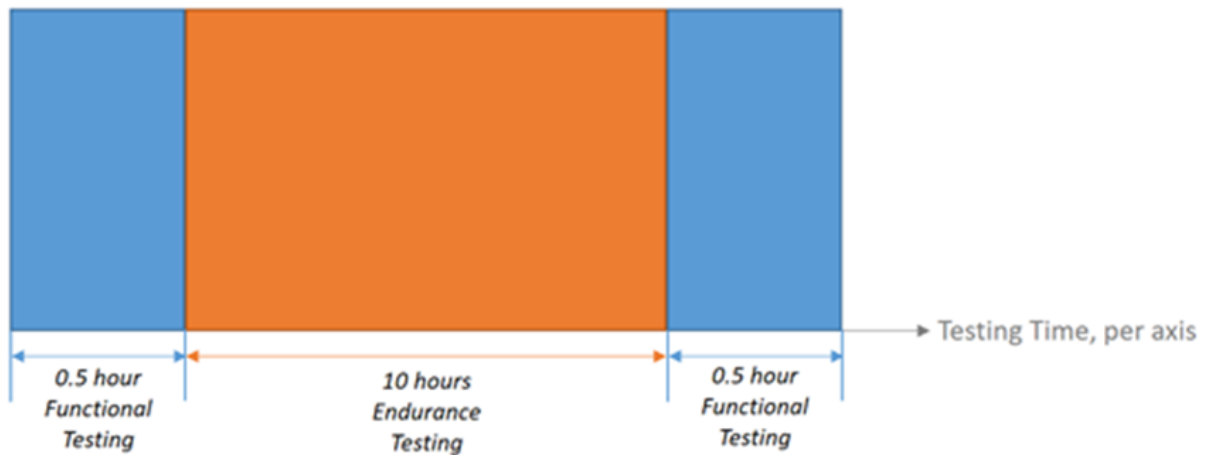
TF-Req-00077975 / A / EHDBK-VIBRATION-OPERATION CAT6 :

Equipment shall be capable of functioning during functional vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



H1 (Hz)	H2 (Hz)	H3(Hz)	W1 (g²/Hz)	W2 (g²/Hz)	W3 (g²/Hz)
50	80	1000	0,15*WF	0,07*WF	0,04

WF: WEIGHT FACTOR
WF= 1 for materiel mounted on vibration isolators and materiel weighing less than 36.3 kg.
WF= 10^{^(0,6-W/60)} for equipment weighing between 36.3 and 72.6 kg. (W = weight in kg.)
WF= 0,25 for equipment weighing 72.6 kg or more.



TF-Req-00077976 / A / EHDBK-SHOCK-HANDLING :

Equipment shall be capable of functioning after exposure to bench handling shock according to MIL-STD-810G W/Change 1 516.7 Procedure 6 or equivalent standard.

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TF-Req-00077977 / A / EHDBK-LOW PRESSURE-TRANSPORT :

Equipment shall be capable of functioning after transportation at 57,2 kPa atmospheric pressure according to MIL-STD-810G W/Change 1 500.6 Procedure 1 or equivalent standard.

P1, ambient pressure.

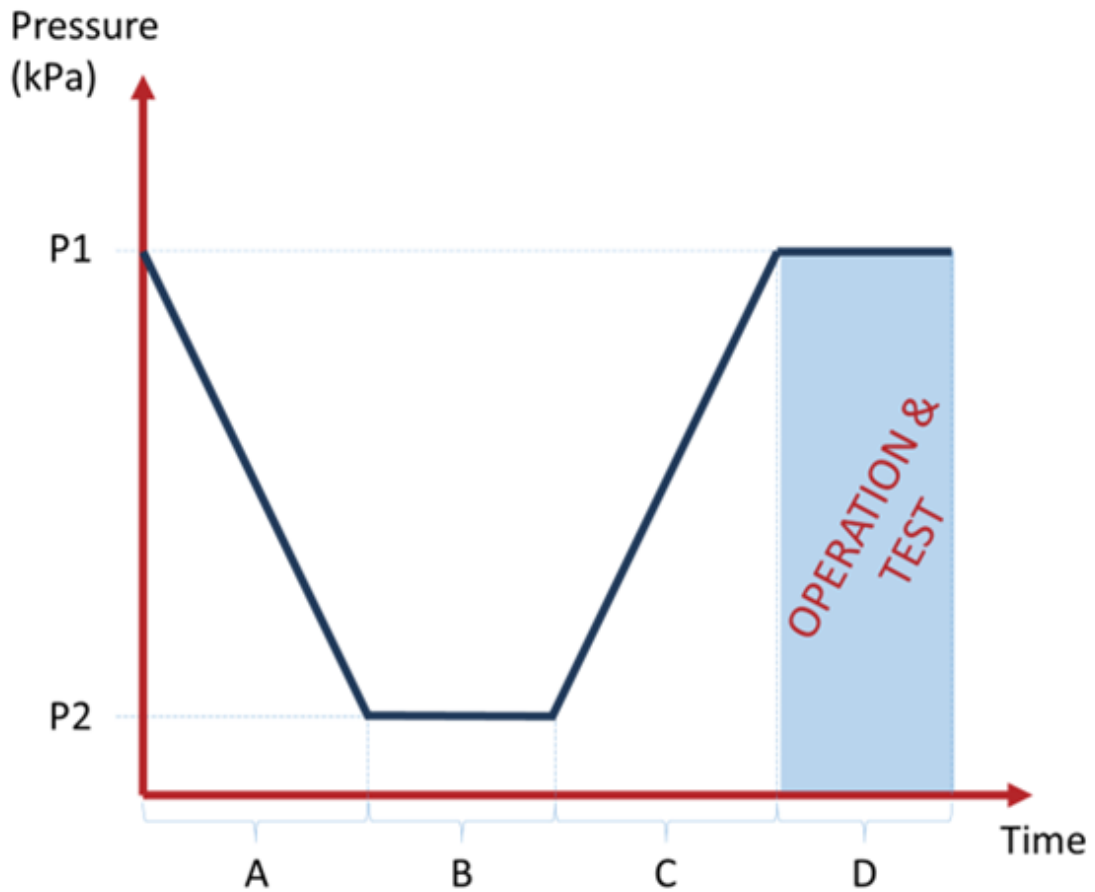
P2, lowest pressure of storage, that defined in related requirement.

A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 1 hour. (Unless otherwise specified)

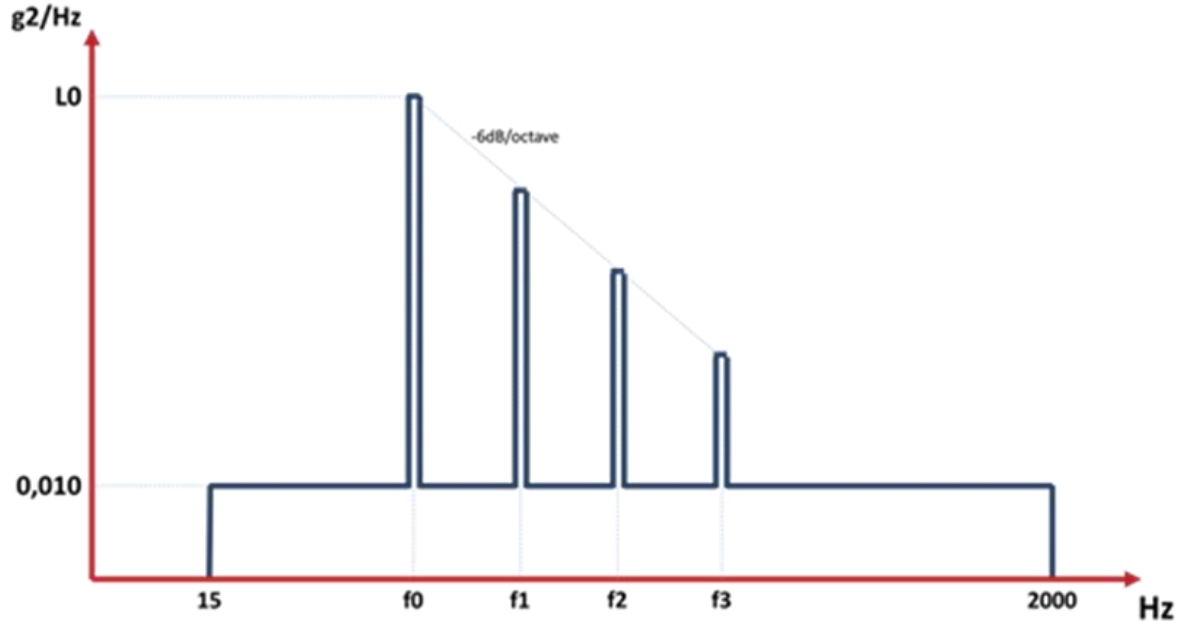
C, pressure increasing time, not greater than 0,125 kPa/sec.

D, turn-on and operational check time, required time for fully verify equipment functionality.



TF-Req-00077979 / A / EHDBK-VIBRATION-AIRWAY TRANSPORT :

Equipment shall be capable of functioning after exposure to the airway transportation at least 1 Hour/axis according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



L0 (g2/Hz)	f0 (Hz)	f1(Hz)	f2(Hz)	f3(Hz)	DURATION
0,3	115*	230*	345*	460*	1 Hour per Each Axis

*Given frequencies are the middle point. For frequency increasing and decreasing point please apply ± 5 Hz.

TF-Req-00077978 / A / EHDBK-LOW TEMP-STORAGE :

Equipment shall be capable of functioning after exposure -54°C temperature storage/transport condition according to MIL-STD-810G W/Change 1 502.6 Procedure 1 or equivalent standard.

T1, test starting temperature, 23±2°C unless otherwise specified.

T2, lowest storage temperature, that defined in related requirement.

A, temperature decreasing time, (T1-T2)/A is not greater than 3°C/min.

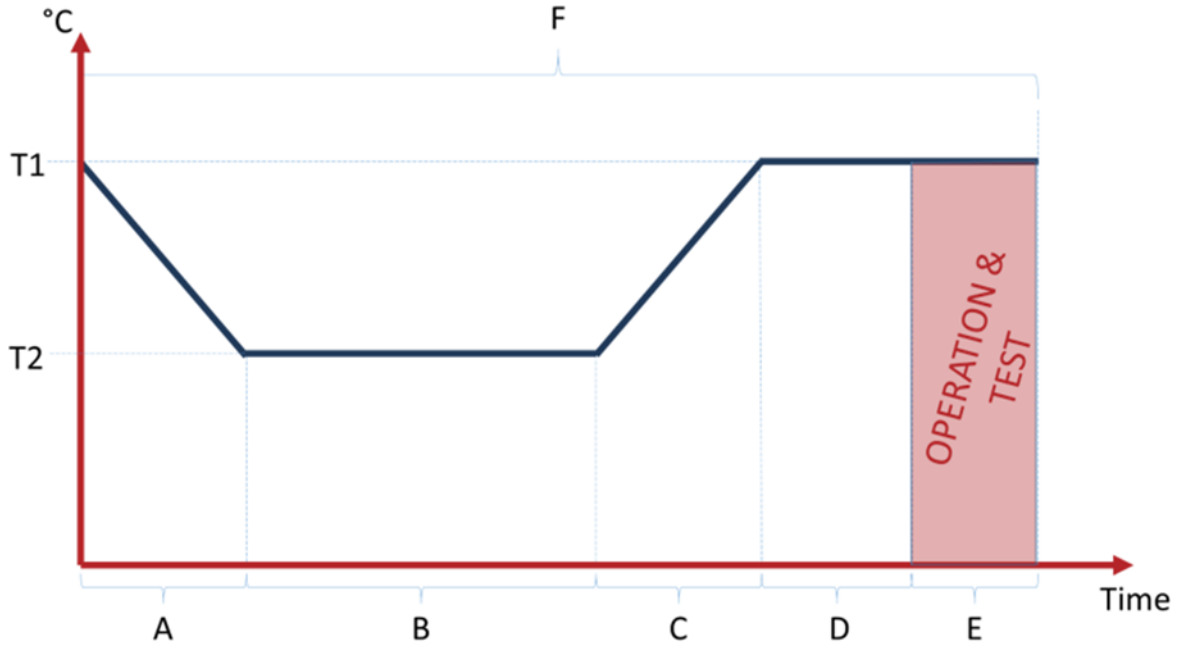
B, storage temperature stabilization time, minimum 24 hours.

C, temperature increasing time, same value with A. (unless otherwise specified)

D, heat up time, minimum 2 hours.

E, turn-on and operational check time, required time for fully verify equipment functionality.

F, cycle number, 1 cycle. (unless otherwise specified)



TF-Req-00077980 / A / EHDBK-LOW PRESSURE-RAPID-DECOMP-1 :

Equipment shall be capable of withstanding to the rapid decompression between 75,2 kPa to 41,9 kPa in not more than 15 seconds according to MIL-STD-810G W/Change 1 500.6 Procedure 3 or equivalent standard.

P1, ambient pressure.

P2, high pressure level of decompression, that defined in related requirement.

P3, low pressure level of decompression, that defined in related requirement.

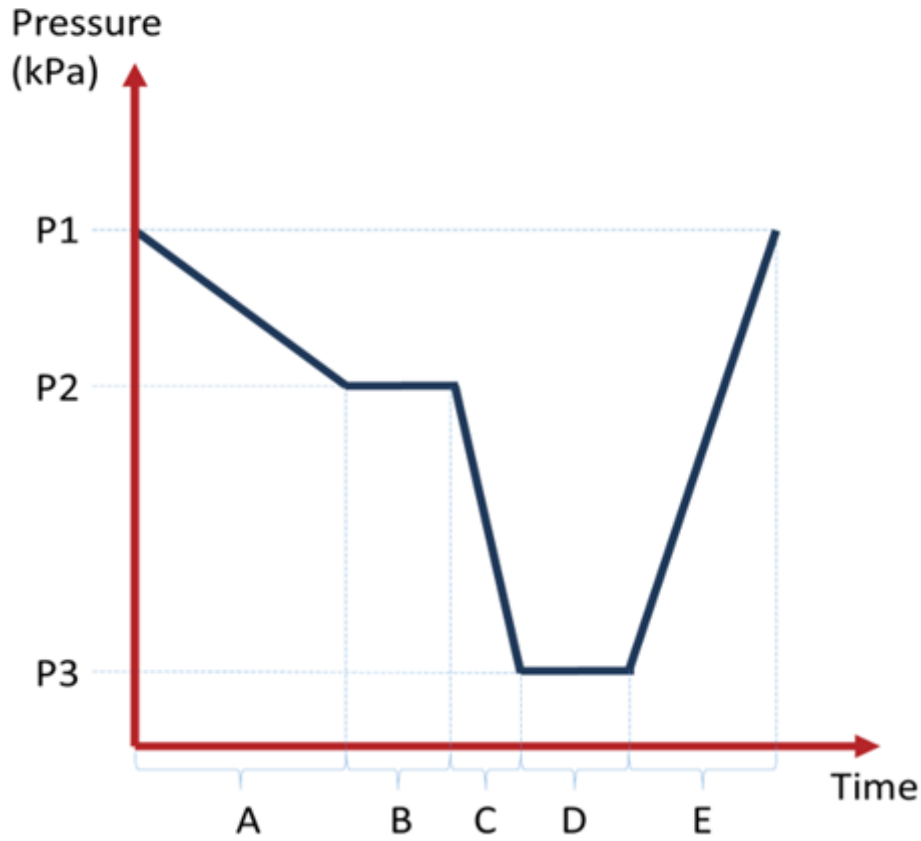
A, pressure decreasing time, not greater than 0,125 kPa/sec.

B, pressure stabilization time, at least 10 min. (Unless otherwise specified).

C, decompression time, for rapid decompression 15 sec., for explosive decompression 0,1 sec.

D, pressure stabilization time, at least 10 min. (Unless otherwise specified).

E, pressure increasing time, not greater than 0,125 kPa/sec.



TF-Req-00077981 / A / EHDBK-HIGH TEMP-INT OPERATE 7 :

Equipment shall be continue to function intermittently at 80°C temperature for 15 minutes duration.

T1, test starting temperature, $23 \pm 2^\circ\text{C}$ unless otherwise specified.

T2, highest operational temperature, that defined for related zone.

T3, intermittent operation temperature, that defined in related requirement.

A, temperature increasing time, $(T2-T1)/A$ is not greater than $3^\circ\text{C}/\text{min}$.

B, turn-on and operational temperature stabilization time, minimum 2 hours.

C, temperature increasing time, quickly as possible.

D, intermittent operational check time, that defined in related requirement.

E, turn-off and temperature decreasing time, $(T3-T1)/E$ is not greater than $3^\circ\text{C}/\text{min}$

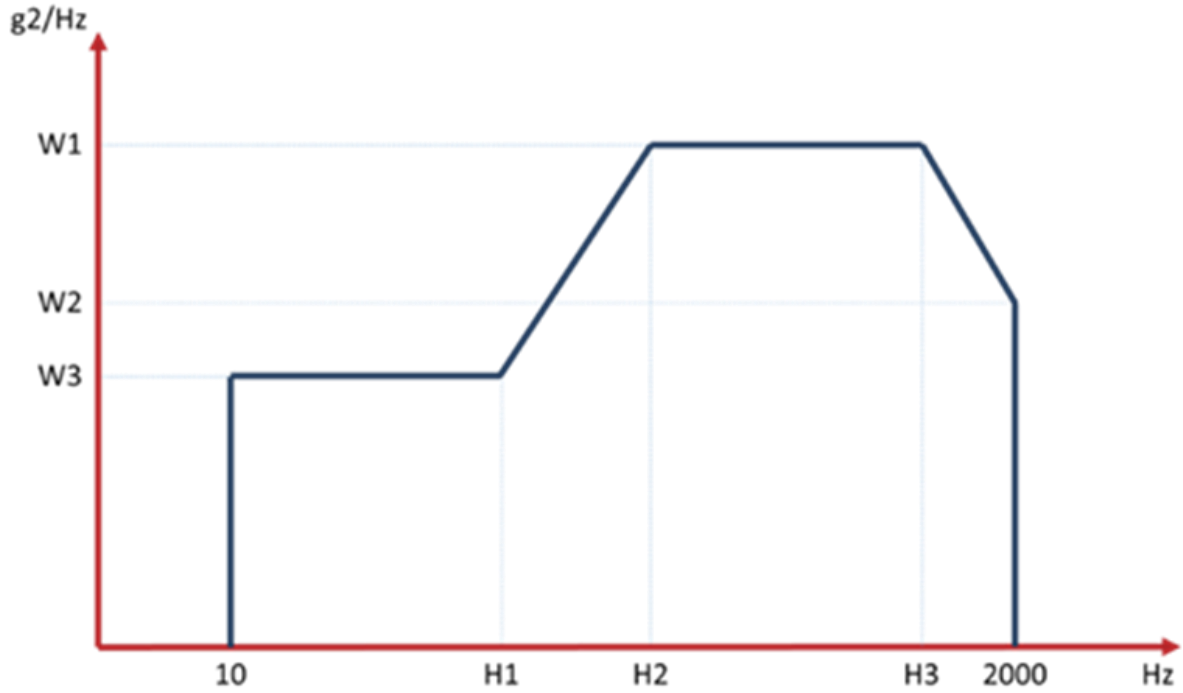
F, cool down time, minimum 2 hours. (unless otherwise specified)

G, cycle number, 1 cycle. (unless otherwise specified)



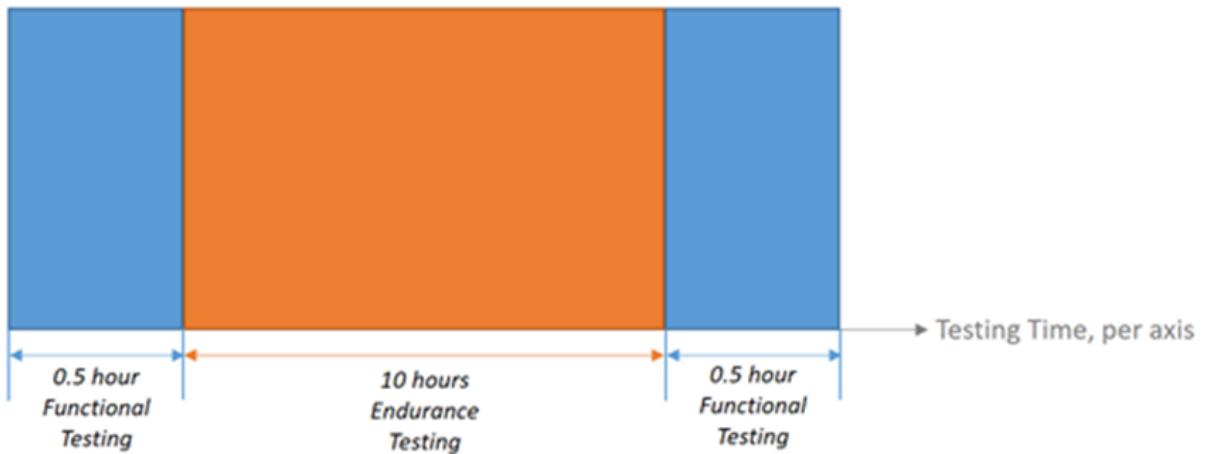
TF-Req-00077956 / A / EHDBK-VIBRATION-ENDURANCE CAT6 :

Equipment shall be capable of functioning after exposure to endurance vibration environment given below according to MIL-STD-810G W/Change 1 514.7 Procedure 1 or equivalent standard.



H1 (Hz)	H2 (Hz)	H3(Hz)	W1 (g^2/Hz)	W2 (g^2/Hz)	W3 (g^2/Hz)
50	80	1000	$0,22 \cdot WF$	$0,1 \cdot WF$	0,05

WF: WEIGHT FACTOR
WF= 1 for materiel mounted on vibration isolators and materiel weighing less than 36.3 kg.
WF= $10^{(0,6-W/60)}$ for equipment weighing between 36.3 and 72.6 kg. (W = weight in kg.)
WF= 0,25 for equipment weighing 72.6 kg or more.



3.6.2 E3 Requirements

TF-Req-00047697 / A / Intra_System Electromagnetic Compatibility :

ExPS shall be electromagnetically compatible among all subsystems and equipment within the system.

TF-Req-00047698 / A / Qualification Requirements :

Subsystem or equipment shall provide following emission and susceptibility requirements.

Table 5 Qualification Requirements

Requirements from MIL-STD-461G		
Requirement	Test Description	Test Limit
CE102	CE, Power Leads, 10kHz to 10MHz	Figure CE102-1
CS101	CS, Power Leads, 30Hz to 150kHz	Figure CS101-1 voltage limit Figure CS101-2 power limit
CS114	CS, Bulk Cable Injection, 10kHz to 200MHz	TABLE VI Figure CS114-1, Curve #3
CS115	CS, Bulk Cable Injection, Impulse Excitation	Figure CS115-1
CS116	CS,Damped Sinusoidal Transients, Cables and Power Leads, 10 kHz to 100 MHz	Figure CS116-1 Figure CS116-2
CS117	CS, Lightning Induced Transients, Cables and Power Leads	TABLE VII, Internal Equipment Levels
CS118	CS, Personnel Borne Electrostatic Discharge	TABLE VIII, up to ± 15 kV TABLE IX
RE102	RE, Electrical Field, 2MHz to 18GHz	Figure RE102-3 “Fixed Wing Internal <25 meters Nose to Tail”
RS103	RS, Electric Field, 2MHz to 40 GHz	TABLE XI 20 V/m, 2 MHz to 1 GHz 60 V/m 1 GHz to 40 GHz

TF-Req-00047699 / A / Operation of EUT :

ExPS all operating modes (including Built in Test and Functional Test modes), shall be considered while performing both emission and susceptibility tests.

TF-Req-00047700 / A / DC Bonding Levels :

The following direct current (DC) bonding levels shall be applied for metallic structures:

- 10 milliohms or less from the equipment enclosure to system structure, including the cumulative effect of all faying surface interfaces.
- 15 milliohms or less from cable shields to the equipment enclosure, including the cumulative effect of all connector and accessory interfaces.
- 2.5 milliohms or less across individual faying interfaces within the equipment, such as between subassemblies or sections.

TF-Req-00047701 / A / Maximum Internal EME Levels :

ExPS shall be electromagnetically compatible with the internal EME levels, involving defined modulation criteria.

Table 6 Maximum Internal EME Levels

Frequency Range (MHz)		Internal Electric Field (V/m)	
		Peak	Average
0.01	2	88	27
2	30	64	64
30	150	67	13
150	225	67	36
225	400	58	3
400	700	1074	79.7
700	790	40.1	40.1
790	1000	144.8	52.6
1000	2000	844.7	105.5
2000	2700	240.4	52.5
2700	3600	1060	114.3
3600	4000	37.2	2.8
4000	5400	892	165
5400	5900	892	165
5900	6000	37.2	1
6000	7900	86.4	3.5
7900	8000	37.2	1
8000	8400	47	17.6
8400	8500	47	17.6
8500	11000	1582.2	59.8
11000	14000	555.4	23.6
14000	18000	451.1	164.5
18000	50000	133.9	9.5

Table 7 Modulation Criteria

MODULATION	
10 kHz to 400 MHz	1 kHz square wave modulation of at least 90 percent depth: The peak of the test signal must meet the requirement based on the average environment.
	CW: The peak of the test signal must meet the requirements based on the peak environment.
400 MHz to 50 GHz	1 kHz pulse modulation of at least 90 percent depth: For frequencies less than 4 GHz the pulse width is 4 µsec. For frequencies greater than 4 GHz the pulse width is 1 µsec. The peak of the test signal must meet the requirement based on the peak environment.
	1 kHz square wave modulation of at least 90 percent depth: The peak of the test signal must meet the requirement based on the average environment.
	CW: The peak of the test signal must meet the requirement based on the average environment.
NOTE	Consider switching the signal on and off at a 1 to 3 Hz rate and 50 percent duty cycle for an EUT. When using 1 to 3 Hz modulation, ensure that sweeping and/or frequency stepping is suspended during the "off" period of the modulation.

TF-Req-00047702 / A / Bonding Provisions Upon Pipes :

ExPS shall have unpainted electrical bonding areas upon pipes at unions or adjacent to attachment points.

TF-Req-00047703 / A / Protection of Bonding Areas :

All electrical bonding areas shall be protected from corrosion by conductive coating suitable for immersion within fuel.

TF-Req-00047704 / A / Bonding in Fuel Tanks :

Copper and copper alloys shall be avoided for bonding in fuel tanks unless tinned or plated.

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)

PROJESİ

PATLAMA ÖNLEME SİSTEMİ

DÖNEM-I, AŞAMA-II SÖZLEŞMESİ

EK-2

İŞ TANIMI

(STATEMENT OF WORK)

2024

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ANNEXES

ANNEX-1 CONTRACT DATA REQUIREMENTS LIST (CDRL)

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ANNEX-3 PROJECT PROGRESS REPORTS TEMPLATE

ANNEX-4 DELIVERABLES LIST

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ANNEX-7 DESIGN ORGANIZATION INTERFACE DOCUMENT (DOID)
TEMPLATE

ANNEX-8 ENGINEERING COORDINATION MEMO (ECM) TEMPLATE

ANNEX-9 TURKISH AEROSPACE FURNISHED ARTICLES (TAFA))

ANNEX-10 QUALITY MANAGEMENT REQUIREMENTS

ANNEX-11 INTEGRATED MASTER PLAN TEMPLATE

RECORDS OF ISSUES

Issue	Date	Author	Change Details
1	07.04.2023		Initial Release
2	20.01.2024		6.1.2.5 and 6.1.2.6 items were added. Chapter 1.2 is added. 4.1.12 and 4.1.13 items were inserted. 13.2.2.17 and 13.2.2.18 items were inserted. “PDOR” Definition was inserted into Abbreviations.
3	26.02.2024		Chapter 6.1.3 was updated.

DEFINITIONS and ABBREVIATIONS

DEFINITIONS

In this Statement of Work (SOW), unless otherwise the context specifically requires, the following words and expressions shall have the meanings assigned to them in this article.

All definitions are applicable to this Appendix and its Annexes.

“Acceptance” means the definition stated in sub-article 3.1.25 of Contract Terms and Conditions.

“Acceptance Test Procedure” means a document that specifies the acceptance test procedure to be applied in order to verify the compliancy of the Explosion Prevention System.

“Acceptance Test” means the tests to be applied in order to verify the compliancy of the system or equipment.

“Air Vehicle” means the Turkish Fighter (TF-X) in the scope of this Contract.

“Airworthiness” means the ability for a particular air vehicle configuration, starting, sustaining and ending its flight safely within the approved limitations and terms of use.

“Airworthiness Certification” means a systematic process that is applied to determine airworthiness of a system, equipment, part or appliance and results with a documented decision.

“Approval Letter” means the definition stated in sub-article 3.1.64 of Contract Terms and Conditions.

“Behavioral Architecture” means sequencing, actions/conditions, triggering events for control or data-flow, states/modes and their transitions of an equipment or system.

“Certification Basis” means set of requirements composed of airworthiness standards, equivalent level of safety findings, special conditions and exceptions that must be met by type design to ensure airworthiness of Air Vehicle, equipment or parts and appliances

“Certification Board” means the certification authority composed of SSB and TurAF representatives in order to carry out the guidance and administration of certification activities.

“Certification Panels” means working group of certification authority at which, Certification Basis, means of compliance, System Certification Plans for a specific discipline are discussed and agreed. In addition, compliance verification activities for the relevant discipline are managed within the panel. Panels are coordinated by panel coordinator and its members may be composed of certification specialists of SSB and TurAF.

“Certification Review Item (CRI)” means a way for describing and tracking the resolution of significant technical, regulatory and administrative issues that occur during the certification process. CRI process establishes a formal communication for dialogue of significant issues between Certification Panels/Board and Turkish Aerospace. CRI types include special condition, interpretative material, equivalent safety finding, and exemption.

“Configuration Item (CI)” means aggregation of hardware, software, firmware or any discrete portion thereof that satisfies an end use function, and is designated for separate configuration management.

“Configuration Management Plan” means a plan containing configuration management activity to be performed under this Contract; how it is organized, how it will be conducted, and the methods procedures and controls effective configuration identification, change control, status accounting, and audits of the configuration.

“Cost Collection Number (CCN)” means the unique number to define the work package derived from work breakdown structure for assigning and managing the budget by integrating (mapping) integrated master schedule, cost collection system and earned value management calculations.

“Common Reconfigurable Architecture Framework for TF-X (CRAFT)” defines a reference architecture used for common hardware and software solution that provides open architecture, modularity, scalability, reusability, reconfigurability, portability, loosely coupling, ease of change, abstraction, common development environment. Conformance to the CRAFT architecture helps ensure SW/HW components are open, modular, and reusable to the maximum extent possible.

“Delivery Standard” means the maturity of the Product delivers to Turkish Aerospace as laboratory qualified, SoF qualified, full qualified.

“Design Budget” means sources/targets allocated to system/subsystem such as cooling, hydraulic power, electrical power etc.

“Design Assurance System” means the organizational structure, responsibilities, procedures and resources to ensure the proper functioning of the design organization.

“Engineering Change” means a change to the current approved configuration of a CI at any point in the item’s life cycle. Also known as configuration change.

“Environmental Qualification” means a test to provide means of determining the performance characteristics of airborne equipment in environmental conditions representative of those which may be encountered in airborne operation of equipment.

“Expense Report” means the definition stated in sub-article 3.1.22 of Contract Terms and Conditions.

“Functional Architecture” means functional decomposition that identifies system functions and their interactions.

“Hardware Plan(s)” means a set of plans defined in DO-254.

“Hardware Requirements Document” means a requirements document containing the hardware requirements, details of the interfaces of the system and traceability information.

“Integrated Master Plan (IMP)” means a plan covering necessary events and significant accomplishments, needed to successfully complete the Project, including the mandatory events, accomplishments, progress to date, key project phases, critical events and critical deliverables as reflect the overall Project summary identified in this Contract.

“Integrated Master Schedule (IMS)” means a schedule covering the activities, activity durations, sequence of the activities, interdependencies for Phase-I, Stage-II including activities for each block. Resource management is conducted at cost collection level (with related Cost Collection Number (CCN)) in line with IMS and separate resource table using appropriate project control system tools.

“Key Performance Parameters (KPPs)” means performance parameters of a System considered critical to the development of an effective operational capability. A KPP normally has a threshold representing the minimum acceptable value achievable.

“Logical Architecture” means functional elements and their interactions required to meet system functions and requirements.

“Long Lead Time Items (LLTI)” means components of the System for which the times to design and fabricate are the longest, and therefore, to which an early commitment of funds may be desirable to complete the system by the earliest possible.

“Low Level Hardware Requirements Document” means a requirements document containing the derived or decomposed low level hardware requirements, details of the interfaces of the system and traceability information.

“Low Level Software Requirements Document” means a requirements document containing the derived or decomposed low level software requirements, details of the interfaces of the system and traceability information.

“Means of Compliance” means the techniques that will be used to demonstrate the compliance of the type design against each certification requirement identified in the Certification Basis.

“Physical Architecture” means actual components or equipment and their interface relations that perform the functions of the associated logical elements.

“Product(s)” means the definition stated in sub-article 3.1.66 of Contract Terms and Conditions.

“Program Management Plan” means a plan containing project management activity to be performed under this Contract; how it is organized, how it will be conducted, associated methods and procedures.

“Project Progress Reports” means a report that summarizes the status of the Project for the associated Term (e.g. issues, risks, maturity, achievements) and planning for the coming Term (e.g. mitigation plans, coming phase schedule).

“Program Quality Management Plan” means a plan containing quality

management activity to be performed under this Contract; how it is organized, how it will be conducted, and the methods procedures.

“Project Review Meetings” means formal meetings that are defined in sub-article 4.1 of this SOW and at which the progress of the Project will be reviewed.

“Program Risk, Opportunity and Issue Management Plan” means a plan containing risk and opportunity management process under this Contract; how it is organized, how it will be conducted, and the methods procedures.

“Qualification Status Report” means a document prepared for every block configuration that presents the requirement qualification status and compliance documents for each MoC.

“Reliability and Testability Management Plan” means a plan containing the reliability and testability management organization and activities that will influence the design of the systems and aid the definition and establishment of a support solution to achieve a cost effective and available System.

“Review Report” means summary of technical review containing purpose of review, content of review, attendees, minutes, action items, critical issues and conclusion of the review (e.g. passes or failed)

“Safety Program Plan” means a plan containing the safety work and the deliverables planned and to assign responsibilities under this Contract. It also indicates the principles of the safety assessment tasks, management and the schedule for deliverable items set forth in Annex-1.

“SEU” Single Event Upset means the resulting unintentional change in the state of a binary logic storage cell (i.e., changing from 0 to 1 or vice versa) that occurs when an ionizing particle or electro-magnetic radiation strikes the storage circuitry. The erroneous state change is not permanent and is considered a soft failure because resetting or rewriting to memory will clear the condition.

“Software Plan(s)” means a set of plans defined in DO-178C.

“Software Requirements Document” means a requirements document containing the software requirements, details of the interfaces of the system and traceability information

“Special Condition” means the additional requirements created when the existent airworthiness standards do not include sufficient or appropriate safety requirements due to new or extraordinary qualifications and out-of-standard use of the airborne platform.

“Specialty Engineering Analyses/Assessments/Handbook Dossier” means a set of analyses report(s), assessment(s) and handbook(s) containing specialty engineering disciplines which are Safety, RMST, environmental engineering, Electromagnetic Environmental Effects (E3).

“Stakeholders” means stakeholders consisting of Turkish Aerospace, SSB, TurAF and Subcontractors, consultants, subject matter experts.

“Systems Engineering Management Plan” means a plan containing systems engineering management activities to be performed under this Contract; how it is organized, how it will be conducted, associated methods and procedures.

“System Design Description” means a document containing system design rationale, system architectural design (interfaces, system components etc.), requirements traceability and functional allocations. This document will be traceable to system requirements.

“TO” means the definition stated in sub-article 3.1.55 of Contract Terms and Conditions.

“Technical Reviews” means formal meeting defined in sub-article 0 of this SOW and the maturity of design activities set forth in this SOW will be reviewed.

“Term” means the definition stated in sub-article 3.1.13 of Contract Terms and Conditions.

“Test Management Plan” means a plan containing test and evaluation activities to be performed under this Contract; how it is organized, how it will be conducted, associated methods and procedures.

“TF-X” means Turkish Fighter which will be developed according to Appendix-1.

“Project” means the definition stated in sub-article 3.1.46 of Contract Terms and Conditions.

“Type Certification” means the process demonstrating that the design of a new type

or derivative Air Vehicle complies with the applicable type Certification Basis.

“Variance” means a departure from approved product definition information, for a limited amount of time or for a specified effectivity, that does not require revision of approved product definition information.

“Verification Test” means the system or equipment level tests to be performed for the verification of the system or equipment level requirements.

“Work Breakdown Structure” means hierarchical and incremental decomposition of the works set forth in this SOW.

ABBREVIATIONS

All abbreviations are applicable to this Appendix and its Annexes.

“**CAD**” stands for Computer Aided Design

“**CCN**” stands for Cost Collection Number

“**CDR**” stands for Critical Design Review

“**CI**” stands for Configuration Item

“**CID**” stands for Configuration Index Document

“**COC**” stands for Conformance of Certification

“**COTS**” stands for Commercial Off the Shelf

“**CRAFT**” stands for Common Reconfigurable Architecture Framework for TF-X

“**CRI**” stands for Certification Review Item

“**CSA**” stands for Configuration Status Accounting

“**DDP**” stands for Declaration of Design and Performance

“**DMU**” stands for Digital Mock Up

“**DOCA**” stands for Design Organization Competency Approval

“**DOID**” stands for Design Organization Interface Document

“**ECM**” stands for Engineering Coordination Memo

“**E3**” stands for Electromagnetic Environmental Effects

“**EMAR**” stands for European Military Airworthiness Requirements

“**EMC**” stands for Electro-Magnetic Compatibility

“**EMI**” stands for Electromagnetic Interference

“**FAI**” stands for First Article Inspection Report

“**FMECA**” stands for Failure Mode, Effects and Criticality Analysis

“**FRACAS**” stands for Failure Reporting, Analysis and Corrective Action System

“**GQAR**” stand for Government Quality Assurance Representative

“HW” stands for Hardware

“ID” stands for Identification

“IMP” stands for Integrated Master Plan

“IMS” stands for Integrated Master Schedule

“IPS” stands for Integrated Product Support

“IT” stands for Information Technologies

“ITAR” stands for International Traffic in Arms Regulations

“EAR” stands for Export Administration Regulation

“KPP” stands for Key Performance Parameter

“LCC” stands for Life Cycle Cost

“LLTI” stands for Long Lead Time Items

“LSA” stands for Logistics Support Analysis

“MFHBF” stands for Mean Flight Hour Between Failures

“MFHBCF” stands for Mean Flight Hour Between Critical Failures

“MFHBFA” stands for Mean Flight Hour Between False Alarms

“MoC” stands for Means of Compliance

“MTBF” stands for Mean Time Between Failures

“MTBCF” Mean Time Between Critical Failure

“PDR” stands for Preliminary Design Review

“PDOR” stands for Preliminary Design Optimization Review

“RBD” stands for Reliability Block Diagrams

“RMST” stands for Reliability, Maintainability, Supportability and Testability

“SCIs” stands for Software Configuration Indices

“CDRL” stands for Contract Data Requirement List

“SECI” standas for Software Life Cycle Environment Configuration Index

“SEMP” stands for Systems Engineering Management Plan

“SMAR” stands for Supplier Maintainability Analysis Report

“SOI” stands for Stage of Involvement

“SOF” stands for Safety of Flight

“SOW” stands for Statement of Work

“SSA” stands for System Safety Assessment

“SSB” stands for Presidency of Defence Industries

“SW” stands for Software

“TFOM” stands for Testability Figure of Merit

“TF-X” stands for Turkish Fighter

“TPM” stands for Technical Performance Measurement

“TRR” stands for Test Readiness Review

“TurAF” stands for Turkish Air Force

“WBS” stands for Work Breakdown Structure

1. SCOPE

1.1. The scope of Phase-I, Stage-II includes the following major activities;

- i. Detail design, implementation, integration and verification of system,
- ii. Acquisition of sub-systems (if buy decision is taken), raw materials and components,
- iii. Production and delivery of products set forth in sub-article 3.1.66 of Contract Terms and Conditions and Annex-4,
- iv. Integrated Product Support (IPS) set forth in Appendix-14
- v. Establishment of infrastructures (integration laboratories, test rigs, manufacturing areas etc.) needed for Phase-I, Stage-II.

1.2. Responsibilities of the Contractor;

- i. Project Management, including integration, scope, schedule, cost, quality, resource, risk, communication, procurement, stakeholder management.
- ii. Engineering, design, development, modelling, validation and verification activities, system integration testing, qualification, industrialization, manufacturing, inspection, acceptance tests, delivery of the system in accordance with the technical specification (refer to Appendix-1 Technical Specification Document)
- iii. Technical assistance to Purchaser for item installation and integration on Purchaser's test rig (responsibilities defined in TFX-ExPS-ECM-31) and the aircraft, and aircraft certification,
- iv. Supply of the associated technical data, models, prototypes, documentation, reporting for procured items.
- v. TÜBİTAK MAM shall provide system integration suggestions for the placement of the verified system on the aircraft. If these suggestions shall not possible for aircraft integration, improvement suggestions shall be developed together with TA. If these improvement suggestions shall not be implemented due to other constraints, their impact on the requirements should be evaluated by TA.

2. APPLICABLE DOCUMENT AND REFERENCES

Applicable and reference standards/ handbooks for TF-X Project are given below. Applicable standards, guidelines and handbooks may be tailored with Turkish Aerospace approval. Contractor shall specify other standards that are applicable or reference to the TF-X Project. If the standard/handbook is found to be obsolete Contractor shall propose an equivalent standard/handbook. Unless specific revision is stated, latest and valid version at T0 will be valid.

Applicable Standards

EIA 649-1 Configuration Management Requirements for Defence Contract

AS9100-D Quality Management Systems - Requirements for Aviation, Space and Defence Organizations

EMAR-21 European Military Aviation Requirements (EMAR) Part 21 Military Design, Certification and Production

IEEE STD 15288.1-2014_ IEEE Standard for Application of Systems Engineering on Defence Programs

IEEE STD 15288.2-2014 IEEE Standard for Technical Reviews and Audits on Defence Programs

MIL-HDBK-338B – Electronic Reliability Design Handbook

MIL-HDBK-516C Airworthiness Certification Criteria (Dated: 12 December 2014)

MIL-STD-781D – Reliability Testing for Engineering Development, Qualification and Production

MIL-STD-1798C Mechanical Equipment and Subsystems Integrity Program

RTCA DO-160E/F/G Environmental Conditions and Test Procedures for Airborne Equipment or MIL-STD-810E/F/G Environmental Engineering Considerations and Laboratory Tests with MIL-STD-461E/F/G Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

RTCA/DO-178B/C Software Considerations in Airborne Systems and Equipment Certification

RTCA/DO-254 (19/04/2008) Design Assurance Guidance for the Verification of Airborne Electronic Hardware

S3000L International Procedure Specification for Logistics Support Analysis

SAE ARP4754A Guidelines for Development of Civil Aircraft and Systems or MIL-STD-882E System Safety

SAE ARP4761 Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment or MIL-STD-882E System Safety

Reference Standards

AQAP 2310 NATO Standard: Quality Assurance Requirements for Aviation, Space and Defence Suppliers

AQAP 2105 NATO Standard: NATO Requirements for Quality Plans.

IEEE STD 12207-2008 Systems and software engineering - Software Life Cycle Processes

ISO10005 International Standard: Quality Management – Guidelines for Quality Plans

MIL-HDBK-5400 Electronic Equipment, Airborne General Guidelines for

MIL-HDBK-773 Electrostatic Discharge Protective Packaging

MIL-STD-464C Electromagnetic Environmental Effects Requirements for Systems,

MIL-STD-1472G Human Factors Engineering

MIL-STD-46855A Human Engineering Requirements for Military Systems, Equipment, and Facilities

MIL-STD-881C Work Breakdown Structure for Defence Material Items

MIL-STD-1388-1A Requirements for a Logistic Support Analysis Record

MIL-STD-129-N Military Marking Shipment Storage

MIL-STD-2073 Standard Practice for Military Packaging

MIL-STD-785B Department of Defence Standard: Reliability Program for Systems and Equipment Development and Production

MIL-STD-1629A Department of Defence Standard: Procedures for Performing A Failure Mode Effects and criticality Analysis

MIL-STD-2165A Department of Defence Standard: Testability Program for Systems and Equipment

MIL-HDBK-2165 Department of Defence Handbook: Testability Program for Systems and Equipment

RTCA DO-326A Airworthiness Security Process Specification

RTCA DO-356A Airworthiness Security Methods and Considerations

SAE ARP5580 Recommended Failure Modes and Effects Analysis Practices for Non-Automobile Applications

3. GENERAL REQUIREMENTS

- 3.1. The requirements of the Explosion Prevention System are set forth in Appendix-1
- 3.2. These requirements may be changed during the execution of the Project as per the process that will be defined in CDRL 12 Configuration Management Plan.

4. PROJECT MANAGEMENT

4.1 INTEGRATED PROJECT MANAGEMENT

- 4.1.1. Contractor shall prepare, deliver and maintain Program Management Plan [CDRL 1] to incorporate Phase-I, Stage-II. This plan covers including but not limited to approach for execution, delivery and management activities.
- 4.1.2. Contractor shall perform planning, execution, monitoring, controlling, and closing of TF-X Project according to CDRL 1 Program Management Plan.
- 4.1.3. Contractor shall prepare, deliver and maintain Work Breakdown Structure (WBS) [CDRL 6] to incorporate Phase-I, Stage-II.
- 4.1.4. Contractor shall maintain and update the action items with a database. SSB/Turkish Aerospace shall have access to this database when requested.
- 4.1.5. Contractor shall prepare, deliver and maintain Project Progress Reports [CDRL 2] in accordance with Annex 3.
- 4.1.6. Project Review Meetings shall be held within 30 (thirty) days after the completion of each Term to review the Project status of progress.
- 4.1.7. Contractor shall perform contract management according to the process defined in CDRL 1 Program Management Plan.
- 4.1.8. Contractor shall perform infrastructure management according to the process defined in CDRL 1 Program Management Plan which covers planning, coordination, implementation and management of infrastructures.

- 4.1.9. Contractor shall assign an accountability to an individual for the Project. Project organization, associated roles and responsibilities and decision-making process shall be defined in CDRL 1 Program Management Plan.
- 4.1.10. Contractor shall provide accurate and up to date Project status to Turkish Aerospace according to CDRL 10 Stakeholder Management Plan. Electronic means should be used to the maximum extent to provide status.
- 4.1.11. Expenses Review Meetings shall be held at Turkish Aerospace to review the costs incurred and actual expenses within each payment period according to article 23 of Contract Terms quarterly.
- 4.1.12. Contractor shall prepare, deliver and maintain CDRL 63 Human Resources Management Plan.
- 4.1.13. Contractor shall prepare, deliver and maintain CDRL 62 Critical Personnel List and CDRL 64 Security Classification Guide.

4.2 SCOPE MANAGEMENT

- 4.2.1. Contractor shall control, monitor and verify of the scope according to the process defined in CDRL 1 Program Management Plan.
- 4.2.2. Contractor shall perform change management (i.e. contract change, schedule change) according to the process that will be defined in CDRL 1 Program Management Plan.

4.3 TIME MANAGEMENT

- 4.3.1. Contractor shall control the schedule according to the process that will be defined in CDRL 1 Program Management Plan.
- 4.3.2. Contractor shall prepare deliver, and maintain an Integrated Master Plan (IMP) [CDRL 4] in accordance with Annex-11. This plan covers the necessary events and significant accomplishments, needed to successfully complete the Project including the mandatory events, accomplishments, progress to date, key project phases, critical events and critical deliverables as reflect the overall Project summary identified in this Contract. This plan provides a mapping between Appendix-3, CDRL 5 Integrated Master Schedule (IMS) and CDRL 6 WBS.

- 4.3.3. Contractor shall prepare, deliver and maintain IMS [CDRL 5] including resource allocation. This schedule covers the activities, activity durations, sequence of the activities via defined predecessors and successors, resource allocations and interdependencies for Project. IMS integrates all schedules and allows analysis for the critical path. IMS shall be prepared using Primavera P6 and delivered to Turkish Aerospace as a “.xer” file.

4.4 COST MANAGEMENT

- 4.4.1. Contractor shall perform estimating, budget allocation, financing, funding, and controlling the Project cost according to the process that will be defined in CDRL 1 Program Management Plan.
- 4.4.2. Contractor shall prepare Life Cycle Cost (LCC) modelling and LCC analysis, deliver and maintain the LCC Analysis Report [CDRL 3] in line with Turkish Aerospace LCCA Report Template. [TAF 2].
- 4.4.3. Contractor shall provide at least the following required data for life cycle cost analysis and provide support for life cycle cost analysis activities when required. Details will be defined in Turkish Aerospace LCCA Report Template.
- i. Unit production price for the part, with details of any volume driven cost benefits in the form of price breaks,
 - ii. Unit spares price for the part, with details of any volume driven cost benefits in the form of price breaks,
 - iii. Mean Time Between Failures (MTBF) data,
 - iv. Typical new buy lead-time,
 - v. Typical repair turnaround time,
 - vi. Typical price of repair, possibly expressed as a percentage of the new buy price.
- 4.4.4. Contractor shall identify life cycle cost drivers and cost reduction opportunities and report to Turkish Aerospace in CDRL 2 Project Progress Reports.

4.5 QUALITY MANAGEMENT

- 4.5.1. Contractor shall prepare, deliver and maintain Program Quality Management Plan [CDRL 7] to incorporate Phase-I, Stage-II, in accordance with AS9100-D.
- 4.5.2. Contractor shall perform quality management according to CDRL 7 Program Quality Management Plan by means of audit, conformance evaluations, assessments, design reviews, process performance measurements, problem reporting, investigations, data collection and analyses, monitoring acceptance activities to ensure that processes and procedures applicable for this Project are applied and effective.
- 4.5.3. Turkish Aerospace shall have right to request corrective and preventive action for dispositions identified during design, development, production, testing and delivery processes. Corrective and preventive action request shall be evaluated by Contractor and necessary actions shall be taken within 15 (fifteen) days or within extended duration approved by Turkish Aerospace. If not, Turkish Aerospace may reject associated activities (product, document, services etc.) within the scope of Contract.
- 4.5.4. Turkish Aerospace shall deliver nonconformity report to Contractor within 15 (fifteen) days for the nonconformities detected during the investigations Contractor shall take necessary corrective action within 15 (fifteen) days or within extended duration approved by Turkish Aerospace. If not, Turkish Aerospace may reject associated activities (product, document, services etc.) within the scope of Contract.
- 4.5.5. Any decision taken by Government Quality Assurance Representative (GQAR) or Turkish Aerospace Representative does not remove contractual liability of Contractor.
- 4.5.6. Any deficiency identified as a result of the conditions specified in this Contract shall be corrected by the Contractor within an agreed time frame at no cost to Turkish Aerospace.
- 4.5.7. Contractor shall define and implement a system for production operations;

- i. to keep the records of system/component/equipment tests and field failures,
- ii. to monitor the status of design and process corrective actions,
- iii. to analyse the failure modes and root causes,
- iv. to measure the effectiveness of corrective actions and lessons learned.

4.5.8. Contractor shall comply with the quality requirements stated in Annex-10.

4.6 HUMAN RESOURCE MANAGEMENT

4.6.1. Contractor shall perform human resources and talent management according to the process that will be defined in CDRL 1 Program Management Plan. This covers all reasonable efforts and activities of finding and recruiting correct personnel, preparing career plan, developing their talent and skills, assign the correct position and following their performances and keeping them in the Project to the maximum extend.

4.7 COMMUNICATION MANAGEMENT

4.7.1. Contractor shall perform the communication management according to the process that will be defined in CDRL 1 Program Management Plan. Communication management covers the planning of the outline who receives which communications for the Project, who is responsible to deliver and respond to communication content, how and when communications are delivered.

4.8 RISK, OPPORTUNITY AND ISSUE MANAGEMENT

- 4.8.1. Contractor shall prepare, deliver and maintain Program Risk, Opportunity and Issue Management Plan [CDRL 8] to incorporate Phase-I, Stage-II.
- 4.8.2. Contractor shall conduct risk and opportunity management planning, identification, analysis, response planning and controlling risks and opportunities on the Project according to CDRL 8 Program Risk, Opportunity and Issue Management Plan. Contractor shall identify the risks, opportunities and related control plans (including mitigation, contingency and realization plans) in accordance with Annex-3 and

delivered to Turkish Aerospace quarterly with CDRL 2 Project Progress Reports.

- 4.8.3. Contractor shall manage issues according to the process that will be defined in CDRL 8 Program Risk, Opportunity and Issue Management Plan. Issue management covers identification, resolution, monitoring and controlling issues arisen on the Project. Contractor shall present the key issues and their resolution plans in CDRL 2 Project Progress Report in accordance with Annex-3.

4.9 ACQUISITION MANAGEMENT

- 4.9.1. Contractor shall perform acquisition management according to the process that will be defined in CDRL 1 Program Management Plan, which covers the subcontracting, procurement and outsourcing management process.
- 4.9.2. Contractor shall perform acquisition, supply chain management, procurement management and outsourcing management according to CDRL 1 Program Management Plan.
- 4.9.3. Contractor shall monitor, manage and report single source suppliers, export license limitations and restrictions as a part of CDRL 2 Project Progress Reports.
- 4.9.4. Contractor shall identify, manage, monitor, procure and report Long Lead Time Items (LLTI) (e.g. materials, equipment, components, etc.) as a part of CDRL 2 Project Progress Reports.
- 4.9.5. Contractor shall monitor, manage supply chains and report the status as a part of CDRL 2 Project Progress Reports. Contractor shall manage and maintain the procurement data from the subcontractors.
- 4.9.6. Contractor shall define guidelines and directives for the prevention of obsolescence and allocate to subcontractors. Contractor shall manage obsolescence and diminishing manufacturing sources, material shortages.
- 4.9.7. Contractor shall perform acquisition of raw materials and components for delivery aircraft according to Appendix-3.

4.10 STAKEHOLDER MANAGEMENT

- 4.10.1. Contractor shall prepare, deliver and maintain Stakeholder Management Plan [CDRL 10] to incorporate Phase-I, Stage-II. This plan covers the requirements, processes, techniques for engaging Stakeholders.
- 4.10.2. Contractor shall perform identification of the people, groups or organizations that could impact or be impacted by the Project and develop appropriate management strategies for effectively engaging Stakeholders in decisions and execution according to the process that will be defined in CDRL 10 Stakeholder Management Plan, which covers the requirements, processes, techniques for engaging Stakeholders.
- 4.10.3. Contractor shall provide the Project information to associated Stakeholders according to the process that will be defined in CDRL 10 Stakeholder Management Plan. Contractor shall develop system upgrades, IT system capabilities and rules that ensure data integrity and management.

5. SYSTEMS ENGINEERING

5.1 SYSTEMS ENGINEERING MANAGEMENT

- 5.1.1. Contractor shall prepare, deliver and maintain Systems Engineering Management Plan (SEMP) [CDRL 9] to incorporate Phase-I, Stage-II and in accordance with IEEE STD 15288.1-201.
- 5.1.2. Contractor shall perform engineering management, Technical Performance Measurement (TPM), requirements management, interface management and Design Budget management according to CDRL 9 SEMP.
- 5.1.3. Contractor shall track and manage TPM and Key Performance Parameters (KPP)'s according to CDRL 9 SEMP.
- 5.1.4. Contractor shall identify, procure and/or develop the methods and tools that will be used on Phase-I, Stage-II.

- 5.1.5. Contractor shall refine the overall concurrent engineering management rules, methods, tools and objectives for the System and ensure that they are applied by all Stakeholders.
- 5.1.6. Contractor shall manage engineering competencies, technical signatories, standards/reference documents, and the generation/revision of processes, procedure and methods that will be needed for the Project.

5.2 OPERATIONAL ANALYSIS

Contractor shall support Turkish Aerospace in order to assess and improve system's vulnerability.

5.3 REQUIREMENTS MANAGEMENT and DEFINITION

- 5.3.1. Contractor shall perform requirements management to track, and bi-directionally trace all requirements from high level to low level according to SAE ARP 4754 as defined in CDRL 9 SEMP.
- 5.3.2. Contractor shall manage the requirements by using a database and ensure that requirements traceability can be accessed in real time. SSB/Turkish Aerospace shall have access to this database when requested.
- 5.3.3. If there is any need to a change a requirement, the change process set forth in 5.5.4 shall be applied and Contractor shall revise, deliver and maintain System Requirement Document [CDRL 11].

5.4 SYSTEM ARCHITECTURE

- 5.4.1. Contractor shall define the selected System architecture and prepare, deliver and maintain System Design Description [CDRL 26]. System Design Description covers the architecture of the system, the interactions between equipment/other item within the system, system design rationale and the implementation of functions performed by the system.
- 5.4.2. Contractor shall perform interface management and Design Budget management according to CDRL 9 SEMP to ensure that harmonized and technical solutions are developed in accordance with these interfaces.

5.5 CONFIGURATION MANAGEMENT

- 5.5.1. Contractor shall prepare, deliver and maintain Configuration Management Plan [CDRL12] to incorporate Phase-I, Stage-II. This plan shall in line with the principles defined in EIA 649-1 Configuration Management Standard.
- 5.5.2. Contractor shall perform configuration management within the Project according to CDRL 12 Configuration Management Plan.
- 5.5.3. If there is an update for a CDRL approved by Turkish Aerospace, Contractor shall either resubmit the CDRL for Turkish Aerospace approval or establish a change management process that enables Turkish Aerospace to review the changes and final document and access all CDRL revisions.
- 5.5.4. Within the scope of quality management and configuration management;
 - i. Engineering Changes shall be classified in accordance with EIA 649-1,
 - ii. Engineering Changes shall be in the format as defined in CDRL 12 Configuration Management Plan or equivalent format with the same content,
 - iii. In addition, both request for changes/Variations shall classified in accordance with EIA 649-1.
 - iv. All Major (Class I) Engineering Changes shall be approved by Turkish Aerospace in accordance with CDRL 12 Configuration Management Plan.
 - v. Class-II Engineering Changes shall be delivered to Turkish Aerospace for evaluation. If a Class-II Engineering Change is identified as Class-I by Turkish Aerospace, then, this Engineering Change shall be submitted to Turkish Aerospace approval.
 - vi. Classification of requested Variance as critical, major or minor shall be performed by Turkish Aerospace.
 - vii. Critical and major Variations shall be approved by Turkish Aerospace in accordance with CDRL 12 Configuration Management Plan.
 - viii. Minor Variations shall be approved by Turkish Aerospace in

accordance with CDRL 12 Configuration Management Plan.

- 5.5.5. Contractor shall identify the product configuration information, which shall enable to define and verify the configuration of products, to label their product configuration information to manage the changes in addition to maintain traceability throughout the product's life cycle.
- 5.5.6. Contractor shall have configuration management identification approach in accordance with EIA 649-1. Contractor shall define CIs and associated data with traceability to defined configuration baseline in Configuration Management Plan [CDRL 12].
- 5.5.7. Contractor shall prepare a report covering a status of baseline and present CI list before transition to new baseline defined in CDRL 12 Configuration Management Plan or when requested by Turkish Aerospace. CI list shall be approved by Turkish Aerospace.
- 5.5.8. Contractor shall establish a Configuration Status Accounting (CSA) system to be able to capture and report the status of product configuration information. Contractor shall prepare and publish a CSA report and Configuration Index Document (CID) for each project milestone set forth in Appendix-3 and when requested by Turkish Aerospace. CSA report covers below information in line with project milestones;
 - i. Status of all configuration information (3D models, technical documents, etc.).
 - ii. The status of proposed/requested changes to the established configuration (change identification, documentation, effectivity and disposition)
 - iii. The list and implementation status of all engineering changes and Variances (deviation).
- 5.5.9. SSB/Turkish Aerospace may perform investigations, reviews, tests, inspections or audits within the scope of CDRL 12 Configuration Management Plan at local Contractor's facilities. In this context, SSB/Turkish Aerospace shall inform Contractor 15 (fifteen) days before the investigation. Contractor shall support SSB/Turkish Aerospace and

take all necessary precautions to provide secure and appropriate condition to SSB/Turkish Aerospace.

- 5.5.10. Contractor shall manage design data, the product structure and digital models according to CDRL 12 Configuration Management Plan.

5.6 SPECIALITY ENGINEERING

5.6.1 SAFETY

- 5.6.1.1. Contractor shall prepare or revise, deliver and maintain Safety Program Plan [CDRL 13] to incorporate Phase-I Stage-II, in accordance with the Supplier Safety Dossier [TAFA 3].
- 5.6.1.2. Contractor shall perform all safety activities within the project according to CDRL 13 Safety Program Plan.
- 5.6.1.3. Contractor shall perform all necessary activities to support Turkish Aerospace to perform air vehicle and system level safety assessment in accordance with SAE ARP4761.
- 5.6.1.4. Contractor shall prepare, deliver and maintain System/Sub-system level Safety Assessment (SSA) [CDRL 14.1] as part of Specialty Engineering Analyses/Assessments Dossier [CDRL 14] in accordance with SAE ARP4761 and the template in Supplier Safety Dossier [TAFA 3] in the content of CDRL 14.1 SSA.
- 5.6.1.5. Contractor shall perform all necessary activities to support Turkish Aerospace to perform safety risk management activities in accordance with MIL-STD-882E Department of Defence Standard Practice System Safety (Section 4). The output of this activity will be captured as safety risk assessment report in line with the Supplier Safety Dossier [TAFA 3] in the content of CDRL 14.1 SSA.
- 5.6.1.6. Contractor shall perform all necessary activities to support Turkish Aerospace to identify and manage hazards of the product. The output of this activity will be captured as safety risk assessment report in line with the Supplier Safety Dossier [TAFA 3] in the content of CDRL 14.1 SSA.

- 5.6.1.7. Contractor shall identify the product hazards and course of mitigations, considering the operational and human hazards, occupational safety and health and environmental impacts to provide a comprehensive evaluation of the status of safety hazards and their associated risks prior to product delivery. The output of this activity will be captured as safety risk assessment report in line with the Supplier Safety Dossier [TAFA 3] in the content of CDRL 14.1 SSA.
- 5.6.1.8. Contractor shall manage, justify and report hazardous material according to Turkish Aerospace Environmental Safety and Occupational Health Program Plan. Hazardous material list and related part of Environmental Safety and Occupational Health Program Plan will be provided as Environmental Safety and Occupational Health Program Guidance [TAFA 10].

5.6.2 RELIABILITY, MAINTAINABILITY, SUPPORTABILITY, TESTABILITY (RMST)

5.6.2.1 Reliability

- 5.6.2.1.1. Contractor shall prepare, deliver and maintain Reliability and Testability Management Plan [CDRL 15] in accordance with Turkish Aerospace Reliability and Testability Management Plan Template [TAFA 6], to incorporate Phase-I, Stage-II. This plan covers the reliability and testability management organization and activities that will influence the design of the systems, aid the definition and establishment of a support solution to achieve a cost effective and available System and approach to hardware and software reliability assurance.
- 5.6.2.1.2. Contractor shall perform Reliability Analyses according to CDRL 15 Reliability and Testability Management Plan and deliver the results as part of Specialty Engineering Analyses/Assessments Dossier [CDRL 14]. The applicability of tasks shall be documented within the Reliability and Testability Management Plan [CDRL 15] and agreed with Turkish Aerospace.

- 5.6.2.1.3. Contractor shall perform reliability activities and analysis in accordance with MIL-STD-785B Department of Defence Military Standard for Reliability Program. This shall include, but not be limited to tasks 101, 102, 103, 104, 105, 201, 202, 203, 204, 205 (or similar analysis), 206, 207, 208 and 209. Amendment to the scope of activities shall be agreed by Turkish Aerospace and defined within the Reliability and Testability Management Plan [CDRL 15].
- 5.6.2.1.4. Contractor shall prepare, deliver and maintain Reliability Analysis Report Document [CDRL 14.2] in accordance with MIL-STD-785B and Turkish Aerospace Reliability Analysis Report Template [TAFA 7] and deliver as part of Specialty Engineering Analyses/Assessments Dossier [CDRL 14]. This report includes but not limited to:
- i. Reliability modelling (Reliability Block Diagrams (RBD)), based on the system functions and physical architectures which shall be used to predict the Mean Flight Hours Between Critical Failures (MFHBCF) and Mean Flight Hours Between Failure (MFHBF) for the system.
 - ii. Reliability predictions that estimates the expected basic (failure rate-MFHBF) and mission (critical failure rate-MFHBCF) reliability performance of the equipment and basic (MFHBF) and mission (MFHBCF) reliability performance of the system (as applicable) based on critical functions. The equipment level reliability predictions shall identify the expected level of achieved reliability performance in accordance with approved techniques, processes, standards and reliability testing methods (where applicable systems) to be agreed with Turkish Aerospace.
- 5.6.2.1.5. Contractor shall show all calculations and information related with all tasks within the scope of Reliability and Testability Management Plan [CDRL 15] in the Reliability Analysis Report [CDRL 14.2].
- 5.6.2.1.6. The quantitative reliability calculations shall use environmental adjustment factors which are representative of the ambient temperature and the environmental conditions for related system.

- 5.6.2.1.7. Contractor shall apply de-rating criteria which ensure adequate de-rating for limiting electrical, thermal and/or mechanical stresses.
- 5.6.2.1.8. Contractor shall provide MTBF and Mean Time Between Critical Failure (MTBCF) conversion to MFHBF and MFHBCF based on MIL-HDBK-338B.
- 5.6.2.1.9. Contractor shall perform Piece-Parts / Hardware Failure Mode, Effects and Criticality Analysis (FMECA) and deliver Piece-Parts / Hardware FMECA Report Document [CDRL 14.6] as part of Specialty Engineering Analyses/Assessments Dossier [CDRL 14] at the appropriate indenture level(s) as proposed and agreed by Turkish Aerospace, via the Reliability and Testability Management Plan [CDRL 15]. This report shall be prepared according to the Turkish Aerospace Piece-Parts / Hardware FMECA Report Template [TAFA 9] which is prepared in accordance with MIL-STD-1629A or SAE ARP5580.
- 5.6.2.1.10. Contractor shall establish a Failure Reporting, Analysis and Corrective Action System (FRACAS) in accordance with MIL-STD-785B Task 104. Contractor shall prepare, deliver, maintain FRACAS report with an interval defined in Reliability and Testability Management Plan [CDRL 15] and agreed by Turkish Aerospace.
- 5.6.2.1.11. Contractor shall establish Reliability Development and Production Testing strategies and programs in accordance with MIL-STD-785B. This shall include, but not be limited to tasks 301, 302, 303 and 304. Amendment to the scope of activities shall be agreed by Turkish Aerospace and defined within the RMST Management Plan [CDRL 15].
- 5.6.2.1.12. Contractor shall perform reliability tests (such as accelerated life test, highly accelerated life test, highly accelerated stress screening) according to MIL-HDBK-338B and MIL-STD-781D. Contractor shall prepare deliver and maintain reliability test report as part of Reliability Analysis Report [CDRL 14.2].

5.6.2.2 Maintainability

- 5.6.2.2.1. Contractor shall prepare, deliver and maintain Maintainability Analysis [CDRL 14.3] as part of Specialty Engineering Analyses/Assessments

Dossier [CDRL 14] by using Supplier Maintainability Analysis Report (SMAR) Template [TAFA 1].

5.6.2.3 Supportability

5.6.2.3.1. Contractor shall prepare, deliver and maintain Supportability Analysis Report [CDRL 14.4] with reference to MIL-STD-1388-1A and/or S3000L standards and deliver as part of Specialty Engineering Analyses/Assessments Dossier [CDRL 14].

5.6.2.4 Testability

5.6.2.4.1. Contractor shall perform testability activities and analyses in accordance with MIL-STD-2165 Department of Defense Military Standard for Testability Program & MIL-HDBK-2165, for elements of the design and integration that is under the direct influence of the Contractor. This shall include, but not be limited to tasks 101, 102, 103, 201, 202, 203 and 301. Amendment to the scope of activities shall be agreed by Turkish Aerospace and defined within the Reliability and Testability Management Plan [CDRL 15].

5.6.2.4.2. Contractor shall perform testability analyses according to Reliability and Testability Management Plan [CDRL 15] and prepare, deliver and maintain Testability Analysis Report [CDRL 14.5] according to the Turkish Aerospace Testability Analysis Report Template [TAFA 8] and MIL-HDBK-2165 and deliver as part of Specialty Engineering Analyses/Assessments Dossier [CDRL 14]. This report includes:

- i. Information and calculations related with all tasks within the scope of Reliability and Testability Management Plan [CDRL 15].
- ii. Information and calculations for fault detection rate, fault isolation rate and Mean Flight Hour Between False Alarms (MFHBFA)..

5.6.2.4.3. Testability Figure of Merit (TFOM) of system should be at least 90 percent. Inherent testability checklist which is provided with Turkish Aerospace Testability Analysis Report Template [TAFA 8] shall be used for tailoring according to system design by Contractor. Tailoring activities shall be agreed by Turkish Aerospace.

5.6.3 ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3)

- 5.6.3.1. Contractor shall revise, deliver and maintain Electromagnetic Environmental Effects (E3) Control Plan [CDRL 16] according to the Turkish Aerospace E3 Control Plan Template [TAFA 12]. Contractor shall revise E3 Control Plan [CDRL 16] when there is any change in the design, organization or plan.
- 5.6.3.2. Contractor shall perform detail E3 Analysis [CDRL 14.7] and deliver as part of Specialty Engineering Analyses and Assessments Dossier [CDRL 14] according to the E3 Control Analyses and Assessments Template [TAFA 13].
- 5.6.3.3. Contractor shall prepare, deliver and maintain E3 Test Plan [CDRL 53.4] according to E3 Test Plan Template [TAFA 14] and E3 Test Procedure [CDRL 53.5] according to Template [TAFA 15].
- 5.6.3.4. Contractor shall perform the E3 qualification of the subsystem/equipment with regards to Appendix-1 Technical Specification and in accordance with CDRL 53.4 E3 Test Plan and CDRL 53.5 E3 Test Procedure. Contractor shall support Turkish Aerospace in E3 qualification activities
- 5.6.3.5. Contractor shall provide EMI/EMC test report as part of CDRL 54.2 Environmental Qualification Test report.

5.6.4 ENVIRONMENTAL ENGINEERING

- 5.6.4.1. Contractor shall prepare, deliver and maintain Environmental Qualification Test Procedure [CDRL 53.2] prior to the commencement of testing.
- 5.6.4.1. Contractor shall perform the Environmental Qualification of the subsystem/equipment with regards to Appendix-3 in accordance with CDRL 53.2 Environmental Qualification Procedure. Contractor shall support Turkish Aerospace in Environmental Qualification activities.
- 5.6.4.2. Contractor shall prepare, deliver and maintain Environmental Qualification Test Report [CDRL 54.2].

5.6.5 RESERVED

5.7 TECHNICAL REVIEWS

- 5.7.1. Contractor shall perform the following Technical Reviews throughout the Phase-I, Stage-II as per dates set forth in Appendix-3, with participation from Turkish Aerospace, according to the process defined in CDRL 9 SEMP.
- 5.7.2. Contractor shall propose to Turkish Aerospace the required tailoring of IEEE 15288.2 in order to eliminate impracticable clauses, make necessary additions/corrections and remove inconsistencies with other sections for a cost-effective application and available technologies. This tailoring proposal shall initially be included as part of SEMP [CDRL 9] and may subsequently be updated and re-submitted to Turkish Aerospace within the set forth date in Annex-1 before related technical review for approval.
- 5.7.3. If the deliverables set forth in Annex-1, has major issue(s) regarding the entry criteria in CDRL 9 SEMP for respective Technical Review, then the Technical Review date will be set upon solution of the major issues. Turkish Aerospace, at its own discretion, may choose to perform the Technical Review with major issues.
- 5.7.4. Critical Design Review (CDR) shall be performed at the date set forth in Appendix-3. CDR shall be successfully completed when the deliverables set forth in Annex-1 are approved by Turkish Aerospace and the exit criteria in CDRL 9 SEMP are fulfilled. Contractor shall prepare and deliver CDR Report [CDRL 20] within 15 (fifteen) days after the review.
- 5.7.5. Test Readiness Review (TRR) shall be performed at the date set forth in Appendix-3. TRR shall be successfully completed when the deliverables set forth in Annex-1 are approved by Turkish Aerospace and the exit criteria in CDRL 9 SEMP are fulfilled. Contractor shall prepare and deliver TRR Report [CDRL 21] within 15 (fifteen) days after the review. System TRR date will be provided by contractor.
- 5.7.6. System Verification Review (SVR) shall be performed at the date set forth in Appendix-3. SVR shall be successfully completed when the deliverables set forth in Annex-1 are approved by Turkish Aerospace and the exit

criteria in CDRL 9 SEMP are fulfilled. Contractor shall prepare and deliver SVR Report [CDRL 24] within 15 (fifteen) days after the reviews. SVR shall be held for reviewing the verification evidences. Once all the verification activities are completed, Qualification Status Report [CDRL 25] shall be prepared and delivered to Turkish Aerospace for approval.

- 5.7.7. Contractor shall support Turkish Aerospace for the Air Vehicle level Production Readiness Review. Production Readiness Review will be held between Turkish Aerospace and SSB at the date set forth in Appendix-3.

6 PROGRAM PHASES

6.1 DESIGN and IMPLEMENTATION

6.1.1 SYSTEM DESIGN and IMPLEMENTATION

- 6.1.1.1 Contractor optimize and refine the design of Explosion Prevention System to fulfill the allocated system requirements and prepare, deliver and maintain System Design Description [CDRL 26] accordingly. System design covers but not limited to functional architecture, logical architecture, behavioral architecture, physical architecture, 3D Models parts breakdown structure and product configuration information.
- 6.1.1.2 If there is any need for a design change on PDOR baseline, change process set forth in 5.5.4 shall be applied and Contractor shall revise, deliver and maintain system design accordingly.
- 6.1.1.3 Contractor shall perform all necessary activities to undertake trade off studies and create necessary design data to support Turkish Aerospace's trade studies, including data for equipment installation, interface management, behavioral architecture/model, design budget, safety, RMST.
- 6.1.1.4 Contractor shall define interfaces for each Configuration Item (CI) and contribute interface definition activities with other systems, equipment throughout Turkish Aerospace interface definition process.
- 6.1.1.5 Contractor shall perform all necessary activities to support Turkish Aerospace system integration activities.

- 6.1.1.6 Contractor shall perform the thermal analysis to support air vehicle level thermal load analysis, prepare, deliver and maintain Thermal Analysis Report [CDRL 28].
- 6.1.1.7 Contractor shall provide the system mathematical modelling activities, develop and deliver the mathematical and behavioral models in accordance with System Model Management Plan [TAFA 11] also deliver [CDRL 67], .
- 6.1.1.8 Contractor shall develop executable, desktop, white box system models to give confidence in a proposed design solution and demonstrate compliance against performance requirements.
- 6.1.1.9 Turkish Aerospace shall have visibility of any models generated at the Contractor's facilities. If requested by Turkish Aerospace, Contractor shall deliver the up to date working copy of the models. Where models are delivered to Turkish Aerospace, Contractor shall provide written details of how all models were constructed and any model validation evidence that has been produced.
- 6.1.1.10 Contractor shall prepare, deliver and maintain System Analysis Calculations Dossier [CDRL 51]. This dossier includes the analyses where the requirement verification is proven by an analysis activity and report, such as static and fatigue strength, lifetime, system performance, etc.
- 6.1.1.11 Contractor shall prepare or revise, deliver and maintain Functional Requirements Allocated to Software (FRS) [CDRL 68] document to form a software in tandem with other systems in aircraft.
- 6.1.1.12 Contractor shall prepare or revise, deliver and maintain FRS Interface Control Document (FRS ICD) [CDRL 70] document to identify software interfaces in tandem with other systems in aircraft.
- 6.1.1.13 Contractor shall prepare or revise, deliver and maintain System Integration Laboratory FRS (SIL FRS) [CDRL 69] document to form a test software in tandem with System Integration Laboratory in TA facilities.

- 6.1.1.14 Contractor shall prepare FRS, FRS ICD, SIL FRS, SIL Test Procedure [CDRL 71] and SIL Test report [CDRL 72] using TA provided templates and guidelines.
- 6.1.1.15 Contractor shall procure FRS, FRS ICD, SIL FRS, SIL Test Procedure and SIL Test report documents in DOORS environment.
- 6.1.1.16 Contractor shall identify system and equipment level functional requirements in Magic environment.
- 6.1.1.17 Contractor shall provide traceability for FRS requirements to Magic Functions Table.
- 6.1.1.18 Contractor shall authorize a functional leader of the subsystem to be responsible for the preparation and consistency of FRS, FRS ICD and SIL FRS documents.
- 6.1.1.19 Contractor shall assign two individuals as author and system test responsible for FRS, FRS ICD, SIL FRS and SIL tests.
- 6.1.1.20 Contractor shall assign one or more individuals as reviewers for FRS, FRS ICD, SIL FRS and SIL test reports.
- 6.1.1.21 Contractor shall prepare or revise, deliver and maintain SIL test procedure for every baseline of software.
- 6.1.1.22 Contractor shall run a complete run test for every baseline of software.
- 6.1.1.23 Contractor shall prepare or revise, deliver and maintain complete run test reports for every baseline of software tested at system integration laboratory test.
- 6.1.1.24 Turkish Aerospace shall have right to request corrective and preventive action for dispositions identified during design, development, production, testing and delivery processes.
- 6.1.1.25 Contractor shall make arrangements and perform all necessary activities to support Turkish Aerospace's software development process.
- 6.1.1.26 Contractor shall commit a CR in 3 days after an issue is reported by TA.

- 6.1.1.27 Contractor shall perform change management according to the process as defined in CDRL 12 Configuration Management Plan
- 6.1.1.28 Contractor shall participate with FRS author and system test responsible or one of the reviewers at system change management activities in TA facility.
- 6.1.1.29 Contractor shall participate with FRS author at peer review activities in TA facility.

6.1.2 EQUIPMENT DESIGN AND IMPLEMENTATION

- 6.1.2.1 Contractor shall perform equipment detail design and deliver the associated 3D model (digital space allocation and interface mock-up) for each CI in the format with CATIA V5 or CATIA V6. Contractor shall release the production data package (3D Models, bill of materials, material technical data sheet, procurement list etc.) accordingly. In case of an update in equipment design, the updated 3D models shall be delivered to Turkish Aerospace within two weeks. The changes on 3D model shall be subject to process set forth in 5.5.4.
- 6.1.2.2 Contractor shall deliver the Maturity C 3D Model [CDRL 29] including:
 - i. Declared/measured (weighed) weight defined for equipment,
 - ii. Declared/measured heat load defined for equipment,
 - iii. Declared/measured power consumption defined for equipment,
 - iv. Declared/measured center of gravity defined for equipment,
 - v. Finalized space envelope and 3D model of the equipment.
- 6.1.2.3 Contractor shall derive the equipment requirements from CDRL 11 System Requirement Document and update and deliver Supplier Equipment Specification [CDRL 30]. This document covers:
 - i. equipment requirements,
 - ii. the high level description which outlines the major functions and show the flow of information between these functions,
 - iii. the weight data,
 - iv. the mechanical structure which describes the arrangement of the equipment items,

- v. architectural features that are important for an airworthiness point of view,
 - vi. top level equipment item functional description.
 - vii. technical drawings.
- 6.1.2.4 Contractor shall define electrical, mechanical, data interface of Explosion Prevention System/equipment in Interface Control Document [CDRL 31].
- 6.1.2.5 Contractor shall generate and manage mass properties database for the ExPS equipment, control weight allocations. Contractor shall prepare, deliver and maintain Weight Management Plan [CDRL 73] to define target weights, process, make risk and opportunity analysis and manage weight trend and balance status according to Weight Management Plan for Vendors [TAF 24].
- 6.1.2.6 Contractor shall provide weight status reports periodically in Project Progress Report [CDRL 2]. Contractor shall present weight responsible name, current weight trend and balance status, weight reduction opportunities, risks and mitigations for Maturity C.

6.1.3 RESERVED.

6.1.4 RESERVED.

6.2 PRODUCTION

- 6.2.1. Contractor shall perform production planning and control, manufacturing trials, manufacturing engineering, tool design activities, tool manufacturing.
- 6.2.2. Contractor shall perform procurement of the materials, outsourcing of component manufacturing, stock management and associated quality engineering and perform all the manufacturing activities.

6.3 VERIFICATION and QUALIFICATION

- 6.3.1. Contractor shall revise, deliver and maintain System Verification Plan [CDRL 50]. This plan covers:
- i. The detailed explanation of every verification activity planned to be executed by the Contractor, how the status of design verification will be maintained, or managed, when changes are made to design, a general description of the tools and facilities that are used to generate evidence throughout the verification process etc.
 - ii. Means of Compliance (MoC) for each requirement including the justification for each MoCs and how different verification activities will be used to generate evidence]
 - iii. Reference of the proof of compliance for each MoC.
- 6.3.2. Contractor shall perform all necessary activities to support Turkish Aerospace verification activities.

6.4 TEST AND EVALUATION

- 6.4.1. Contractor shall prepare, deliver and maintain Test and Evaluation Plan [CDRL 52] in order to provide a road map for test and evaluations to accomplish the test and evaluation objectives to incorporate Phase-I, Stage-II. This plan covers the development tests, certification tests, Verification Tests and Acceptance Tests and detailed test schedule. Tests executions and test service acquisition shall be managed in accordance with CDRL 52 Test and Evaluation Plan.
- 6.4.2. Contractor shall prepare, deliver and maintain System Test Procedures Dossier [CDRL 53]. This dossier covers the Verification Test Procedure [CDRL 53.1], Environmental Test Procedure [CDRL 53.2], Acceptance Test Procedure [CDRL 53.3].
- 6.4.3. Contractor shall execute all verification, environmental qualification and Acceptance Tests according to CDRL 53 System Test Procedures. Contractor shall prepare, deliver and maintain System Verification Test Report Dossier [CDRL 54]. This dossier covers the Verification Test

Report [CDRL 54.1], Environmental Qualification Test Report [CDRL 54.2], Acceptance Test Report [CDRL 54.3].

- 6.4.4. Contractor shall perform at least the Safety of Flight (SoF) Environmental Qualification tests defined by Turkish Aerospace before delivery to development test aircrafts.
- 6.4.5. Contractor shall allow Turkish Aerospace to make any inspection and perform or witness any test necessary to check the validity of the compliance of the requirements. Contractor shall support Turkish Aerospace and take all necessary precautions to provide secure and appropriate condition to Turkish Aerospace in the test environment. Contractor shall invite Turkish Aerospace for every test demonstration activity at least 15 days prior.
- 6.4.6. Contractor shall attend the necessary test and evaluation meetings as requested by Turkish Aerospace.

7. INFRASTRUCTURES

- 7.1. Contractor shall perform construction and commissioning of the test laboratories needed to perform the tests set forth in CDRL 52 Test and Evaluation Master Plan.

8. PROJECT IMPLEMENTATION SCHEDULE

- 8.1. Contractor shall perform the activities within the scope of this Contract in accordance with schedule set forth in Appendix-3.

9. DELIVERABLES

9.1 ITEMS

- 9.1.1. Products definition stated in sub-article 3.1.66 of Contract Terms and Conditions and Annex-4 shall be delivered to Turkish Aerospace after Acceptance in accordance with sub-article 3.1.25 of Contract Terms and Conditions.
- 9.1.2. Contractor shall prepare and deliver Declaration of Design and Performance (DDP) [CDRL 55] at each Delivery Standard (Laboratory qualified, Safety of Flight (SoF) qualified and full qualified) for the

equipment design, performance and qualification. The DDP shall be updated or re-issued as necessary. An update or re-issue of the DDP shall be done as follows:

- i. A new DDP shall be issued if the evolution of the equipment is identified by a part number change (modification),
- ii. The Environment Qualification tests, Verification Tests or Acceptance Tests are completely or partially rerun,
- iii. Any data or reference in the DDP has to be updated.

9.2 DATA

- 9.2.1. Contractor shall prepare all necessary Data set forth in Annex-1 and submit them to Turkish Aerospace at delivery dates set forth in Annex-1.
- 9.2.2. In accordance with sub-article 3.1.61 of Contract Terms and Conditions, all data generated in the Project (such as reports, analysis, description documents, 3D models, simulations etc.) shall be delivered to Turkish Aerospace if requested.

9.3 TURKISH AEROSPACE FURNISHED ARTICLES (TAFA)

- 9.3.1 Turkish Aerospace shall deliver the articles set forth in Annex-9.

10 COMPLETION OF PHASE-I, STAGE-II

- 10.1. Completion of Phase-I, Stage-II shall occur when conditions stated below have been completed;
 - i. Final Approval is realized when Turkish Aerospace delivers Final Approval Letter to Contractor when the exit criteria set forth in CDRL 9 SEMP are completed for the last Technical Review set forth in 0 according to CDRL 4 IMP.
 - ii. Acceptance of Products realized in accordance with Contract Terms and Conditions,

11. APPROVAL

- 11.1. Approval of Turkish Aerospace shall be complete with the following;
- i. Turkish Aerospace's approval of the data set forth in Annex-1 by Approval Letter.
 - ii. Turkish Aerospace's approval of the successful completion of Phase-I, Stage-II by Approval Letter when the exit criteria set forth in CDRL 9 SEMP are completed for each Technical Review set forth in 0 according to CDRL 4 IMP.
- 11.2. The document approval process is as follows;
- i. Turkish Aerospace shall provide comments to Contractor within review period set forth in Annex-1, after delivery of the Data that shall be approved by Turkish Aerospace,
 - ii. If Turkish Aerospace requests any update related to Data, Contractor shall prepare and submit the revised edition within period set forth in Annex-1 upon receipt of Turkish Aerospace comments,
 - iii. Turkish Aerospace shall approve the revised edition in 15 (fifteen) days if the document is appropriate.

12. ACCEPTANCE

- 12.1. Acceptance shall be in accordance with article 17 of Contract Terms and Conditions.
- 12.2. Contractor shall prepare and deliver Conformance of Certification (CoC) or Form-1 [CDRL 56] to ensure the product being manufactured, tested and passed in accordance with CDRL 53 System Test Procedures Dossier.

12 AIRWORTHINESS CERTIFICATION

12.1 GENERAL

- 12.1.1 Contractor shall support Turkish Aerospace for the airworthiness certification activities to the end of the Type Certification release. When deemed necessary, the Contractor shall participate in meetings and workshops related to the Airworthiness Certification activities.
- 12.1.2 Contractor shall carry out the necessary Certification Board investigations in order to determine compliance with the certification requirements.
- 12.1.3 Contractor shall allow the Turkish Aerospace/Certification Board to review any report and make any inspection and perform or witness any test necessary to check the validity of the compliance statements within the scope of the certification issues.
- 12.1.4 Contractor shall make arrangements that allow the Turkish Aerospace/Certification Board to make any investigations necessary to determine compliance and continued compliance following initial Type Certification with the applicable requirements.
- 12.1.5 Special Conditions, exceptions and equivalent level of safety requirements may be added to the Air Vehicle Certification Basis may be flowed down to

Contractor through Certification Review Item (CRI) by Certification Board, for new design features, if found appropriate.

12.2 DESIGN ORGANIZATION COMPETENCY APPROVAL (DOCA)

12.2.1 CONTRACTOR - Turkish Aerospace DESIGN ORGANIZATION INTERFACE

- 12.2.1.1 It is an obligation of Turkish Aerospace to acquire DOCA Approval as per EASA Part (EMAR) 21 Subpart J. Contractor shall give support to Turkish Aerospace to comply with the requirements of Subpart J 21. A239(c).
- 12.2.1.2 Contractor design organization and activities shall be revised and delivered to Turkish Aerospace for agreement in Design Organization Interface Document [CDRL 57] in accordance with the template in Annex-7. Any significant change to the content of a DOID shall be notified to Turkish Aerospace for acceptance.
- 12.2.1.3 Contractor shall nominate a competent and suitably qualified and experienced person as the design assurance coordinator.

12.2.2 CONTRACTOR DESIGN ORGANIZATION

- 12.2.2.1 Contractor shall set up design assurance system for the Project including the design organization structure, responsibilities, resources, procedures and the authorized signatories to ensure its proper functioning, in order to comply with EASA Part (EMAR) 21 Subpart J requirements.
- 12.2.2.2 Contractor design organization shall ensure and demonstrate compliance with Appendix-1 and this SOW including the workshares of their key contributing parties.
- 12.2.2.3 Contractor design organization shall also cover design/production interface and design/product support (logistics and in-service support)

interface in order to identify and address any design impacts arising from manufacturing and product support elements.

- 12.2.2.4 Contractor shall have and maintain a design assurance organization controlled by a competent, suitably qualified and experienced design assurance coordinator who shall implement design assurance activities.
- 12.2.2.5 Contractor shall conduct systematic documented audits to demonstrate to Turkish Aerospace of compliance with the quality standards imposed by this Contract and the contents of CDRL 57 Design Organization Interface Document (DOID). These audits shall identify areas of non-conformance and/or inadequacy and recommend appropriate corrective actions. Such systematic documented audits shall be carried out at a frequency and scope compatible with the relevant design tasks and functions. These audits shall cover the tasks and activities conducted by the design subcontractors of the Contractor. The results of such audits shall be recorded, documented and provided to Turkish Aerospace.
- 12.2.2.6 Contractor shall maintain all other detailed and comprehensive records as evidence of compliance with all requirements of this contract.
- 12.2.2.7 All records and documents shall be made available for inspection by Turkish Aerospace's representatives, their Customers or relevant Certification Board.
- 12.2.2.8 In addition, the Contractor, upon notification by Turkish Aerospace of any non-conformance, shall undertake prompt rectification and/or replacement together with suitable investigative and preventative measures.
- 12.2.2.9 Turkish Aerospace/Customer may control, monitor and audit Contractor design process as per EASA Part (EMAR) 21 Subpart J 21A.239 via reviews, assessments and audits against CDRL 57 DOID to ensure compliance with Turkish Aerospace Design Assurance System. Findings which are raised during these audits shall be closed in a defined time.
- 12.2.2.10 Contractor shall specify the manner in which the design assurance system accounts for the acceptability of the parts or appliances designed or the

tasks performed by subcontractors according to methods, which are the subject of written procedures.

- 12.2.2.11 Contractor shall make arrangements that allow the Turkish Aerospace/Certification Board to make any investigations, including investigations of design subcontractors, necessary to determine compliance and continued compliance with the applicable requirements of EASA Part (EMAR) 21 Subpart J.
- 12.2.2.12 Contractor shall make arrangements that Turkish Aerospace /Airworthiness Authorities to review any report and make any inspection and perform or witness any test necessary to check the validity of the compliance statements within the scope of the certification issues.
- 12.2.2.13 An arrangement between Turkish Aerospace as a design organization and “Design Contractor” shall be established according to EASA Part (EMAR) 21 Subpart J 21A.133.
- 12.2.2.14 Contractor shall identify the descriptions and versions of every method and tool in the CDRL 57 DOID.
- 12.2.2.15 Where the Contractor utilizes in-house developed tools within the scope of this SOW, evidences of validation/qualification of such tools and those of Commercial Off the Shelf (COTS) tools shall be made available to Turkish Aerospace and their Customers or relevant Certification Board, if requested.
- 12.2.2.16 Unless otherwise specified by Turkish Aerospace, Acceptance of the goods and services will be made by the Contractor following the closure of all Design Organization Approval (DOA) audit finding (if any) by subcontractor in accordance with article 17 of Contract Terms and Conditions.
- 12.2.2.17 Contractor shall ensure all DOA audit finding evidences (if any) within the period specified by the Turkish Aerospace.

12.2.3 AUTHORIZED SIGNATORIES

- 12.2.3.1 Contractor shall designate and document competent and sufficiently qualified and experienced Authorized Signatories for releasing design data.
- 12.2.3.2 Contractor Authorized Signatories List shall include, but is not limited to, the Design Manager, the Design Assurance Manager and the persons nominated to have special responsibilities for Airworthiness aspects and tests.
- 12.2.3.3 The design data to be covered by Authorized Signatories shall include:
 - i. All design data used for the compliance demonstration,
 - ii. All deliverable documents, set forth in Annex-1,
 - iii. Product support documents requiring an acceptance from the design organization, such as vendor service bulletins, concessions and repairs.

12.2.4 ACCIDENT/OCCURRENCE REPORTING AND INVESTIGATION

- 12.2.4.1 Contractor shall have a written procedure for reporting all events coming from in-service, production or design that may jeopardize the safety of Turkish Aerospace certified product according to EASA Part (EMAR) 21.A.3.
- 12.2.4.2 Contractor shall participate in any defect and/or occurrence and/or accident investigation, in respect of design work carried out on behalf of Turkish Aerospace, if needed. All such investigations and results provided to Turkish Aerospace shall be strictly in accordance with requirements and/or procedures from Turkish Aerospace. All data and information resulting from such investigations shall be made available to Turkish Aerospace and Certification Board.

14. INTEGRATED PRODUCT SUPPORT (IPS)

- 13.1 Contractor shall provide “O” Level Illustrated Part Catalogues, Spare Part List and Consumables and CMMs (including training if needed) to Turkish Aerospace to operate, maintain and support development test aircrafts to perform ground tests and flight tests campaigns according to

CDRL 66. IPS SOW shall be discussed and added for serial phase of this contract

15. PROJECT CONTROL OFFICE

- 14.1 Contractor shall support project control office at her facilities. The number of Turkish Aerospace/SSB/TurAF/Certification Board personnel and basic office requirements of the office are defined in article 24 of Contract Terms and Conditions.
- 14.2 Turkish Aerospace/TurAF/User/Certification Board representatives may request corrective actions from Contractor for the issues determined during control and monitoring.
- 14.3 Contractor shall provide all the data to support project control office.
- 14.4 Contractor shall provide orientation for project control office within 15 (fifteen) days after the office is established.

16. DATA MANAGEMENT RULES AND PRINCIPLES

- 15.1 Data sharing and exchange of large volumes of data between Contractor and Turkish Aerospace should be enabled in a secure environment. The exchanged information (all performance data, qualification data, certification data, service data and test results data) can be categorized as follows:
- i. Model based data that consists of main and complementary data, i.e.
- Computer Aided Design (CAD) files containing geometrical or interface data (master geometry, space allocation, Digital Mock Up (DMU), etc.)
 - Lightweight geometrical data for visualization tools,
 - Assembly structure with position matrix data,
 - Functional and Logical architecture,
 - Standard parts,
 - Meta data complementing previous data such as;
 - Configuration management or change information (up-to-date data, configured data)
 - Products structure information
 - Attributes (status, effectivities etc.)

- ii. Document based data such as:
- Requirement specifications,
 - Statement of work,
 - Analysis data,
 - Maintenance data,
 - Plans and Procedures,
 - CDRL documents,
 - Parts and materials catalogs, etc.

15.2 During exchange period, associated meta data shall be shared along with the exchanged data, in order to import data correctly into project data storage environment and place in the product hierarchy with the correct configuration information. Exchanged data shall have following attributes at minimum. Other attributes needed for data exchange can be specified with mutual agreement.

Project Name: Project name of the object

Object ID: Unique ID of the object

Object Name: Name of the object

Object Description: Description of the object

Object Revision ID: Object revision

Lifecycle Status: Lifecycle status of this specific revision of the object. These statuses indicate whether this revision of the object is finalized and released or still being worked on (Ex: Frozen, Released, Cancelled etc.).

Release Date and Time: Date and time when the object revision was released. If the object revision is released, this property is mandatory and must be exchanged.

Object Security Classification: Security classification of the object, ie. Unclassified, company sensitive, company confidential, restricted etc.

Export Control Classification: Export control classification of the object, ie. The International Traffic in Arms Regulations (ITAR), Export Administration Regulation (EAR) etc.

15.3 Delivery package shall cover the following content for the document based data;

- i. Engineering Coordination Memo (ECM) including detail sender and receiver information, i.e. Company name, sender and receiver name, contact information of sender and receiver, date of sending and exchange context, can be “word” or “pdf” file format. ECM template is set forth in Annex-8.
- ii. Exchanged data is attached in the related ECM document or presented as a section of the ECM document.

15.4 Delivery package shall cover the following content for the model based data;

- i. ECM including detail sender and receiver information, i.e. Company name, sender and receiver name, contact information of sender and receiver, date of sending and exchange context, can be “word” or “pdf” file format.
- ii. Cover Sheet, providing list of attributes of technical data package and relationship between each other, can be “txt” or “excel” file and attached in the related ECM file or can be as section of that ECM file. Cover sheet should include technical explanations, attributes list, product breakdown, applicable configuration and data format.
- iii. Exchanged data is attached in the related ECM document.

15.5 Formal deliveries’ contents shall be in line with the Annex-1 using the process defined in this Contract. ECM file is not necessary in this case but cover sheet should be provided for the model based data.

15.6 Contractors may use Turkish Aerospace’s or their own ECM and cover sheet template while delivering data to Turkish Aerospace.

15.7 Turkish Aerospace and Contractors should decide a common software toolset in order to avoid incompatible and incomplete data exchange. The preferred data formats from Contractors are as following;

- i. Requirements set: Requirements Interchange Format (ReqIf) (*) and Word, Excel formats.
- ii. Architectures diagrams: SysML, Visio and Word formats.
- iii. Interface definitions: SysML, Visio and Word formats.

- iv. Documents: Searchable Portable Document Format with “.pdf” extension or Document with “.doc” or “.docx” extension.
- v. All exchanged database: “.xml” or “.html” extension.
- vi. All the exchanged solid model data: Compatible format with CATIA V5 or CATIA V6.

NOTE: *ReqIf files needs to include “Reference ID” attribute which includes original requirement IDs for proper data import since the requirement IDs are changed every time when a ReqIf export is produced.

**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TUSAŞ**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II
SÖZLEŞMESİ**

**EK-2 LAHİKA-1
SÖZLEŞME VERİ İSTERLERİ LİSTESİ (SVIL)
(CONTRACT DATA REQUIREMENT LIST (CDRL))**

2024

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RECORDS OF ISSUES

Issue	Date	Author	Change Details
1	02.08.2023		Initial Release
2	20.01.2024		CDRL 62,63,64,65,66,67,68,69,70 were inserted. CDRL 14.4,15 were changed into “Left Blank Intentionally”. Date of First Edition Submission of CDRLs changed into CDR-30 days for instead of CDR-45 days.
3	26.02.2024		CDRL 71 and CDRL 72 were inserted.
4	21.08.2024		CDRL 77 was added.

DEFINITIONS and ABBREVIATIONS

DEFINITIONS

Definitions are given in Appendix-2 SOW.

ABBREVIATIONS

Abbreviations are given in Appendix-2 SOW.

1. SCOPE

- 1.1. The Project Contract Data Requirement List (CDRL) lists the deliverables to be produced by Contractor as part of the work defined in Appendix-2 SOW.
- 1.2. All deliverables listed in CDRL shall be written in English unless otherwise is agreed between Turkish Aerospace and Contractor.
- 1.3. Some of the CDRLs below may contains more than 1 (one) item considering the scope of associated System/Subsystem. Contractor shall define the content for each CDRL according to TF-X product breakdown structure.
- 1.4. Day(s) mean callendar days in this document. If delivery day is bank holiday, delivery of the Data shall be performed at the next working day.
- 1.5. Technical Reviews will be performed incrementally and the deliverables set forth in article **Hata! Başvuru kaynağı bulunamadı.** shall be revised and delivered at delta reviews.

GENERAL NOTE:

FOR THE ITEMS WHICH WAS WRITTEN “LEFT BLANK INTENTIONALLY” AT THE COLUMUN “DATE OF FIRST EDITION SUBMISSION”, IT IS ASSUMED AND AGREED THAT THOSE ITEMS SHALL NOT BE DELIVERED ON THE SCOPE OF THE PHASE 1 STAGE 2 PROJECT.

2. PHASE-I, STAGE-II CDRL

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
1	Program Management Plan	A	T0+30 days	-	30 days	10 days	-	-
2	Project Progress Report	I	Every 3 months		-	-	Annex -3	
3	Life Cycle Cost Analysis Report	I	Quarterly	-	30 days	10 days	TAFA 2	-
4	Integrated Master Plan	A	T0 + 30 days	-	30 days	10 days	-	Will be presented quarterly as part of Project Progress Reports
5	Integrated Master Schedule	I	T0 + 30 days	-	-	-	-	Will be presented quarterly as part of Project Progress Reports

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
6	Work Breakdown Structure	A	with response to RFP Package	T0 + 30 days	-	-	-	
7	Program Quality Management Plan	A	T0+30 days	-	30 days	10 days	-	-
8	Program Risk, Opportunity and Issue Management Plan	A	T0+30 days	-	30 days	10 days	-	
9	Systems Engineering Management Plan (SEMP)	A	CDR-30days	CDR- 30days	30 days	10 days	-	-
10	Stakeholder Management Plan	A	T0 + 30 days	-	30 days	10 days		
11	System Requirements Document(s)	A	Revisions will be delivered if there is any update needed. SRD is provided by Turkish Aerospace, if another document is mentionaed please clarify. Also in case SRD is updated, impacts of the update can require update of other documents prepared by TÜBİTAK MAM.					
12	Configuration Management Plan	A	T0+30 days	-	30 days	10 days	-	-
13	Safety Program Plan	A	CDR-30days	CDR- 30days	30 days	10 days	TAFA 3	TAFA 3

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
14	Specialty Engineering Analyses/ Assessments Dossier	See below						
14.1	System Safety Assessment	A	CDR-30Days TRR-45 days SVR-45 days	-	30 days	10 days	TAFA 3	CDR: First version TRR: Revision SVR: Final Version
14.2	Reliability Analysis Report	A	CDR-30 days	-	30 days	10 days	TAFA 7	-
14.3	Maintainability Analysis Report	A	CDR-30 days	-	30 days	10 days	TAFA 1	-
14.4	Supportability Analysis Report	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
14.5	Testability Analysis Report	A	CDR-30days	-	30 days	10 days	TAFA 8	-
14.6	The Piece-Parts / Hardware Failure Mode, Effects and Criticality Analysis Report	A	CDR-30days	-	30 days	10 days	TAFA 9	-
14.7	E3 Analysis	A	CDR-30days	-	30 days	10 days	TAFA 13	-

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
15	RMST (Reliability, Maintainability, Supportability and Testability) Management Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
16	Electromagnetic Environmental Effects (E3) Control Plan	A	When update is necessary	-	30 days	10 days	TAFA 12	-
17	Cyber Security Project Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
18	Information Security Assurance Report	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
19	Cyber Security Project Report	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
20	CDR Report	A	CDR+15 days	-	15 days	7 days	Refer to SEMP	-
21	TRR Report	A	TRR+15 days	-	15 days	7 days	Refer to SEMP	-
22	Software CDR Report	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
23	Hardware CDR Report	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
24	SVR Report	A	SVR+15days	-	15 days	7 days	Refer to SEMP	-
25	Qualification Status Report	A	SVR-45 days	-	30 days	10 days	-	-
26	System Design Description	A	CDR-30days	-	30 days	10 days	-	-
27	SEU Analysis Report	A	LEFT BLANK INTENTIONALLY	-	30 days	10 days	-	-
28	Thermal Analysis Report	A	CDR-30days	-	30 days	10 days	-	-
29	Maturity C 3D Models	A	CDR - 30 days	-	-	-	-	
30	Supplier Equipment Specification	A	T0+30 days	CDR- 30days	30 days	10 days	-	-
31	Interface Control Document	A	T0+30 days	CDR- 30days	30 days	10 days	-	-
32	Software Plans Dossier	See below						

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
32.1	Plan for Software Aspects of Certification	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
32.2	Software Development Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
32.3	Software Verification Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
32.4	Software Configuration Management Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
32.5	Software Quality Assurance Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
33	Software Requirements Document	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
34	Software Design Description	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
35	Software Delivery Package	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
36	Software Configuration Indices (SCIs)	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
37	Software Life Cycle Environment Configuration Index (SECI)	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
38	Software Verification Cases and Procedures	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
39	Software Verification Results	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
40	Software Accomplishment Summary	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
41	Source Code	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
42	Hardware Plans Dossier	See below						
42.1	Plan for Hardware Aspects of Certification	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
42.2	Hardware Design Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
42.3	Hardware Validation and Verification Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
42.4	Hardware Configuration Management Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
42.5	Hardware Process Assurance Plan	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
43	Hardware Requirement Document	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
44	Hardware Design Description	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
45	Hardware Delivery Pack	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
46	Hardware Verification Cases and Procedures	A	LEFT BLANK INTENTIONALLY	-	-	-	-	-
47	Hardware Verification Results	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
48	Hardware Configuration Index	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
49	Hardware Accomplishment Summary	I	LEFT BLANK INTENTIONALLY	-	-	-	-	-
50	System Verification Plan	A	CDR-30days	CDR-30days	30 days	10 days	-	
51	System Analysis Dossier	A	CDR-30days	TRR-45 days	30 days	10 days	-	
52	Test and Evaluation Plan	A	CDR-30days	TRR-45 days	30 days	10 days	-	RFP

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
53	System Test Procedures Dossier	See below						
53.1	Verification Test Procedure	A	Each Test Activity-30 days	-	21 days	7 days	-	-
53.2	Environmental Qualification Test Procedure	A	Each Test Activity-30 days	-	21 days	7 days	-	-
53.3	Acceptance Test Procedure	A	Each Test Activity-30 days	-	21 days	7 days	-	-
53.4	E3 Test Plan	A	Each Test Activity-45 days	-	21 days	7 days	TAF A 14	
53.5	E3 Test Procedure	A	Each Test Activity-30 days	-	21 days	7 days	TAF A 15	
54	System Verification Test Report	See below						
54.1	Verification Test Report	A	Each Test Activity+15 days	-	15 days	7 days	-	-
54.2	Environmental Qualification Test Report	A	Each Test Activity+15 days	-	15 days	7 days	-	-
54.3	Acceptance Test Report	A	Each Test Activity+15 days	-	15 days	7 days	-	-
55	Declaration of Design and Performance	I	For each delivery standard	-	-	-	-	-

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
56	Conformance of Certification CoC or Form-1	I	Each Delivery	-	-	-	-	-
57	Design Organization Interface Document	A	T0 + 90 days	-	30 days	10 days	Annex-7	-
58	First Article Inspection Report (FAI/Delta FAI)	I	Each new production	-	-	-	-	-
59	Dry-Run Test Reports	I	Acceptance/Verification Test – 21 days	-	-	-	-	-
60	Quality Management Review Report	I	Quarterly	-	-	-	-	-
61	Project Audit Plan	A	T0+90 days	-	30 days	10 days	-	-
62	Critical Personnel List	I	Quarterly	-	30 days	10 days	-	Will be provided in CDRL 2
63	Human Resources Management Plan	A	T0+30 days	-	30 days	10 days	-	Will be provided in CDRL 1

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
64	Security Classification Guide	I	Quarterly	-	30 days	10 days	-	Will be provided in CDRL 2
65	Weight Management Plan	A	T0+30 days	-	30 days	10 days	-	TAFA 24
66	System Human Factors Engineering Analysis	A	LEFT BLANK INTENTIONALLY					
67	Model Validation Report	A	CDR-30Days	With every Model Update	-	30 days	10 days	-
68	FRS	A	T0+10 days	-	Revisions will be delivered if there is any update informed by TA.	2 weeks	-	Template will be shared by TA.

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
69	SIL FRS	A	T0+10 days	-	Revisions will be delivered if there is any update informed by TA.	2 weeks	-	Template will be shared by TA.
70	DATA ICD	A	T0+10 days	-	Revisions will be delivered if there is any update informed by TA.	2 weeks	-	Template will be shared by TA.

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
71	SIL TEST PROCEDURE	A	T0+20 DAYS		Revisions will be delivered if there is any update informed by TA.			
72	SIL TEST REPORT	A	After Test Run		Revisions will be delivered if there is any update informed by TA.			
73	Integrated Product Support Dossier	A	TRR		30 days	10 days		
74	Illustrated Part Catalogues	A	TRR		30 days	10 days		

CDRL	TITLE	APPROVAL CODE A=Approval I=Information	DATE OF FIRST EDITION SUBMISSION	DATE OF REVISED EDITION SUBMISSION	REVIEW PERIOD	CONTRACTOR REVISION PERIOD	DATE OF DOCUMENT TEMPLATE SUBMISSION	NOTES
75	Spare Part List	A	TRR		30 days	10 days		
76	Consumables and CMMs	A	TRR		30 days	10 days		
77	Infrastructure Description Document	A	Every 6 Months		30 days	10 days		

Table 1 Phase-I, Stage-II CDRL

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)

PROJESİ

PATLAMA ÖNLEME SİSTEMİ

DÖNEM-I, AŞAMA-II SÖZLEŞMESİ

EK-2 LAHİKA-2

Ayrılmıştır.

2024

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ő.
TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŐTİRİLMESİ (KAAN)
PROJESİ

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŐAMA-II
SÖZLEŐMESİ

EK-2
İŐ TANIIMI
(STATEMENT OF WORK)

LAHİKA-3
PROJE İLERLEME RAPORU őABLONU
(PROJECT PROGRESS REPORT)

2024

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Records of Issue

Issue	Date	Author	Change Details
1	07.04.2023		Initial Release
2	20.01.2024		Chapter 7 Weight status was added.

1. INTEGRATED MASTER SCHEDULE (IMS)

IMS significant variances and critical path for the next milestone shall be presented here.

Mountly progress shall be presented in the following format.

[illegible]

Monthly IMS Report

+30 days Ahead Plan shall be presented.

2. PROJECT COST

Labor Cost Status shall be presented in the following format.

	2023												2024												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
Planned Human Resource	0												0												0
Project Engineer (TS 0)																									
Project Engineer (TS 1)																									
Project Engineer (TS 2)																									
Project Engineer (TS 3)																									
Design Engineer (TS 0)																									
Design Engineer (TS 1)																									
Design Engineer (TS 2)																									
Design Engineer (TS 3)																									
Others																									
Others																									
Current Human Resource	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Engineer (TS 0)																									
Project Engineer (TS 1)																									
Project Engineer (TS 2)																									
Project Engineer (TS 3)																									
Design Engineer (TS 0)																									
Design Engineer (TS 1)																									
Design Engineer (TS 2)																									
Design Engineer (TS 3)																									
Others																									
Others																									
Delta Human Resource	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Engineer (TS 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Engineer (TS 1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Engineer (TS 2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Engineer (TS 3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Design Engineer (TS 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Design Engineer (TS 1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Design Engineer (TS 2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Design Engineer (TS 3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Monthly HR
Report.xlsx

Non-labor Cost Status shall be presented in the following format.

	2023												Expense Details					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	CBS Number	Expense Item	Expense Explanation/Details	Invoice Date	Invoice Amount	Invoice Amount (USD)
Budget	0	0	0	0	0	0	0	0	0	0	0	0						
CBS Number # 1																		
CBS Number # 2																		
CBS Number # 3																		
CBS Number # 4																		
CBS Number # 5																		
CBS Number # 6																		
CBS Number # 7																		
CBS Number # 8																		
CBS Number # 9																		
CBS Number # 10																		
Actuals	0	0	0	0	0	0	0	0	0	0	0	0						
CBS Number # 1																		
CBS Number # 2																		
CBS Number # 3																		
CBS Number # 4																		
CBS Number # 5																		
CBS Number # 6																		
CBS Number # 7																		
CBS Number # 8																		
CBS Number # 9																		
CBS Number # 10																		
Delta	0	0	0	0	0	0	0	0	0	0	0	0						
CBS Number # 1																		
CBS Number # 2																		
CBS Number # 3																		
CBS Number # 4																		
CBS Number # 5																		
CBS Number # 6																		
CBS Number # 7																		
CBS Number # 8																		
CBS Number # 9																		
CBS Number # 10																		

Monthly
Non-Labour Budget

3. RISK and OPPORTUNITIES

Risks shall be presented in the following format.

TF-X PROJECT RISK MANAGEMENT

Risk ID		Originated By		Date Risk Identified		
Risk Status		Initial trigger date		Retirement date		
Risk Description						
There is a risk that						
Caused By						
Resulting in						
	Risk Probability	Risk Impact	Risk Criticality Level			
Initial Risk C.L.						
Actual Risk C.L.						
Risk Owner						
Risk Discussion						
	Discussion	Message				
Risk Mitigation Plan						
	Action Item	Status	Related Personnel	Target Date	Completion Date	Residual Risk
1						
2						
3						
Mitigation Discussion						
	Action Item	Discussion	Message			
Risk Contingency Plan						
	Action Item	Related Personnel				
1						
2						
3						
Contingency Discussion						
	Action Item	Discussion	Message			



Risk_Register_Template.xlsx

Opportunities shall be presented in the following format.

TF-X PROJECT OPPORTUNITY MANAGEMENT					
Opportunity ID		Originated By		Date Opportunity Identified	
Opportunity Status		Initial trigger date		Retirement date	
Opportunity Description					
There is an opportunity that					
Caused By					
Resulting in					
	Opportunity Probability	Opportunity Impact	Opportunity Criticality Level		
Initial Opportunity C.L.					
Actual Opportunity C.L.					
Opportunity Owner					
Opportunity Realization Plan					
	Action Item	Status	Related Personnel	Target Date	Completion Date
1					
2					
3					



Opportunity_Register_Template.xlsx

Issues shall be presented in the following format.

TF-X PROJECT ISSUE MANAGEMENT					
Issue ID		Related Risk ID		Date Issue Identified	
Issue Status		Issue Priority		Issue Owner	
Issue Description					
Issue Definition					
Results					
Issue Resolution Plan					
	Action Item	Status	Related Personnel	Target Date	Completion Date
1					
2					
3					



Issue_Register_Template.xlsx

4. DELIVERABLES

Contract Data Requirement List (CDRL) status shall be presented in the following format.

[illegible]

CDRL Status.xlsx

5. MANUFACTURING STATUS

Manufacturing status shall be presented in the following format.

Product ID:																
Individual Parts											Product					
Manufacturing Company	Vendor P/N	Qty	Part Description	COTS/Make Part	Design State	Notes on Design State	Design & Manufacturing Process Agreement	Part ¹ Manufacturing Start	% COMPLETE	Part Manufacturing Completion	Product Assembly Start	Product Assembly Completion	Product Test State	Product Test Start	Product Test Completion	Product Delivery Date
								20/MM/YYYY		20/MM/YYYY	20/MM/YYYY	20/MM/YYYY		20/MM/YYYY	20/MM/YYYY	20/MM/YYYY
								20/MM/YYYY		20/MM/YYYY						



Manufacturing
Status.xlsx

6. VERIFICATION STATUS

Verification status shall be presented in the following format.

#	TEST	Responsible	Test Facility Request Demand	Test Facility Construction Start Date (if necessary)	Test Start Date	Test Location	Details of Test

COMPLIANCE TRACEABILITY		
Related Stardarts		
TEST #	TEST NAME	CDRL 29-Test Management Plan HEADINGS



Verification
Template.xlsx

7. WEIGHT STATUS

Contractor shall present weight responsible name, current weight trend and balance status, weight reduction opportunities, risks and mitigations for Maturity B and Maturity C.

8. OTHERS

Additionally, the following shall be presented in the report with free format:

- *Key issues*
- *Life Cycle Cost Estimate*
- *Sub-Contractors and Supply Chain Status*
- *Actions items*

9. LESSONES LEARNED

Lessons learned defined in last month shall be presented here.

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)

PROJESİ

PATLAMA ÖNLEME SİSTEMİ

DÖNEM-I, AŞAMA-II SÖZLEŞMESİ

EK-2

LAHİKA-4

DELIVERABLES LIST

2024

DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Definitions are given in Appendix-2 SOW.

ABBREVIATIONS

Abbreviations are given in Appendix-2 SOW.

SCOPE

The objective of Deliverables List is to list the software and hardware deliverables to be produced by the Contractor as part of the work defined in Appendix-2 SOW.

DELIVERABLE LIST

DELIVERABLE NAME	DEFINITION	COMPLETION DATE	APPROVAL METHOD	REMARKS and NOTES
Lab Qualified Items	Items that will be installed on Turkish Aerospace system laboratories		Acceptance	2 Shipsets Explosion Prevention System for Test Rig
Sof Qualified Items	Items that will be installed on development test aircrafts		Acceptance	4 Shipsets Explosion Prevention System for Development Test Aircrafts 2 Shipsets Explosion Prevention System for Development Test Aircrafts (DTA-1, DTA-2 Retrofit)
Spares			Acceptance	1 Shipset Explosion Prevention System

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EK-2 LAHİKA-5

Ayrılmıştır.

2024

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

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PROJESİ

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EK-2 LAHIKA-6

Ayrılmıştır.

2024

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ
PATLAMA ÖNLEME SİSTEMİ
DÖNEM-I, AŞAMA-II SÖZLEŞMESİ
EK-2
LAHİKA-7
DESIGN ORGANIZATION INTERFACE DOCUMENT (DOID)
TEMPLATE

2024

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PURPOSE

This document identifies the interface between the TURKISH AEROSPACE Design Organization and design contractor's design organization in order to comply with design assurance requirements.

1 SCOPE OF DESIGN WORK

The scope of this document is to describe the contractor's design work packages

2 STATEMENTS OF UNDERTAKING

The Contractor shall provide a Design Organization Interface Document including, but not limited with, the following content:

Statements of Undertaking by the responsible persons stating responsibility to maintain the design organization defined in DOID:

- a. Statement of Undertaking by the Head of Company
- b. Statement of Undertaking by Design Manager
- c. Statement of Undertaking by Responsible Directors / Managers who do not hierarchically report to the Design Manager

3 ORGANIZATION-RESPONSIBILITIES AND RESOURCES

1. A general description of the organization, its main departments, their functions and the names of those in charge; including departments responsible for airworthiness, independent monitoring
2. A description of the line management and functional relationships between the various departments and resources.
3. A description of assigned responsibilities and delegated authority of all parts of the organization which, taken together, constitute the organization's design assurance system (design, airworthiness and independent monitoring functions) together with a chart indicating the functional and hierarchical relationship of the design assurance system to management and to other parts

of the organization; also the chains of responsibilities within the design assurance system, and the control of the work of all sub-contractors.

4 DESIGN ASSURANCE SYSTEM OF CONTRACTOR

1. A description of the means by which the continuing evaluation (independent system monitoring) of the design assurance system will be performed in order to ensure that it remains effective. The following process assurance activities/objectives are to be defined in DOID and fulfilled with evidences.
 - a. Process assurance independence from the development process.
 - b. The Process Assurance objectives:
 - provide timely and accurate information concerning the application and suitability of system development processes to facilitate corrective and preventive actions,
 - provide independent confirmation of the completeness of activities as part of the certification and qualification process,
 - provide independent assurance of the completeness of products and deliverables from the development process,
 - support the review process by providing process assurance inputs,
 - assure the review process,
 - assure that lessons learnt are reviewed and adopted appropriately.
 - c. Process that any deviations from plans are identified and acceptable by relevant process owner.
 - d. Process assurance that development activities and processes are conducted in accordance with the approved product development plans / project management plan and assuring that evidence is available to show the implementation of product development plans / project management plan.
2. A description of the system to ensure that all the technical staff are of adequate quantity and quality, have adequate knowledge, expertise and experience and are trained as necessary.

5 PROCEDURES OF DESIGN ASSURANCE SYSTEM

1. The Contractor shall have procedures covering at least the following areas:
 - a. The procedures followed and forms used in the airworthiness compliance process to ensure that the design of, or the change to the design of, the product as applicable is identified and documented, and complies with the scope of the subcontract.
 - b. The procedures for classifying and approving unintentional deviations from the approved design data occurring in production (concessions or non-conformance's) (including TURKISH AEROSPACE involvement)
 - c. The procedures for awarding and managing design organization signatories
 - d. The procedures for control of design subcontractors.
 - e. The procedures for training and qualification of relevant staff.
 - f. The procedures for configuration management.
 - g. The procedures for design/ manufacturing interface
 - h. The procedures for non-conformity handling process,
 - i. The procedures for design/product Support (In-Service activities) interface
 - j. The procedures for regular and comprehensive reviews to ensure the continued achievements of specified design requirements.
 - k. The procedures for reporting to TURKISH AEROSPACE all events coming from in-service, production or design that may jeopardize the safety of TURKISH AEROSPACE certified product.
 - l. The procedure which ensures that only data which has been authorized by an identified responsible shall be dispatched to TURKISH AEROSPACE and that all necessary precautions are taken to ensure its safe receipt.
2. A description of the human resources, facilities and equipment, which constitutes the means for design, and where appropriate, for ground testing.
3. An outline of a system for controlling and informing the staff of the organization of current changes in engineering drawings, specifications and design assurance procedures.

4. A description of the recording system for:
 - a. The type design in scope of the subcontract, including relevant design information, drawings and test reports, including inspection records of test specimens.
 - b. The means of compliance.
 - c. The compliance documentation (compliance check list, reports, etc.).
5. A description of the means by which the organization monitors and responds to problems (failures, malfunctions, defects) affecting the airworthiness of its product during design, production and in-service in terms of a system for collection, investigation, analysis of data and reporting to TURKISH AEROSPACE.
6. The documents and data shall be at least the ones described below:
 - a. All the documents and data required within the scope of this subcontract and any additional ones that will be produced during the subcontract.
 - b. Product support documentation such as service bulletin, repair approval sheet, etc.
 - c. Test specimen data, test equipment and all the measuring devices as required by EMAR 21 21.A.33.

6 AUTHORIZED SIGNATORIES

1. The description of the Authority and Signatory Management System.
2. The names of the design organization authorized signatories for the preparation, approval and authorization (release to TURKISH AEROSPACE) documents and data to be produced within the scope this subcontract. This information can be a part of DOID or kept as a separate list. Each revision of the list shall be sent to TURKISH AEROSPACE if not a part of DOID.
3. A description of the formal lines of communication that shall be established and suitable personnel be nominated as focal points for discussion, negotiation and resolution with TURKISH AEROSPACE of all matters connected with defined areas of responsibility encompassing all significant aspects of each design, airworthiness and independent monitoring functions.

7 TOOLS

A description of the tools (software, ERP tools, etc.) used for design, airworthiness and independent monitoring functions.

8 CONTROL OF SUBCONTRACTORS

A description of the system to monitor the design and COTS item sub-suppliers of The Subcontractor. This system shall enable monitoring with respect to the requirements of this subcontract.

9 ACCIDENT / OCCURRENCE REPORTING AND INVESTIGATION

Contractor shall have a written procedure for reporting to TURKISH AEROSPACE all events coming from in-service, production or design that may jeopardize the safety of TURKISH AEROSPACE certified products.

A description of the means by which the organization monitors and responds to problems (failures, malfunctions, defects) affecting the airworthiness of its product during design, production and in-service in terms of a system for collection, investigation, analysis of data and reporting to TURKISH AEROSPACE.

10 MANAGEMENT OF THE DOID

Management of the DOID including creating, updating and cancellation process, configuration management rules.

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)

PROJESİ

PATLAMA ÖNLEME SİSTEMİ

DÖNEM-I, AŞAMA-II SÖZLEŞMESİ

EK-2

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ENGINEERING COORDINATION MEMO (ECM) TEMPLATE

2024

SECURITY CLASSIFICATION:	KAAN PROJECT External Engineering Coordination Memo (ECM)	
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ECM Ref No:	DATE:	ISSUE:
SUBJECT:		
FROM: Author, Dept. Code: Phone: Fax: E-mail:	TO: Attention: Phone: Fax: E-mail:	
Reply to ECM No: Reply Required: Yes ☐ No ☐ If Yes, Date:		
SUBCONTRACTOR DISTRIBUTION LIST	TURKISH AEROSPACE DISTRIBUTION LIST	
Name	Name	
Function	Function	
<u>1.References:</u>		
<u>2.Discussion:</u>		
<u>3.Action Items:</u>		
<u>4.Attachment:</u>		

THIS ECM IS NOT CONSIDERED TO BE OF SIGNIFICANT IMPACT TO EFFECT COST OR SCHEDULE. IF THIS IS NOT THE CASE, PLEASE NOTIFY TAI SUBCONTRACTING DEPARTMENT IMMEDIATELY BEFORE TAKING ACTION ON THIS ECM.

TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



**TURKISH FIGHTER AIRCRAFT DEVELOPMENT
(KAAN)
PROJECT**

EXPLOSION PREVENTION SYSTEM

PHASE-I, STAGE-II

CONTRACT

EK-2

LAHİKA-9

**TUSAŞ TARAFINDAN SAĞLANACAK KALEM LİSTESİ
TURKISH AEROSPACE FURNISHED ARTICLES (TAFA))**

2024

TURKISH AEROSPACE FURNISHED ARTICLES (TAFA))		
No	Nomenclature	Delivery Date
		(M: Months)
1	Supplier Maintainability Analysis Report (SMAR) Template	 TAFA 1 Maintainability Anal
2	Life Cycle Cost Analyses Report (LCCA) Template	 Subcontractor_LCC_Report_Template_v0
3	Supplier Safety Dossier	 TAFA 3 Supplier Safety Dossier.7z
4	Turkish Aerospace Cyber Security Assurance Requirements	 TAFA 4 Cyber Security Assurance F
5	Turkish Aerospace Information Security Assurance Requirements	N/A
6	Reliability and Testability Management Plan Template	  TAFA 6 Testability Management Plan TTAFA 6 Reliability Management Plan T
7	Reliability Analysis Report Template	 TAFA 7 Reliability Analysis Report Tem
8	Testability Analysis Report Template	 TAFA 8 Testability Analysis Report Tem
9	Piece-Parts / Hardware FMECA Report Template	 TAFA 9 HW FMECA Template.xlsx
10	Environmental Safety and Occupational Health Program Guidance	 TAFA 10ESOH_Şablon_Ten
11	System Model Management Plan	T0+1M
12	E3 Control Plan Template	 TAFA 12 E3 Control Plan Template.docx
13	E3 Analysis and Assessments Template	 TAFA 13 E3 Analysis and Assessments Dc

14	E3 Test Plan Template	 TAF A 14 E3 Test Plan Template.docx
15	E3 Test Procedure Template	 TAF A 15 E3 Test Procedure Template.
16	Weight Management Plan for Vendors	 TAF A 24 Weight Management Plan f

**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II
SÖZLEŞMESİ**

**EK-2 LAHİKA-10
KALİTE YÖNETİM GEREKSİNİMLERİ
QUALITY MANAGEMENT REQUIREMENTS**

2024

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DEFINITIONS and ABBREVIATIONS**DEFINITIONS**

Term	Definition
Acceptance Test Procedure	A document which includes methods to be followed, tests to be run and minimum acceptable results for related test while executing acceptance activities for an Equipment.
Alert and Recall	Alert means notifying Turkish Aerospace / Customer about suspect or non-conforming product/ service/ data provided. Recall means the action of collecting back suspected or nonconforming product/service/data from Turkish Aerospace / Customer
Calibration Certificate	The certificate signed by designated member of a Calibration Service Provider. This document valuable information (e.g. detailed information about Calibration Service Provider, calibration results, relevant statement, evidence of traceability, detailed information about calibrated devices) about calibration activities.
Calibration Report	A calibration report is a document that provides details of the calibration of an item. A calibration report includes details of the methods and standards used and the actual measurement results and uncertainty.
Calibration Service	A calibration service is a service with which any deviations and inaccuracies of measuring instruments and dimensional standards (or parts of a measuring instrument) are detected.
Calibration Service Provider	Calibration Service Provider is a provider which conducts calibration services
Catastrophic	Failure Conditions which would result in multiple fatalities to occupants, fatalities or incapacitation to the flight crew, or result in loss of rotorcraft.
Certification of Conformity	The certificate signed by designated member of organization of the Contractor as per standard form or certificate signed by designated member of organization of Contractor's subcontractors or vendors, as applicable, which states that the goods being presented for Turkish Aerospace 's acceptance have been examined and found to be in compliance with the requirements of the contract signed between the parties.
Contract	The agreement executed between Turkish Aerospace and Contractor under TF-X Program.
Critical Part	Any part or item designated as "critical", "flight critical", "safety critical", "primary", "fatigue critical", "life limited", "vital", "Class 1, 2 or 3", "Class A,B or C", "Grade A or B", "significant", "maintenance critical", "mission abort critical"

Term	Definition
	or “durability critical”, which has one or more non-redundant failure modes classified in a Failure Modes, Effects and Criticality Analysis (FMECA) as “Catastrophic”, “Hazardous” or “Major”, for which critical characteristics have been identified and must be controlled to ensure the required level of integrity.
Customer	Presidency of Defense Industries (SSB).
Design Authority	A person who has authority about design issues.
Dry-Run	A dry-run (or practice run) is a testing process where the effects of possible failure are intentionally mitigated.
Dry Run Test Report	A report which is prepared as a result of Dry-Run test activities.
Durability Critical	Durability Critical parts are structural components that are designed by durability requirements. The failure of the part may result in functional impairment of, or major economic impact on an aircraft or subsystem performance. The failure of the part requires costly maintenance and/or part repair or replacement, which if not performed would significantly degrade performance or operational readiness. Failure of these parts will not cause a safety of flight condition. In addition to general analytical requirements, these parts generally call for special quality control procedures and NDI practices.
Engineering Log Card	It is a document which is used in maintenance to track the operational and overhaul history of individual component.
Fatigue Critical	It is any aircraft part which could be susceptible to fatigue cracking that could lead to catastrophic failure.
First Article Inspection	A planned, complete, independent, and documented inspection and verification process to ensure that prescribed production processes have produced an item conforming to engineering drawings, digital product definition, planning, purchase order, engineering specifications, and/or other applicable design documents.
First Article Inspection Report	A report which is prepared as a result of First Article Inspection activities.
Flight Critical	It is any aircraft part, assembly or installation containing a critical characteristic whose failure, malfunction or absence could cause a catastrophic failure resulting loss or serious damage to the aircraft.
Goods	It means the system/subsystem contracted or its LRU, SRU, equipment with their trays, mounting kits/accessories, components, assemblies, subassemblies, detail parts, tools (mounting), spare and repair parts, ground support equipment, test equipment, repair and maintenance special

Term	Definition
	test equipment, along with their technical documentation (user manual, maintenance manual, interface control document (ICD), technical specification, installation manual, training notes, illustrated parts catalogue, service bulletins etc.), required for installation/testing/integration/airworthiness, as described and listed under the relevant Appendices,
Government Quality Assurance Representative	A representative who is appointed by Customer and who has right to monitor and surveil quality activities both in Turkish Aerospace premises and Contractor premises.
Hardware Process Assurance Plan	A plan that describes the procedures, methods, and standards to be applied and the processes and activities to be conducted for achieving the process assurance objectives. This plan should include; process control, organizational responsibilities, conformance, process assurance activities and deviations management process.
Hazardous	A failure which may cause severe injury, major property damage, or major system damage which will result in mission loss, loss of ability to continue safe flight to a suitable landing site.
Major	Failure conditions which would reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be, for example, a significant reduction in safety margins or functional capabilities, a significant increase in crew work load or in conditions impairing crew efficiency, physical distress to occupants, possibly including injuries, or physical discomfort to the flight crew.
Material Review Board	Board who reviews nonconformities on product or material and determine dispositions.
Non-Destructive Testing	Non-destructive testing is the process of inspecting, testing or evaluating materials, components or assemblies for discontinuities, or differences in characteristics without destroying the serviceability of the part or system.
Project Audit Plan	A plan which includes descriptions of the activities and arrangements for audits which will be performed within the scope of project.
Project Quality Management Reviews	Determination of the suitability, adequacy or effectiveness of quality management activities which are planned and described in Project Quality Management Plan to achieve established objectives.
Project Quality Management Review Reports	A report which is prepared as a result of Project Quality Management Review.
Safety Critical	A term applied to a condition, event, operation, process, or item whose mishap severity consequence is either

Term	Definition
	Catastrophic or Hazardous (e.g., safety-critical function, safety-critical path, and safety-critical component).
Services	It means any and all of the technical study, integration support/assistance, technical advice training, logistic support service and any form of other similar service to be provided to be performed by the Contractor as set forth in the relevant appendices of this Contract,
Software Quality Assurance Plan	A plan which establishes the methods to be used to achieve the objectives of the software quality assurance process. This plan should include; software quality assurance environment, authority, software quality assurance activities, transition criteria, definition of records to be produced by software quality assurance process, and supplier process management.
Statement of Conformity	An expression that clearly describes the state of compliance or non-compliance to a specification, standard or requirement.
Technical Authority	A person who has authority about technical issues.
TF-X Program	It means Turkish Fighter Development (TF-X) Program for an indigenous jet fighter aircraft, that will be designed, developed, tested and certified by Turkish Aerospace towards Customer.
Turkish Aerospace Approved Supplier	Approval status of a Contractor as a result of successful Quality Management System audit performed by Turkish Aerospace Quality Assurance.
Quality Approval	Quality Approval means that the Contractor can be listed in "Turkish Aerospace Approved Supplier List" after getting Approval as a result of successful Quality Management System audit performed by Turkish Aerospace Quality Assurance.
Quality Authority	A person who has authority about quality issues.
Quality Management Plan	Plan containing quality management activities to be performed under this Contract; how it is organized, how it will be conducted, and the methods procedures.
Quality Management System	A comprehensive system comprises activities by which the organization identifies its objectives and determines the processes and resources required to achieve desired results.
Quality Record	An evidence which could be in both hard copy format (e.g. paper) and soft copy format (e.g electronic media) and which is created as a result of planned/performed quality activities.

Term	Definition
Quality Record Process	A process which describes the way of management of quality records.

ABBREVIATIONS

Term	Definition
AS	Aerospace Standard
AQAP	Allied Quality Assurance Publications
CMM	Coordinate Measuring Machine
CSP	Calibration Service Provider
CoC	Conformance of Certification
EASA	European Aviation Safety Agency
FAA	Federal Aviation Administration
FAI	First Article Inspection
FMECA	Failure Modes, Effects and Criticality Analysis
GQAR	Government Quality Assurance Representative
HPAP	Hardware Process Assurance Plan
ISO	International Standard Organization
MRB	Material Review Board
NC	Numerical Control
NDT	Non-Destructive Testing
CDRL	Contractual Data Requirement List
SOIR	Shop Order Inspection Report (Simultaneous Operations Inspection Report)
STANAG	Standardization Agreement
SQAP	Software Quality Assurance Plan
QA	Quality Assurance

1. PURPOSE

This annex describes the general requirements for quality standards that are applicable to the Turkish Fighter Development Project Contractors.

2. APPLICABLE AND REFERENCE DOCUMENTS

Applicable and reference documents are given in Table 1.

#	Document No	Title
1	AS 9100D	Quality Management Systems-Requirements for Aviation, Space, and Defence Organizations
2	AS 9102	Aerospace First Article Inspection Requirement
3	AQAP 2310	NATO Quality Management System Requirements for Aviation, Space and Defence Suppliers
4	ISO 9000	Family of Quality Management Systems Standards
5	AQAP 2105	NATO Requirements for Deliverable Quality Plans
6	AQAP 2110	NATO Quality Assurance Requirements for Design, Development and Production
7	ISO 10005	Quality Management-Guidelines for Quality Plans
8	ISO 17025	General Requirements For The Competence of Testing and Calibration Laboratories
9	AQAP 2070	NATO Mutual Government Quality Assurance
10	STANAG 4107	Mutual Acceptance of Government Quality Assurance and Usage of The Allied Quality Assurance Publications
11	IN.QUA.25.031E	Nonconformity and Corrective Action Management for Suppliers
12	IN.QUA.25.110E	Instructions for Supplier Quality Requirements for Classified Items
13	FM.QUA.0237E	Supplier Disposition Request Form
14	MN.QUA.25.001	Turkish Aerospace Supplier Quality Requirements Manual.
15	IN.QUA.25.050E	First Article Inspection (FAI) Requirements for Suppliers

Table 1 Applicable and Reference Documents

In order to set a harmonized Quality Management System, all Contractors shall comply with the latest revision of the standards.

3. GENERAL REQUIREMENTS

3.1. Quality Management System

- 3.1.1. Contractor shall have AS9100 certificate (or equivalent)
- 3.1.2. Contractor shall comply with the requirements stated in latest applicable revision of MN.QUA.25.001 Turkish Aerospace Supplier Quality Requirements Manual.
- 3.1.3. Critical Part Contractors, shall comply with IN.QUA.25.
Note: Classified Item (Critical Part) : Any part or item designated as “Critical”, “Flight Critical”, “Safety Critical”, “Primary”, “Fatigue Critical”, “Life Limited”, “Vital”, “Class 1, 2 or 3”, “Class A,B or C”, “Grade A or B”, “Significant”, “Maintenance Critical”, “Mission Critical” or “Durability Critical”, which has one or more non-redundant failure modes classified in a Failure Modes, Effects and Criticality Analysis (FMECA) as “Catastrophic”, “Hazardous” or “Major”, for which critical characteristics have been identified and must be controlled to ensure the required level of integrity.
- 3.1.4. Contractor shall ensure that its Quality Management System meets the requirements for work packages to be undertaken.
- 3.1.5. Contractor shall submit a Program Quality Management Plan [CDRL 3], Software Quality Assurance Plan (where DO 178 is applicable) [CDRL 32.5], Hardware Process Assurance Plan (where DO-254 is applicable) [CDRL 42.5] which addresses contractual requirements to Turkish Aerospace.
- 3.1.6. Contractor shall provide to Turkish Aerospace unrestricted opportunity in any phase of this contract to evaluate Contractor’s Quality Management System and Contractor compliance to AS9100 to satisfy this contract’s requirements by means of audits, conformance evaluations, assessments, investigations, reviews and inspections. Turkish Aerospace shall inform Contractor about the activity at least 15 (fifteen) days before.
- 3.1.7. Contractor shall respond and provide an action plan for the nonconformities detected during conformance evaluations, assessments, investigations, reviews and inspections within 7 (seven) days after the receipt of the written notification of nonconformities. For audits, action plans shall be provided within a period as defined in IN.QUA.25.031E.
- 3.1.8. Contractor shall complete the agreed actions within 15 (fifteen) days (unless agreed otherwise), after action plan, root cause analysis and corrective action

will be agreed with Turkish Aerospace. In the event such nonconformities cannot be corrected within the mutually agreed period, Turkish Aerospace shall have the right to reject the relevant activities or items. For audits, completion of the actions shall be in line with IN.QUA.25.031E (unless agreed otherwise).

- 3.1.9. The Customer shall have the right to assign a Government Quality Assurance Representative (GQAR) to perform and monitor all the quality management activities in Contractor premises and also has rights defined in AQAP 2310 Para. 9.1.1. The customer has the right to assign GQAR responsibilities to national GQARs in accordance with STANAG 4107 (AQAP-2070).
- 3.1.10. Contractor shall prepare Project Audit Plan [CDRL 61] considering the all phases of the contract and shall keep it update based on the scope of the contract. Content of the Project Audit Plan shall include as a minimum the following information areas:
- i A cover page with Document Title, Publish Date, Document/Reference Number, CDRL number, classification type, author/approver/authorizer
 - ii Audit title (compliance to contract and standards audits, program management audit, configuration management audit, quality management audit, requirement management audit, design process audit and implementation and integration process audits should be covered at least)
 - iii Audit criteria (contract and relevant standards)
 - iv Audit type (internal audit, subcontractor audit etc.)
 - v Audit team, methods, planned date and duration
- 3.1.11. Contractor shall flow-down of all applicable Turkish Aerospace requirements to its lower tier subcontractors.
- 3.1.12. Contractor shall request a Quality Management Plan which satisfies the requirements of AS 9100, or equivalent from its subcontractors. The Contractor shall identify and agree any subcontract (sub tier) Quality Management Plan, and shall provide visibility of this process to Turkish Aerospace if it is deemed.
- 3.1.13. Project Quality Management Reviews shall be performed by contractor (Turkish Aerospace and the Customer shall have right to attend these

meetings) in accordance with the Quality Management Plan which shall be submitted within the scope of TF-X Project.

- 3.1.14. Contractor shall provide timely Project Quality Management Review Reports [CDRL 60]. Content of the report shall comply with the requirements of the chapter 9.3 of AS9100 standard as minimum.

3.2. Quality Approval / Contractor Exit

- 3.2.1. Turkish Aerospace shall have right to carry out Quality Management System audit and Contractor assessment against the requirements of the contracted quality standards in order to ensure that Contractor has implemented a documented Quality Management System which is capable of satisfying these requirements.
- 3.2.2. Contractor shall achieve and maintain Turkish Aerospace Approved Supplier status and support quality assurance surveillance including Customer/Government with reasonable access throughout the life of any Contract/Purchase Order. Contractor shall notify location changes, adhere to environmental and statutory regulations.
- 3.2.3. Quality Approval may be withdrawn or suspended at the discretion of Turkish Aerospace Quality Assurance, for example, for continued late delivery, poor quality performance, late responses to audit findings, and/or evidence of the failure of Contractor's Quality Management System to meet Turkish Aerospace contractual quality conditions in respect of any deliverable.
- 3.2.4. Any quality deficiencies identified as a result of the conditions specified in this contract shall be corrected by Contractor within an agreed time frame at no cost to Turkish Aerospace.
- 3.2.5. In case Contractor holds an approval granted by an international or national aviation authority, and in case this approval is appropriate to the scope of work contracted, Contractor shall at all times operate in accordance with this approval.
- 3.2.6. Where there is a business need to utilise a lower tier subcontractor, the lead Contractor shall prepare a supplier list and shall inform Turkish Aerospace for the necessary clearance from Turkish Aerospace before proceeding with work placement. Where the lower tier subcontractor does not hold a Turkish Aerospace approval, or where they hold a Turkish Aerospace approval without the correct scope, Turkish Aerospace shall have right to approve the

lower tier subcontractors by performing an audit. Under all circumstances, the lead Contractor shall evaluate and approve its suppliers/subcontractors within its own quality management system.

- 3.2.7. In case, there is no longer a requirement to maintain a Contractor Quality Approval, appropriate action shall be taken by Contractor in conjunction with Turkish Aerospace to facilitate Contractor exit arrangements. Disposal or destruction of records are under Turkish Aerospace's authorization under all circumstances.

Note: Disposal or destruction of records will vary depending upon the categorisation of Contractor and type of work packages. Consideration (based on type of Contractor) needs to be given to the type of assets and artefacts which may require repatriation to Turkish Aerospace (these may include Turkish Aerospace specifications, drawings, design data, tooling, equipment, free issue product / material). In some cases, there may be assets or artefacts which do not require repatriation to Turkish Aerospace, but require appropriate disposal / destruction noting project security considerations.

3.3. Access to Premises and Data

- 3.3.1. Turkish Aerospace and the Customer shall have the right to access relevant areas in Contractor's premises where the work relevant to Contract is performed, and to perform audits, conformance evaluations, reviews and investigations in those areas prior written notice to Contractor.
- 3.3.2. Contractor shall provide, the facilities and assistance for the safe and convenient audits, conformance evaluations, reviews and investigations as necessary to ascertain Contractor's compliance to contracted standards, the Quality Management Plan requirements, and the other requirements of this Contract, and to verify the conformance of the Goods and Services to be furnished under the Contract with the Terms and Conditions thereof.
- 3.3.3. Relevant assistance, information, data, equipment, personnel as may be required for performance of these audits, conformance evaluations, reviews

and investigations shall be provided by Contractor at no cost to Turkish Aerospace and/or Customer.

3.4. Delivery and Release

- 3.4.1. All products/services shall be released under cover of the correct form of authorized release certificate (Such as EASA Form-1, FAA Form 8130-3 or any civil / military equivalent etc. which shall be acceptable for TF-X Program) and /or Conformance of Certification (CoC) which is approved by Contractor's authorised Quality Assurance (QA) signatory whenever any product, procurement item, technical documentation or any part of them is delivered to Turkish Aerospace. (e.g. A Certificate of Conformity, data transmittal note, approved certificate, release certificate, certificate of release to service etc.) as appropriate.
- 3.4.2. Contractor's release documentation shall include the information in sample CoC form at least (A sample COC format is given in the section 4 of this document).
- 3.4.3. Release documentation shall identify the Contractor, its Turkish Aerospace supplier number/Purchase Order or Contract number and include a certification clause declaring that the product / service conforms to the requirements of the order. See examples of certification clauses below.
- i It is certified that the articles detailed hereon have been supplied and conform in all respects to the specifications, drawings and contract / order unless otherwise stated on the release document.
 - ii It is certified that the articles detailed hereon, have been supplied, are in the same condition as when received and conform in all respects to the contract / order unless otherwise stated on the release document. (typically be used by a stockist / distributor)
- 3.4.4. Release documentation shall provide a means to ensure traceability of the supplies; this may be achieved through the provision of a unique reference number, lot traceability, internal works order number etc. Release documentation shall include comprehensive details of the subject supplies, including any applicable accepted / agreed limitations, qualification status, software status, production permits, shortages and work outstanding.

Applicable concession or production permit documentation shall be supplied with release documentation.

- 3.4.5. If a deliverable is supplied to Turkish Aerospace with caveats as to its intended use, then the certification or release documentation will clearly identify the limitations.
- 3.4.6. All Turkish Aerospace authorized concessions shall be referenced on the Contractor's CoC.
- 3.4.7. The completed CoC shall be accompanied by any additional supporting documentation previously specified as deliverable.
- 3.4.8. CoC's shall be counter-signed by the Contractor's Government Quality Assurance Representative when required contractually.
- 3.4.9. All items delivered for repair/overhaul shall be returned by clearly identifying as "serviceable" or "unserviceable".
- 3.4.10. Contractor shall prepare Engineering Log Card(s) or equivalent with the deliverable item(s), if a component is returned for repair or overhaul. This Engineering Log Card or equivalent shall contain a statement detailing the nature of the work performed. Engineering Log Card or equivalent shall be agreed with Turkish Aerospace wherever required.
- 3.4.11. Firearms or other explosives shall be dealt with in accordance with the agreed export control and firearms/explosive regulations.
- 3.4.12. Dangerous goods shall be transported and stored in accordance with the requirements of the contract and applicable local or national legislation at all times.

3.5. Certification

- 3.5.1. Where applicable, Contractor is to provide a release documentation under their national or international aviation approval.
- 3.5.2. Products/Equipment that requires special identification (e.g. "not for flight", "experimental", "hazardous", "explosive") shall be identified in accordance with recognised industry or military standards where applicable and all

product release documentation shall be annotated accordingly. E.g. red/blue banding.

3.6. Quality Records

- 3.6.1. Contractor shall establish a documented Quality Records Process which satisfies all applicable legal, regulatory, product liability and contractual requirements and specifies the quality records relating to the product / service (including, where applicable and without limitation, in relation to design, production, maintenance repair and overhaul). Additionally, Quality Record Process shall address the legibility, identification, storage, protection, retrieval, retention and destruction or disposal of the Quality Records.
- 3.6.2. Quality records shall be retained and stored by Contractor in accordance with the agreement with Turkish Aerospace and made available upon request to Turkish Aerospace, the Customer, the end user of the product / service, applicable authority and / or in each case their nominated representatives.
- 3.6.3. Contractor shall require a written authorisation from Turkish Aerospace prior to destroy or dispose any quality records. Quality Records include, but are not limited to: design, development; configuration documents/records; manufacturing planning and records (SOIR's, stamp records, reworks, Material Review Board (MRB) decisions, First Article Inspection (FAI), Numerical Control (NC) programming, tooling lists, Coordinate Measurement Machine (CMM) programs, inspection etc); test and qualification; Records of externally provided product (supplier/subcontractor evaluations, actions, FAI's, source and receiving inspection, traceability etc); control of customer supplied product/data; product traceability; maintenance repair and overhaul; product / service non-conformance and corrective action; staff competence / authorities; data relating to product safety; records stating product

conformity/supporting the continued airworthiness of the product (authorized release certificate, CoC's, Statement of Conformity etc.)

3.7. Alert and Recall Process

- 3.7.1. Contractor shall have its own Alerts and Recalls process that identifies what actions are required when notifying Turkish Aerospace/Customers about suspect or non-conforming product/ service/data provided.

Note: This covers all deliverable product / service, including maintenance activities, training provision, technical documentation / information etc.

- 3.7.2. Notification of an occurrence which requires an Alert and Recall being raised (through the supply chain) shall be provided (preferably electronically) to the Turkish Aerospace (for orders placed directly by Turkish Aerospace) within 48 hours of confirmation of the need to raise an Alert and Recall. Where the order is not placed directly by Turkish Aerospace, notification shall be sent through the product / service supply chain.

- 3.7.3. The Alert and Recall shall be provided by Contractor, signed by the Technical Authority and / or Quality Authority. The following minimum information shall be considered for inclusion (depending upon product / service type and application) in the Alert and Recall notice:

- i Contractor / manufacturer's name and address
- ii Contractor point of contact name, telephone number and email address
- iii Part / drawing number and issue
- iv Description
- v Serial / batch number
- vi Flight / operational / product safety criticality statement (where known)
- vii Applicable Turkish Aerospace programme
- viii Quantity
- ix Release documentation (e.g. Certificate of Conformity reference)
- x Turkish Aerospace purchase order / contract number
- xi Turkish Aerospace goods receipt note number (where applicable)
- xii Delivery destination
- xiii Delivery date
- xiv Problem / deviation description
- xv Proposed containment, correction and corrective action

xvi Any other pertinent information that will enable timely recovery of the subject items

- 3.7.4. Contractor shall ensure timely completion of all activities related to the Alert and Recall with all suspect or non-conforming product accounted for and / or disposed of appropriately as agreed with Turkish Aerospace.

3.8. Concession/Nonconforming Items

- 3.8.1. Contractor shall maintain a documented procedure for the identification, documentation, segregation and disposition of nonconforming product. Contractor's nonconforming product control system shall comply with and the nonconformities shall be processed in accordance with IN.QUA.25.031E.
- 3.8.2. Contractor shall identify and record all non-conformance(s) raised against product or system and all subsequent corrective and preventive actions.
- 3.8.3. Control of nonconforming product system at Contractors shall assure that any nonconforming product is controlled throughout all areas of Contract/Purchase Order.
- 3.8.4. Contractor will notify Turkish Aerospace in case of the existence of any or nonconformity, and will agree with Turkish Aerospace about actions to be taken.
- 3.8.5. All Major concessions to be submitted to Turkish Aerospace with FM.QUA.0237E.

3.9. Calibration

- 3.9.1. Calibration services shall be performed by a Calibration Service Provider (CSP) which is accredited to ISO 17025 in the relevant measurement area. If work not within the CSP's scope of accreditation, then prior approval to

proceed shall be required from the relevant Turkish Aerospace QA and Design Authority.

- 3.9.2. In case, a CSP which is accredited to ISO 17025 in the relevant measurement area is not found, Contractor shall ensure that traceability to national or international standards is assured.
- 3.9.3. Where calibration has been performed a Calibration Certificate or Calibration Report shall be supplied. All "Calibration Certificates" shall as a minimum conform to the requirements of ISO 17025.
- 3.9.4. Where repair work is undertaken, prior to or as part of calibration, a full repair report shall be provided.
- 3.9.5. Equipment subject to calibration shall be delivered with a minimum of 75% of its calibration period remaining at the point of delivery.
- 3.9.6. If a deliverable contains calibrated items, the Contractor shall supply legible copies of certificates of Calibration for these items, and ensure the calibration period remaining is as required by the Contract/Purchase Order.

3.10. Additional Quality Requirements

- 3.10.1. If Turkish Aerospace deems it appropriate, Contractor shall submit proposed Material Review Board (MRB) arrangements to Turkish Aerospace for review and/or approval. Turkish Aerospace and the Customer have always rights to reject the "repair" and "use as is" dispositions as well as non-conforming items.
- 3.10.2. Contractor shall perform a review process for all deliverables including drawings, specifications, standards etc.
- 3.10.3. In case Non Destructive Testing (NDT) activities are planned/identified within scope of Contract, these activities shall be under the control of Contractor's nominated NDT Level 3 staff (verified by Turkish Aerospace). If Contractor lose the services of nominated NDT Level 3 staff, Contractor shall notify the Turkish Aerospace and nominate a replacement within 30 days.
- 3.10.4. Contractor shall perform First Article Inspection (FAI) [CDRL 58] on new product representative of the first production run in accordance with IN.QUA.25.050E and AS 9102 unless otherwise specified within the order. Contractor shall perform a comparable inspection (delta FAI) at production change points or for specified articles following inspection tooling changes,

design changes, or evident quality degradation. This includes all details and sub-assemblies, which constitute the end item ordered. Contractor shall provide FAI/Delta FAI Report [CDRL 58] with shipment of deliverable product to Turkish Aerospace.

- 3.10.5. Contractor shall perform Dry-Run tests in accordance with the approved (by Turkish Aerospace) Acceptance Test Procedure. Each Dry-Run Test Report [CDRL 59] shall be submitted to Turkish Aerospace at least 3 weeks before qualification and acceptance tests.

4. SAMPLE CONFORMANCE OF CERTIFICATION (COC) FORMAT

CERTIFICATE OF CONFORMITY (C.O.C) <i>Uygunluk Beyanı (UB)</i>					
Supplier No (Tedarikçi No)		Project/Program Name (Proje/Program Adı)		Document No. (Doküman No.)	
Supplier (Name, Address, e-mail etc.) (Firma Adı, Adresi, e-mail vb.)					
Delivery Address (Teslimat Adresi)					
Customer (Müşteri)		Customer Code (Müşteri Kodu)			
Subcontract / P.O. No (Alt Sözleşme/Sipariş Eseri No)		Subcontract/ P.O. Date (Alt Sözleşme/Sipariş Eseri Tarihi)			
Subcontract/P.O. Modification No (Alt sözleşme/Sipariş Eseri Değişiklik No)		Subcontract/P.O. Modification Date (Alt sözleşme/Sipariş Eseri Değişiklik No)			
Type Version (Tip Versiyonu)		Shipment No. (Sevkiyat No)			
Item Nomenclature (Parça Adı)		Item Version/Change Letter (Parça Versiyonu / Değişiklik Harf)			
Item Part No. (Parça Numarası)		Item Serial/Lot/Batch No. (Parça Seri/Lot/Katılı No.)			
WBS NO (WBS NO)		Operation No. (Operasyon No.)			
Quantity (Adet)		Log No (Giriş No)			
Approved Nonconformities/ Concessions/Waiver (Onaylı Uyumsuzluk/Sapama/Foreverler)					
REFERENCE OF CONFORMITY <i>(Uygunluk Referansı)</i>					
Subcontract Requirements (Design Spec., ICD, and other contractual doc.) <i>Alt sözleşme Gereklileri (Tasarım Spesifikasyonu, Arayüz Kontröl Dokümanı, diğer kontrastel dokümanlar)</i>		Operational Documents (Procedure, drawing, schematics etc.) <i>Operasyonel Dokümanlar (Prosedür, çizim, şema vb.)</i>		Deliverable Documents (User Manuals, log book etc.) <i>Sevime Edilecek Dokümanlar (Kullanıcı El Kitabı, Etki Kayıtları vb.)</i>	
Document No. (Doküman No)	Issue/Rev. (Yayın/Rev.)	Document No. (Doküman No)	Issue/Rev. (Yayın/Rev.)	Document No. (Doküman No)	Issue/Rev. (Yayın/Rev.)
STATEMENT OF CONFORMITY					
It is hereby certified that apart from the deviations or waivers noted in the "Remarks" box below, the whole of the supplies detailed above, conform in all respects to the specification (s), drawing(s) and condition(s) or requirement(s) respects to the specification(s), drawing(s) and condition(s) or requirement(s) of the subcontract.					
REMARKS:					
AUTHORIZED NAME & SIGNATURE:			DATE:		

**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ**

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II

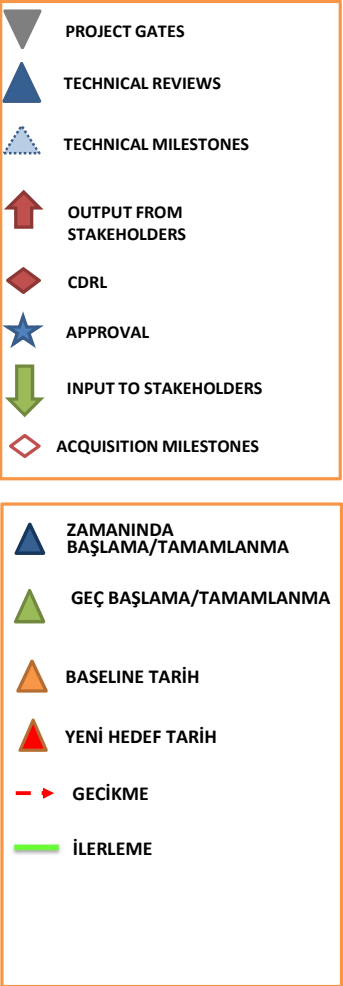
SÖZLEŞMESİ

EK-2 Lahika-11

INTEGRATED MASTER PLAN TEMPLATE

2024

TF-X Projesi, Dönem-I, Aşama-I Sözleşmesi



TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)

PROJESİ

PATLAMA ÖNLEME SİSTEMİ

DÖNEM-I, AŞAMA-II SÖZLEŞMESİ

EK-2 LAHİKA-12

Ayrılmıştır.

2024



**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
(TURKISH AEROSPACE INDUSTRIES INC)**

TURKISH FIGHTER DEVELOPMENT (KAAN) PROGRAM

CONTRACT

FOR

EXPLOSION PREVENTION SYSTEM PHASE-I, STAGE-II

Contract No: 202400217

APPENDIX - 3

PROGRAM IMPLEMENTATION AND DELIVERY SCHEDULE (PIDS)

YEAR		2024				2025				2026				2027				2028				2029			
QUARTER		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
T0 (Contract Signature Date)																									
Kick Off Meeting																									
CDR	30.10.2024																								
TRR (for Lab Qualified System Delivery)	30.6.2025																								
B10 PRR (Production Readiness Review)	30.9.2025																								
Environmental Qualification	30.12.2025																								
Preliminary DDP (SOF)	28.2.2026																								
First Flight (FF) of DTA-3	30.12.2026																								
Flight Test Period and Support & Adaptation by Subcontractor (if needed)																									
B10 SVR (System Verification Review)	28.6.2026																								
Final DDP Delivery	30.4.2026																								
Phase-I, Stage-II - Close-Out																									
Lab. Qualified System Delivery Date(s)																									
2 Shipset of Explosion Prevention System Test Rig (Lab Qualified)	20.10.2025																								
Explosion Prevention System DTA Delivery Dates																									
Delivery for DTA 3 - 1 shipset	27.2.2026																								
Delivery for DTA 4 - 1 shipset	27.2.2026																								
Delivery for DTA 5 & 6 - 2 shipsets	DTA5: 30.07.2026 DTA6: 30.09.2026																								
Delivery for DTA 1 & DTA 2 (Retrofit)- 2 shipsets	TBD																								
Delivery of Spare Set - 1 shipsets for DTA	30.11.2026																								

Note: Delivery means delivered shipset DAP-TAI Facilities in Turkey.

**MİLLİ MUHARİP UÇAK (KAAN)
GELİŞTİRİLMESİ PROJESİ**



TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

İLE

TÜBİTAK MAM - MARMARA ARAŞTIRMA MERKEZİ

ARASINDAKİ

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II

SÖZLEŞMESİ

SÖZLEŞME NO: 202400217

EK 4- MALİYET DAĞILIM AĞACI

(COST BREAKDOWN STRUCTURE)

2024

TABLO-1 DÖNEM-I AŞAMA-II TOPLAM MALİYET

TABLO-1.A ÖNGÖRÜLEN TOPLAM TEKRARLANMAYAN MALİYET

TABLO-1.A.1 ÖNGÖRÜLEN İŞÇİLİK MALİYETİ

IDA Seviyesi	IDA	İş Paketi	Tanım	İş Tanımında İlgili Bölüm	Toplam Direkt İşçilik Maliyeti (USD)	Genel Üretim Gideri (GÜG) (%10) (USD)	Genel Yönetim Gideri (GYG) (%5) (USD)	TOPLAM (USD)
1	00000	PROJECT MANAGEMENT	Realization of relevant Project Management activities defined in the SOW document	4	\$ 563.534,40	\$ 56.353,44	\$ 30.994,39	\$ 650.882,23
1	00001	SYSTEMS ENGINEERING	Realization of relevant Systems Engineering activities defined in the SOW document	5	\$ 281.767,20	\$ 28.176,72	\$ 15.497,20	\$ 325.441,12
1	00002	DETAIL (CRITICAL) DESIGN PHASE	Realization of relevant Critical Design activities defined in the SOW document	6	\$ 175.032,00	\$ 17.503,20	\$ 9.626,76	\$ 202.161,96
1	00003	LOGISTIC SUPPORT	Realization of relevant Logistic Support activities defined in the SOW document	13.2.2.3	\$ 350.064,00	\$ 35.006,40	\$ 19.253,52	\$ 404.323,92
1	00004	VERIFICATION (TEST and EVALUATION)	Realization of relevant Verification Management activities defined in the SOW document	6.3, 6.4	\$ 554.954,25	\$ 55.495,43	\$ 30.522,48	\$ 640.972,16
1	00005	ACQUISITION	Realization of relevant Acquisition Management activities defined in the SOW document	4.9	\$ 233.032,80	\$ 23.303,28	\$ 12.816,80	\$ 269.152,88
1	00006	INFRASTRUCTURES	Realization of relevant Infrastructure Procurement and Management activities defined in the SOW document	7	\$ 116.516,40	\$ 11.651,64	\$ 6.408,40	\$ 134.576,44
1	00007	CERTIFICATION and DESIGN ORGANIZATION APPROVAL	Realization of relevant Certification and Design Organisation (DOCA, DOID) activities defined in the SOW document	11, 12, 13, 14	\$ 229.429,20	\$ 22.942,92	\$ 12.618,61	\$ 264.990,73
1	00008	PRODUCTION OPERATIONS	Realization of relevant Production Organisation activities defined in the SOW document	6.2	\$ 114.714,60	\$ 11.471,46	\$ 6.309,30	\$ 132.495,36
ÖNGÖRÜLEN İŞÇİLİK MALİYETİ TOPLAM					\$ 2.619.044,85	\$ 261.904,49	\$ 144.047,47	\$ 3.024.996,80
İŞÇİLİĞE DAİR ÖNGÖRÜLEN KAR BEDELİ (%15)								\$ 453.749,52
İŞÇİLİĞE DAİR ÖNGÖRÜLEN TOPLAM BEDEL								\$ 3.478.746,32

NOT -1 Maliyet kalemleri arasında, Yüklenici'nin yazılı talebi ve TUSAŞ'ın yazılı onayı ile Öngörülen Toplam Maliyet'te herhangi bir artışa yol açmaması koşuluyla, aktarım yapılabilecektir.

TABLO-1.A.2 DİĞER TEKRARLANMAYAN MALİYETLER

#	Maliyet Kalemi	Toplam (USD)	Genel Yönetim Gideri (GYG) (%5) (USD)	TOPLAM (USD)
1	Danışmanlık, Bireysel Danışmanlık, Diğer Hizmet Alımları (İşçilik x %5)	\$ 130.952,24	\$ 6.547,61	\$ 137.499,85
2	Seyahat Maliyeti (İşçilik x %1)	\$ 26.190,45	\$ 1.309,52	\$ 27.499,97
3	Eğitim Maliyeti (İşçilik x %3)	\$ 78.571,35	\$ 3.928,57	\$ 82.499,91
4	Mühendislik Yazılımları Maliyeti (İşçilik x %10)	\$ 261.904,49	\$ 13.095,22	\$ 274.999,71
5	Alt Yüklenici Sözleşmeleri	\$ 3.348.337,00	\$ 167.416,85	\$ 3.515.753,85

5.1	HTM (ASM modül sonrasında yakıt tanklarına dağıtım sisteminin geliştirilmesi)	\$	275.900,00	\$	13.795,00	\$	289.695,00
5.2	AEROS (Sistem, Emniyet ve Özel Mühendislikler, O2 sensörü tedarik destek)	\$	1.065.437,00	\$	53.271,85	\$	1.118.708,85
5.3	NAVIST (1D Modelleme çalışmaları, 3D tasarım destek)	\$	325.000,00	\$	16.250,00	\$	341.250,00
5.4	GEBZE ÇÖZÜM METAL (Ön modül imalat çalışması)	\$	50.000,00	\$	2.500,00	\$	52.500,00
5.5	GTL (Çevresel Testler/ EMI-EMC)	\$	660.000,00	\$	33.000,00	\$	693.000,00
5.6	Kalibrasyon (Firma TBD)	\$	60.000,00	\$	3.000,00	\$	63.000,00
5.7	Sıcaklı Sensörü Tedarik NRE Bedeli	\$	122.000,00	\$	6.100,00	\$	128.100,00
5.8	Basınç Sensörü Tedarik NRE Bedeli	\$	170.000,00	\$	8.500,00	\$	178.500,00
5.9	Vana Tedarik NRE Bedeli (Yerli Firma-NESA)	\$	500.000,00	\$	25.000,00	\$	525.000,00
5.10	Filtre Tedarik NRE Bedeli	\$	120.000,00	\$	6.000,00	\$	126.000,00
6	Alt Yapı/ Yatırım Maliyeti	\$	1.320.000,00	\$	66.000,00	\$	1.386.000,00
6.1	ExPS Test Sistemi	\$	310.000,00	\$	15.500,00	\$	325.500,00
6.2	ASM Modül Üretim Altyapısı	\$	600.000,00	\$	30.000,00	\$	630.000,00
6.3	Lifecycle Test System (VOC, oil etc.)	\$	100.000,00	\$	5.000,00	\$	105.000,00
6.4	Exps Sistemi Entegrasyon Altyapı Malzemeleri	\$	230.000,00	\$	11.500,00	\$	241.500,00
6.5	ASM Unit Modification (Besleme Havası Koşullandırması)	\$	80.000,00	\$	4.000,00	\$	84.000,00
TOPLAM		\$	5.165.955,52	\$	258.297,78	\$	5.424.253,30

1.) Yüklenici'ye Tablo 1.A.2'de belirtilen maliyet kalemleri üzerinden kar ödemesi yapılmayacaktır.

TABLO 1.A.3 ÖNGÖRÜLEN PROTOTİP ÜRÜN MALİYETİ								
#	Prototip İçeriği	Adedi	Birim Direkt İşçilik Maliyeti	Genel Üretim Gideri (GÜG) (İşçilik x %10) (USD)	Malzeme (USD)	Test Hizmeti Maliyeti (USD)	Genel Yönetim Gideri (GYG) (%5) (USD)	TOPLAM (USD)
1	ExPs Sistemi Prototip	6	109.824,00 \$	10.982,40 \$	109.649,61 \$	96.096,00 \$	16.327,60 \$	2.057.277,65
2	Restrictor Check Valve (Test Rig Set / One Size Bigger / One Size Smaller Units)	32	- \$	- \$	2.660,00 \$	- \$	133,00 \$	89.376,00
3	O2 Sensor (Mettler & Toledo) TUSAŞ'da kurulacak Yakıt Test Sistemi için	24	- \$	- \$	18.335,00 \$	- \$	916,75 \$	462.042,00
TOPLAM ÖNGÖRÜLEN PROTOTİP ÜRÜNLERİ MALİYETİ								2.608.695,65
PROTOTİP ÜRÜNLERİNE DAİR ÖNGÖRÜLEN KAR BEDELİ (%15)								391.304,35
PROTOTİP ÜRÜNLERİ TOPLAM BEDELİ								3.000.000,00

2.) Tablo 1.A.3'de yer alan ürünler Yüklenici tarafından üretilerek ve/veya temin edilerek İşbu Sözleşme gereksinimlerine uygun olarak Yüklenici bünyesinde icra edilecek olan testlerde ve çalışmalarda kullanılacak olup TUSAŞ'a teslim edilmeyecektir.

2a.) Prototip ürünler için Tablo 1.A.3'de verilen bedel öncül bedel olup, prototip bedelinin belirtilen değer üzerinde olması halinde yüklenicinin bu kapsamdaki artış talebi ilgili onay sürecinin akabinde güncellenecek olan prototip birim maliyeti ve toplam prototip ürünleri maliyetleri mali tablolara yansıtılacaktır.

3.) Prototip Ürünler'e ait gerçekleşen kar bedeli Sözleşme kapsamındaki tüm Prototip Ürün üretimlerinin tamamlanmasının ardından belirlenecek olan birim Prototip Ürün maliyeti üzerinden Tablo 1.A.3'de belirtilen oranda belirlenecektir.

TABLO-1.B ÖNGÖRÜLEN TOPLAM TEKRARLANAN MALİYET								
TABLO 1.B.1 ÖNGÖRÜLEN TESLİMAT ÜRÜNLERİ MALİYETİ								
#	Teslimat Ürünü	Adedi	Birim Direkt İşçilik Maliyeti	Genel Üretim Gideri (GÜG) (İşçilik x %10) (USD)	Malzeme (USD)	Test Hizmeti Maliyeti (USD)	Genel Yönetim Gideri (GYG) (%5) (USD)	TOPLAM (USD)
1	Test Rigi	2	54.912,00 \$	5.491,20 \$	32.493,28 \$	27.456,00 \$	\$ 6.017,62	\$ 252.740,22
2	Geliştirme Test Uçağı (DTA-3, DTA-4, DTA-5)	3	54.912,00 \$	5.491,20 \$	23.493,28 \$	27.456,00 \$	\$ 5.567,62	\$ 350.760,32
3	Geliştirme Test Uçağı (DTA-6)	1	54.912,00 \$	5.491,20 \$	32.493,28 \$	27.456,00 \$	\$ 6.017,62	\$ 126.370,11
4	Geliştirme Test Uçağı (DTA-1, DTA-2 Retrofit)	2	54.912,00 \$	5.491,20 \$	32.493,28 \$	27.456,00 \$	\$ 6.017,62	\$ 252.740,22
5	Yedek	1	54.912,00 \$	5.491,20 \$	32.493,28 \$	27.456,00 \$	\$ 6.017,62	\$ 126.370,11
TOPLAM ÖNGÖRÜLEN TESLİMAT ÜRÜNLERİ MALİYETİ								\$ 1.108.980,97
TESLİMAT ÜRÜNLERİNE DAİR ÖNGÖRÜLEN KAR BEDELİ (%15)								\$ 166.347,15
TESLİMAT ÜRÜNLERİ TOPLAM BEDELİ								\$ 1.275.328,12

4.) Teslimat Ürünlerine'e ait gerçekleşen kar bedeli Sözleşme kapsamındaki tüm Teslimat Ürünü üretimlerinin tamamlanmasının ardından belirlenecek olan birim Teslimat Ürünü maliyeti üzerinden Tablo 1.B.1'de belirtilen oranda belirlenecektir.

4a.) Teslimat ürünler için Tablo 1.B.1'de verilen bedel öncül bedel olup, Teslimat Ürünlerinin bedelinin belirtilen değer üzerinde olması halinde yüklenicinin bu kapsamdaki artış talebi ilgili onay sürecinin akabinde güncellenecek olan teslimat ürünlerinin birim maliyeti ve toplam teslimat ürünleri maliyetleri mali tablolara yansıtılacaktır.

5.) Geliştirme Test Uçağı DTA-3, DTA-4, DTA-5 uçaklarının malzeme bedelleri LLTI mahsuplaşması yapılarak yansıtılmıştır.

TABLO 2 . DÖNEM-I AŞAMA-II ÖDEME TABLOSU

TOPLAM SÖZLEŞME BEDELİ	\$ 13.178.327,74
AVANS TUTARI (%15)	\$ 1.976.749,16

EK BÜTÇE DAHİL SÖZLEŞME BEDELİ	\$ 25.592.664,00
EK BÜTÇE BEDELİ	\$ 12.414.336,26

ÖNGÖRÜLEN MALİYET	
Öngörülen Toplam Maliyet (A)	\$ 12.166.926,72
Öngörülen Kar Bedeli (%15,00) (C)	\$ 1.011.401,01

ÖNGÖRÜLEN TOPLAM TEKRARLANMAYAN MALİYET	
GYG Dahil Öngörülen Toplam Maliyet (A)	\$ 11.057.945,75
GYG Hariç Öngörülen Toplam Maliyet	\$ 10.531.376,90
GYG (%5) (B)	\$ 526.568,85
Öngörülen Kar Bedeli (%15,00) (C)	\$ 845.053,87
Teşvik Bedeli (%25 *Kar)	\$ 211.263,47
TOPLAM (A+C)	\$ 11.902.999,62

ÖNGÖRÜLEN TOPLAM TEKRARLANAN MALİYET	
GYG Dahil Öngörülen Toplam Maliyet (A)	\$ 1.108.980,97
GYG Hariç Öngörülen Toplam Maliyet	\$ 1.056.172,36
GYG (%5) (B)	\$ 52.808,62
Öngörülen Kar Bedeli (%15,00) (C)	\$ 166.347,15
Teşvik Bedeli (%25 *Kar)	\$ 41.586,79
TOPLAM (A+C)	\$ 1.275.328,12

TEKRARLANMAYAN MALİYET ÖDEME TABLOSU						
* MALİYET ARTI MODEL OLDUĞUNDAN EVRELER VE KAR ÖDEMELERİ İÇİN AŞAĞIDAKİ TABLODA BULUNAN ÖDEME TUTARI VE FATURA TUTARI TABLODA BELİRTİLDİĞİ ÜZERE TÜBİTAK MAM FİRMASININ ÖNGÖRÜŞÜDÜR. EVRE SONLARINDAKİ FİRMANIN FATURASINA GÖRE GERÇEKLEŞME BAZ ALINACAKTIR. AVANS ÖDEMESİ SABİTTİR.						
#	EVRELER	EVRE ARALIĞI	ÖDEME (%)	*ÖNGÖRÜLEN FATURA TUTARI	*ÖNGÖRÜLEN ÖDEME TUTARI	AVANS TEMİNAT MEKTUBUNDAN ÇIKARILAN TUTAR
1	AVANS ÖDEMESİ	T0	15%	-	\$ 1.976.749,16	\$ -
2	1. EVRE	Eylül-Kasım 2024	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
3	1. Kar Ödemesi (%15 x 1. Evre Gerçekleşmesi)	Eylül-Kasım 2024	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
4	2. EVRE	Aralık - Şubat 2025	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
5	2. Kar Ödemesi (%15 x 2. Evre Gerçekleşmesi)	Aralık - Şubat 2025	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
6	3. EVRE	Mart - Mayıs 2025	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
7	3. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Mart - Mayıs 2025	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
8	4. EVRE	Haziran - Ağustos 2025	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
9	4. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Haziran - Ağustos 2025	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
10	5. EVRE	Eylül-Kasım 2025	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
11	5. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Eylül-Kasım 2025	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
12	6. EVRE	Aralık - Şubat 2026	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
13	6. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Aralık - Şubat 2026	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
14	7. EVRE	Mart - Mayıs 2026	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
15	7. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Mart - Mayıs 2026	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
16	8. EVRE	Haziran - Ağustos 2026	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
17	8. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Haziran - Ağustos 2026	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
18	9. EVRE	Eylül-Kasım 2026	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
19	9. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Eylül-Kasım 2026	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
20	10. EVRE	Aralık - Şubat 2027	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
21	10. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Aralık - Şubat 2027	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
22	11. EVRE	Mart - Mayıs 2027	7%	\$ 1.106.084,25	\$ 940.171,61	\$ 165.912,64
23	11. Kar Ödemesi (%15 x 3. Evre Gerçekleşmesi)	Mart - Mayıs 2027	1%	\$ 91.945,55	\$ 78.153,71	\$ 13.791,83
TOPLAM			100%	\$ 13.178.327,74	\$ 13.178.327,74	\$ 1.976.749,16

TABLO-3 SERİ BİRİM FİYAT

No:	Ekipman Adı	Adet (set)	Birim Fiyat (ABD Doları)	Toplam
1	ExPS	1		
1.1	ASM	1	\$ 40.769,81	\$ 40.769,81
1.2	ExPS Main Structure, Harness and Piping	1	\$ 15.696,38	\$ 15.696,38
1.3	Filter Unit Assy	1	\$ 2.038,49	\$ 2.038,49
1.4	Valve Group	1	\$ 49.005,32	\$ 49.005,32
1.4.1	SoV LF	1	\$ 6.115,47	\$ 6.115,47
1.4.2	SoV HF	1	\$ 6.115,47	\$ 6.115,47
1.4.3	By-pass Valve	1	\$ 5.585,46	\$ 5.585,46
1.4.4	PRV	1	\$ 6.645,48	\$ 6.645,48
1.4.5	Restrictor Check Valve (Internal Tanks)	16	\$ 1.084,48	\$ 17.351,62
1.4.6	Restrictor Check Valve (External Tanks)	2	\$ 1.084,48	\$ 2.168,95
1.4.7	PRSOV	1	\$ 5.495,77	\$ 5.495,77
1.5	Sensor Group	1	\$ 16.348,70	\$ 16.348,70
1.5.1	Heater Upstream Temperature Sensor	1	\$ 856,17	\$ 856,17
1.5.2	Heater Downstream Temperature Sensor	1	\$ 856,17	\$ 856,17
1.5.3	Heater Downstream Pressure Sensor	1	\$ 1.223,09	\$ 1.223,09
1.5.4	Filter Downstream Pressure Sensor	1	\$ 1.223,09	\$ 1.223,09
1.5.5	ASM Upstream Pressure Sensor	1	\$ 1.223,09	\$ 1.223,09
1.5.6	ASM Downstream Pressure Sensor	1	\$ 1.223,10	\$ 1.223,10
1.5.7	Fuel Tanks Upstream Pressure sensor	1	\$ 1.223,09	\$ 1.223,09
1.5.8	Fuel Tanks Upstream Temperature sensor	1	\$ 856,17	\$ 856,17
1.5.9	OSP	1	\$ 7.664,72	\$ 7.664,72
1.6	Heater	1	\$ 2.038,49	\$ 2.038,49
1.7	ESS	0		
				\$ -
	SERIAL TOTAL			\$ 126.370,11

**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ**

**PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II
SÖZLEŞMESİ**

EK-5

GERÇEKLEŞEN TOPLAM MALİYET TABLOSU ŞABLONU

2024

GERÇEKLEŞEN DİĞER TEKRARLANMAYAN MALİYETLER				
#	Maliyet Kalemi	Gerçekleşen Maliyet Bedeli (GÜĞ & GYG Hariç)	Öngörülen Maliyet Bedeli (GÜĞ & GYG Hariç)	FARK (Sözleşme Sonunda Mahsup Edilecek Tutar)
2	Danışmanlık, Bireysel Danışmanlık, Diğer Hizmet Alımları (İşçilik x %5)	\$ 5,00		\$ -5,00
3	Seyahat Maliyeti (İşçilik x %1)	\$ 1,00		\$ -1,00
2	Eğitim Maliyeti (İşçilik x %3)	\$ 3,00		\$ -3,00
4	Mühendislik Yazılımları Maliyeti (İşçilik x %10)	\$ 10,00		\$ -10,00
TOPLAM		\$ 19,00	\$ -	\$ -19,00

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Revizyon Tarihi:

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**TUSAŞ-Türk Havacılık ve Uzay Sanayii A.Ş.
Turkish Aerospace**

KAAN PROJECT

SUBCONTRACT

FOR

EXPLOSION PREVENTION SYSTEM PHASE-I, STAGE-II

Subcontract No: 202400217

**APPENDIX-6 INFORMATION SECURITY REQUIREMENTS
FOR CONTRACTORS**

2024

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EXHIBIT – A User (Individual) Non-Disclosure Commitment

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NOTE: This document is created based on the IN.ITM.20.001E Instruction for Information Security Requirements for Subcontractors published on 21st March 2024 as Revision 02.

INFORMATION SECURITY REQUIREMENTS FOR CONTRACTORS**1. OBJECTIVE**

- 1.1 This Document has been prepared for the purpose of outlining the provisions and conditions for the security of information that Turkish Aerospace allows the use and electronic access by Turkish Aerospace's Contractors and their specified users for the purpose of performing their jobs as a requirement of Turkish Aerospace's programs.
- 1.2 By this Document, the objective is to extend within a supply chain the information security requirements as a result of various contracts and regulations, and maintaining the security of Information Owned by Turkish Aerospace at a suitable level.

2. SCOPE

- 2.1 This Document will be signed by the Contractors as an attachment to the contracts between Turkish Aerospace and its contractors in defense industry projects which are classified as "RESTRICTED" and in other projects which are classified as "Turkish Aerospace SENSITIVE". Following its signing, it will become an integral part of the related subcontract.
- 2.2 If user identification is allocated by Turkish Aerospace in order for users to access and use Turkish Aerospace data in an electronic environment for the purpose of performing their jobs, as a preliminary condition for related access and use, the users shall sign a Non-Disclosure Commitment.

3. DEFINITIONS

Unless otherwise indicated in this Document, terms stated but which are not defined in this Document, shall have the meaning that take place in this Subcontract Terms & Conditions. In this Document the following terms have the meanings indicated below:

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“Business Continuity” means the planning, developing, implementing and testing processes of activities and procedures that support in recovering the most critical business functions in disaster situation.

“eRoom” means a web-based application for online data exchange.

“Facility Security Clearance” means the certificate, provided by the Defense Industry National Security Authority, evidencing the appropriateness and conformance to the required Security Classification of the protective measures projected, by taking into consideration the location and environmental conditions of the facility and external and internal threats that may be exposed to by the facility, in order to ensure the physical security of security classified information, documents and materials that are contained or that may be contained in a facility.

“FTP-File Transfer Protocol” means a transfer protocol for sharing files in electronic environment.

“Individual Security Clearance” means the certificate evidencing the permission of an individual for accessing security classified information, documents, materials or projects on a need- to- know basis.

“Information Owned by Turkish Aerospace” means all types of information, documents, materials and similar supplies, including but not limited to all forms of those that have a commercial, intellectual and industrial property and similar nature, that belong to Turkish Aerospace or held by Turkish Aerospace while it belongs to a any other real or legal entity or organization, and that is provided or disclosed to the contractor with appropriate permissions.

“Information System” means the application that have been developed by Turkish Aerospace or outsourced and which provides the company’s business processes to be conducted in an electronic environment.

“Information Security” means the protection of the confidentiality, integrity, accuracy and accessibility of the information. The purpose of information

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security is to protect the information from multiple threats in order to obtain commercial continuity, reduce losses to a minimum, and increase the return on commercial opportunities and investments to a maximum

“Personal Information” means information about an identifiable individual.

“Personnel Data” means information about a Contractor’s employee required for access to Turkish Aerospace Information Systems that shall include Name, Date of Birth, Address, Security Clearance (level and expiry date), Nationality and Passport Number.

“Risk” means the event or situation that has one or more reasons and has an effect on business objectives when realized.

“Subcontract” means a contract for the KAAN project between Turkish Aerospace (under a commitment as a contractor) and a domestic or foreign product/service provider for the whole or partial procurement of a product or service that needs to be provided in the scope of an aircraft design and development program.

“Contractor” means a domestic or foreign real/legal entity that Turkish Aerospace signs a subcontract for the procurement of materials or products which are required in the process of the design and development of a fifth-generation fighter aircraft.

“Supervised Audit” to be conducted by suitable Turkish Aerospace and Supplier personnel and is limited to the designated KAAN specific areas only. No further rights will be granted to Turkish Aerospace regarding sub-contractor systems.

“Turkish Aerospace Supplier Portal” means the online information sharing platform of Turkish Aerospace for its contractors.

“User” means Contractor’s personnel that uses the information systems that covers Information Owned by Turkish Aerospace.

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4. GENERAL PROVISIONS

4.1 The following methods are used to share Information Owned by Turkish Aerospace with Turkish Aerospace Contractors electronically:

- Via Turkish Aerospace Supplier Portal on Turkish Aerospace web site
- Via File Transfer Protocol (FTP) on Turkish Aerospace FTP site
- Via online access to Turkish Aerospace eRoom site

4.2 Maintaining information security during the access to, use and keeping of Information Owned by Turkish Aerospace by Contractors is considered as a subject very important and that can create a risk for Turkish Aerospace.

4.3 In order to realize a cooperative and work based on mutual trust, the security requirements for Contractors are identified in this Document. Aside from this, ensuring the security of data produced by Contractors is also included herein as this will directly affect the quality and timely delivery of the product and service to be received by Turkish Aerospace.

4.4 Due to some legal and corporate requirements, Turkish Aerospace may, from time to time, make revisions and updates to this Document. In such a case, those revisions and updates, once mutually agreed between Turkish Aerospace and the Contractor, will be an integral part of this Document and become binding for the related Contractor beginning from the date notified in writing by Turkish Aerospace to the Contractors.

5. REQUIREMENTS**5.1 COLLABORATION**

5.1.1 While using Turkish Aerospace Information Systems and while using Information Owned by Turkish Aerospace in their own information systems, Contractors will act in conformity with the requirements specified herein.

5.1.2 In terms of ensuring the security of Information Owned by Turkish Aerospace, Contractors will undertake a risk evaluation at an appropriate level while carrying out their business.

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5.2 OBLIGATIONS

- 5.2.1 Contractors are obligated to obey all current laws, decrees, security rules and policies notified by the Turkish Aerospace's related program management or the contract departments and, as well as the rules established by Turkish Aerospace, with regards to data exchange or access to information systems.
- 5.2.2 Security Classified information, documents and materials in the defense industry projects must be kept at facilities that possess a Facility Security Clearance appropriate to the project Security Classification and must be treated as such by the personnel that possess an appropriate Individual Security Clearance.
- 5.2.3 Users assigned by Contractors are to perform their jobs in accordance with the necessities specified within the scope of the KAAN project and the requirements of legal regulations. Within the scope of this Document, in order for Users to act on behalf of the Contractor, the Contractor is responsible for Users to be appropriately qualified and trained on industry security for defense industry projects, at its own cost. The Contractor is obligated in ensuring that its personnel, including Users, act in compliance with this Document.
- 5.2.4 Under no circumstances shall data be disclosed to third parties nor used for the purposes other than this document, and related Subcontract signed between Turkish Aerospace and Contractor.
- 5.2.5 Within the scope of this Document, the Contractor shall be responsible for any breach by itself, its subcontractors or Users of any of the obligations and rules specified in this Document.
- 5.2.6 Turkish Aerospace's failure to use or any partial use of any of its rights under this Document shall, in no event, constitute a waiver of such right.
- 5.2.7 Providing access rights to Information Owned by Turkish Aerospace at Turkish Aerospace facilities or through externally located information systems to Contractors, and/or sub-subcontractors and/or Users and any expression that takes place in this Document can in no way be construed as to grant any right

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on any subject, invention or innovation, or any license or usage right on any patent, registered industrial design, trade mark, copyright, and/or any other intellectual and industrial property right to said Contractors and/or sub-subcontractors and/or their Users.

5.3 MONITORING AND AUDIT

- 5.3.1 Specific to the KAAN project Turkish Aerospace, within the scope of this Document, may assess on site the activities carried out by Contractors by using Information Owned by Turkish Aerospace and may inspect whether the measures and controls that are applied for ensuring information security are adequate or not.
- 5.3.2 Having a valid certification for ISO/IEC 27001 Information Security Management System will provide Contractors an advantage in Turkish Aerospace's audits.
- 5.3.3 Contractors agree that Contractor information systems for the KAAN project for keeping Information Owned by Turkish Aerospace or that are used to access Information Owned by Turkish Aerospace, related processes and procedures may be subject to a Supervised Audit by the related departments of Turkish Aerospace to ensure that security requirements are met. Contractors will provide the necessary access permits without delay.
- 5.3.4 Necessary actions for correcting non-compliances detected during Supervised Audits will be carried out by Contractor within a calendar month and internal audit results and corrective actions will be visible to Turkish Aerospace when necessary.
- 5.3.5 In case of notification of security vulnerability or an incident, Contractors shall immediately undertake the necessary prevention, correction and recovery procedures and carry out measures to reduce its impacts and reduce the probability of reoccurrence of similar events. Additionally, Contractors must immediately inform Turkish Aerospace about security vulnerabilities or incidents.

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5.3.6 Should a change occur in the situation of the Contractors (e.g.: through mergers and acquisitions), the conditions and requirements that take place in this Document will continue to be in force. If it be considered necessary, Turkish Aerospace has the right to repeat Supervised Audits.

5.4 INFORMATION SYSTEMS AND DATA MANAGEMENT

5.4.1 Access Requirements

5.4.1.1 Turkish Aerospace determines its services, servers and systems accessible to Contractors. Contractors shall only use the access methods approved by Turkish Aerospace.

5.4.1.2 The list of Users authorized to access shall be kept up to date by the Contractor. The Contractor shall immediately inform Turkish Aerospace Users who no longer need access to Turkish Aerospace systems for any reason or where employment conditions have changed; such as long-term leave, termination of employment, resignation, retirement. In such a situation, the Contractor, without prejudice to Turkish Aerospace's rights to prevent access, will immediately prevent the access of User to Turkish Aerospace information systems.

5.4.1.3 Contractors will establish the necessary infrastructure on their own information systems to record and log the activities carried out by their Users.

5.4.1.4 In order for the Contractor's personnel to be connected to Turkish Aerospace's Information Systems as a requirement of work, it is compulsory to define a User ID for each of such personnel. Hence, "User Identification Request Form for the Employees of Customers, Business Partners and Contractors" must be filled by Turkish Aerospace program management and its "User Non-Disclosure Commitment" Annex must be signed by the related User.

5.4.1.5 In situations indicated below, Turkish Aerospace, in addition to other rights, may end Users' access to its systems without any notification or may request such action from its Contractor.

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- Any User acting contrary to the conditions of this Document or the applicability of another law or legal arrangement.
- Continuous access by a User that carries the risk of damaging Turkish Aerospace's interests or that the said access can result in a violation of this Document, based on Turkish Aerospace's own discretion.
- Turkish Aerospace's view that acting contrary will result in the violation of contractual commitments with third parties or applicable laws and legal arrangements.
- Detection of no access to Turkish Aerospace Systems during 6 months (In this case, the user account will be deleted)
- Expiration of contract end date (max. 1 year) which is filled in "User Identification Request Form for the Employees of Customers, Business Partners and Contractors" (In this case, the user account will be deleted)

5.4.2 Control of Use

5.4.2.1 Users shall not attempt to access, change, use or delete any Information Owned by Turkish Aerospace or system without the permission of Turkish Aerospace.

5.4.2.2 Users shall not attempt to breach the security precautions established by Turkish Aerospace.

5.4.2.3 The activities conducted by Users by connecting to Turkish Aerospace information systems will be recorded and monitored.

5.4.2.4 Turkish Aerospace has the right to request Personnel Data of the Users from the Contractor that request to access or that currently access to Turkish Aerospace systems and Information Owned by Turkish Aerospace.

5.4.3 Security Classification and Marking

5.4.3.1 Contractor shall comply with the Security Classification and marking rules designated for Information Owned by Turkish Aerospace. Awareness of and

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compliance with these rules by its employees is the responsibility of the Contractor.

5.4.4 Security Policy

5.4.4.1 Once Turkish Aerospace has provided Information Security Policy and briefed the Contractors, then Contractors are obligated to obey the Information Security Policy of Turkish Aerospace and develop and establish their own policies on information security and increase the awareness of their personnel on this subject.

5.4.5 Network and Information Security

5.4.5.1 Contractors are responsible in ensuring that the systems that contain or process Information Owned by Turkish Aerospace and their computer networks, where these systems run, are protected against unauthorized access. In order to fulfill this requirement, preventive actions must be taken in application, operating systems and network level by the Contractor.

5.4.5.2 Furthermore, even in the case that data transfer takes place from networks that are beyond the control of the Contractor (e.g. Internet), Contractors will take necessary preventive actions for protecting data confidentiality and integrity.

5.4.5.3 Where Information Owned by Turkish Aerospace is required to be kept and processed in the same system of the Contractor containing the information of Turkish Aerospace's competitors, Contractor shall consult Turkish Aerospace and shall request preliminary approval of Turkish Aerospace on this matter. The Contractor is obligated in taking the necessary precautions for preventing Information Owned by Turkish Aerospace from being accessed by Turkish Aerospace's competitors.

5.4.5.4 The Contractor is obligated in taking necessary preventions against malicious software (Virus, Trojan, etc.) that may take place in its hardware in the use and access of Information Owned by Turkish Aerospace.

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- 5.4.5.5 Upon Turkish Aerospace's request, Contractors agree to provide evidence of the suitability of their security control procedures relating to the handling of Turkish Aerospace information to Turkish Aerospace.
- 5.4.5.6 In line with related laws and arrangements (e.g., intellectual property rights, software license agreements) Contractors are responsible in complying with such laws and arrangements.
- 5.4.5.7 Contractors must reach prior agreement with Turkish Aerospace on the methods to be used in destroying Information Owned by Turkish Aerospace that is no longer required to be used in a secure and appropriate manner and precautions must be taken for preventing re-access to destroyed information.
- 5.4.5.8 In the case of Contractor's hardware failures where the hardware contains Information Owned by Turkish Aerospace all reasonable efforts will be made to delete or remove any Turkish Aerospace Information prior to the hardware being submitted for repair by the Contractors IT provider.
- 5.4.6 User IDs and Passwords
- 5.4.6.1 For each Contractor's User, a separate User ID shall be used. User IDs are private and confidential for Users and cannot be shared.
- 5.4.6.2 For each User ID, a complex password with a minimum length of 8 characters shall be provided, in particular if Information Owned by Turkish Aerospace is being transacted. The password must contain at least an uppercase and lowercase character, and a number and should not be predictable. Additionally, the password cannot contain Turkish or special characters.
- 5.4.6.3 The last 10 passwords cannot be reused.
- 5.4.6.4 The password is forced automatically to change in 90 days.
- 5.4.6.5 If users forget their passwords, they can renew their passwords via Password Management link on Turkish Aerospace Supplier Portal.
- 5.4.6.6 An employee that leaves employment after a User ID has been assigned to him/her, it shall be promptly notified to Turkish Aerospace by the Contractor

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for cancelling the User ID. The ID of the User that has left employment cannot be transferred to another User.

5.4.7 Supervision of Changes

5.4.7.1 Contractors must provide evidence that their Information Systems change processes shall ensure the safety and security of Information Owned by Turkish Aerospace.

5.4.8 Backup and Restore

5.4.8.1 Information Owned by Turkish Aerospace that is included in the Contractor's own hardware must be backed up regularly. Periodically, restore tests from backups should be conducted.

5.4.9 Physical Security

5.4.9.1 In order to safeguard information and keep the access to critical systems under control, the Contractor must apply the necessary controls (card access door entrance systems, lock, alarm systems, etc.) at the entrances of the Contractor's building, facility and data processing center.

5.4.9.2 In the Contractor's data processing center, heat and humidity controls must be made and risk reduction precautions such as fire alarm and appropriate power back up systems must be taken.

5.4.10 Business Continuity

5.4.10.1 In the event of a large-scale disaster (e.g., fire, natural disaster, etc.), the Contractor firms are responsible to require preventive actions for the Business Continuity and security of Information Owned by Turkish Aerospace. To fulfill this requirement, Contractors will establish plans for Business Continuity, disaster rescue and emergency and will periodically test these plans.

5.5 CONTRACTOR'S EMPLOYEES

5.5.1 Contractors are responsible in providing awareness among their personnel and their competence regarding Turkish Aerospace's security requirements as explained in this Document.

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5.5.2 Enquiries such as police records and security clearance for Contractor's personnel shall be made by Contractors themselves prior to recruitment. Contractors must guarantee commitment of their personnel to obey confidentiality requirements of both Turkish Aerospace and themselves, in agreements signed with their employees.

5.5.3 Interns, consultants and temporary personnel working in Contractors facilities or the employees of Contractors that do not have National SECRET Individual Security Clearance will not be permitted to access to Information Owned by Turkish Aerospace.

5.6 SUBCONTRACTORS OF Turkish Aerospace'S CONTRACTORS

5.6.1 Without the prior written permission of Turkish Aerospace, Contractors cannot under any circumstances share Information Owned by Turkish Aerospace with their subcontractors (sub-subcontractors) and cannot permit them to use Turkish Aerospace systems.

5.6.2 Should Contractors be in the position to have to share Information Owned by Turkish Aerospace with their own Contractors, after receiving the prior written approval from Turkish Aerospace they shall forward the confidentiality requirements that are explained in this Document to their Contractors and compliance of those requirements by such Subcontractors shall be ensured within the coverage of an agreement. These agreements shall be presented to Turkish Aerospace upon request and under no circumstances contain a contractual relationship statement between the Contractors' subcontractors and Turkish Aerospace.

5.6.3 Contractors shall supervise their subcontractors regarding their compliance with the requirements of this Document report possible inconsistencies to Turkish Aerospace and carry out the necessary measures in resolving these inconsistencies. (Turkish Aerospace has the right to conduct Supervised Audits and supervise the Contractors of its Subcontractors.)

5.7 SECURITY CONTACT POINT

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5.7.1 **Designating a Security Manager:** Contractors will appoint a personnel that will be responsible on matters of security and risk and will notify the name of this person to Turkish Aerospace. This person will also be the contact point on matters of security with Turkish Aerospace. Possible changes related to this person will be notified to Turkish Aerospace without delay. In the event that the Contractor's Security Manager encounters an incident relating to Turkish Aerospace systems or Information Owned by Turkish Aerospace, he/she will immediately notify Turkish Aerospace. The Security Manager will also be in charge as a contact point as well on matters dealing with Information Systems Management and Information Security.

5.7.2 **Authorized Users:** Contractors will maintain a current list of Users authorized to use the information systems and keep the information regarding the authorization of each User in written.

5.8 TERMINATION OF SUBCONTRACT

5.8.1 After the termination of the Subcontract, Contractors will ensure that Information Owned by Turkish Aerospace are protected in line with the provisions of the Subcontract and this Document. Contractor will immediately inform Turkish Aerospace when there is no longer a need for Information Owned by Turkish Aerospace or systems in order to perform the obligations within the Subcontract and will, in coordination with Turkish Aerospace and with the sensitivity to information security, return Information Owned by Turkish Aerospace upon the request of Turkish Aerospace or will meticulously destroy. In the event the information is destroyed, Contractor will forward a document to Turkish Aerospace stating how the procedure was carried out.

6. APPLICABLE REGULATIONS AND DISPUTES

6.1 This Document shall be governed by and interpreted in accordance with regulations of Republic of Turkey as stated in Terms & Conditions of this Subcontract. Also, resolution of disputes shall be in accordance with Article 36 Disputes as found in the Terms & Conditions of this Subcontract.

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6.2 The Contractor whose signature appears below declares that the requirements and the obligations included in this document are understood and accepted.

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EXHIBIT – A
TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
(Turkish Aerospace)

USER (INDIVIDUAL) NON-DISCLOSURE COMMITMENT

I, the undersigned, hereby certify and commit that I agree to abide by the terms and conditions set forth in this Commitment, as a prerequisite condition of receiving a computer user ID and a password to Access Turkish Aerospace's any form of confidential information, and/or the systems requiring access authorization:

1. To access Turkish Aerospace's information systems and/or Turkish Aerospace owned information I agree to share my Personnel Data and I accept that my Personal Information can be processed for reasonable business purposes.
2. Being aware that my user ID and password represent my LEGAL SIGNATURE, I will not disclose my user ID and/or my password to anyone, or allow anyone to access information systems of Turkish Aerospace using my account and password. I will create and use my password in accordance with the instructions of Turkish Aerospace.
3. I assume responsibility for all entries made and all retrievals accessed under my account and password on information systems of Turkish Aerospace, even if such action was made by me or by any other person as a result of my intentional misconduct or negligence.
4. I assume responsibility for all type of activities undertaken on information systems of Turkish Aerospace using my access codes or other authorizations dedicated to my identification.
5. I will not attempt to learn or use another's account and password during access to information systems of Turkish Aerospace.
6. If and when I have reason to suspect that the confidentiality of my password is at risk, I will immediately change my password.
7. Passwords should be changed every 45 days. If I need help in changing my password, I will get support from the coordinating department of Turkish Aerospace. I will notify Turkish Aerospace authorities immediately if I suspect unauthorized use of my password.
8. I will not in any way access, use, disclose, copy, release, sell, loan, review, alter, destroy or process any confidential information owned or held by Turkish Aerospace except as properly and clearly authorized within the scope of my job and as in accordance with the terms of contract(s) signed between Turkish Aerospace and the company I'm employed at.
9. I will only access information that are strictly related to such matters reasonably necessary to carry out the activities for which this account is being requested, and I will not access or request any information that is not directly related to the official activities for which I have been authorised to access in any information systems of Turkish Aerospace.
10. I will not disclose any classified information unless otherwise required to do so pursuant to law or the terms of contract(s) signed between Turkish Aerospace and the company I'm employed at. I also understand that I have no right or ownership interest in any information of Turkish Aerospace.
11. I accept that Turkish Aerospace is entitled to request my Personnel Data in order for my access to Turkish Aerospace's information systems and/or Turkish Aerospace owned information.
12. It is my responsibility to log off from the system to which I'm logged on in order to access Turkish Aerospace information systems. I will not under any circumstances leave unattended a computer to which I have logged on in order to access Turkish Aerospace information systems without first either locking it or logging off the workstation.

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13. I understand that my use of Turkish Aerospace information systems will be periodically monitored to ensure compliance with this agreement and my activities may be subject to audit.
14. I agree not to use the information in any way detrimental to Turkish Aerospace, its customers, business partners and contractors.
15. I will not disclose any military information, classified information or any other information owned or held by Turkish Aerospace that is considered proprietary, sensitive except for the "need to know" principle.
16. In case of termination of the contract(s) or business relationship between Turkish Aerospace and the company I'm employed at, I will apply to the coordinator department of Turkish Aerospace for the cancellation of my user ID.
17. I agree and know that disclosure of classified information is prohibited indefinitely, even after termination of the contract(s) or business relationship between Turkish Aerospace and the company I'm employed at, unless otherwise specifically waived in writing by Turkish Aerospace.
18. I will comply with Turkish Aerospace's security regulations on saving, copying, sending, destroying and process of any confidential information, document, photograph, picture, drawing, etc owned or held by Turkish Aerospace related with my assigned tasks.
19. I agree that any expression or statement herein and any access right granted to me allowing access to Turkish Aerospace's information systems and/or Turkish Aerospace owned information cannot be construed as to grant me any right on any matter, invention or innovation, or any license or usage right on any patent, registered industrial design, trade mark, copyright, and/or any other intellectual and industrial property right.
20. I agree and commit that whilst working on the KAAAN Project, Turkish Aerospace is the sole owner of all intellectual and industrial property rights on any software (including the source codes), technical data package, documentation or any other product that I have developed and/or produced and/or been involved in the developing or production process thereof and I will not claim any copyright and/or other intellectual property right against Turkish Aerospace with regards to the aforementioned.
21. This Non-Disclosure Commitment is an integral part of Turkish Aerospace's "Information Security Requirements for Contractors" Document (Document No: TEK 092 EK G - 2) and I understand and agree to comply with the terms and requirements specified under that document.
22. I acknowledge and declare that Turkish Aerospace can follow, record, process data about my usage of internet and electronic mail, which I can gain access by user ID and password issued by Turkish Aerospace, for the purpose of security, statistical information and business and I have no objection regarding the processing of data including my personal data in this manner as a result of being personnel of Turkish Aerospace's customer/business partner/Contractor.
23. I further understand that if and when I violate any of the above terms, the consequences may be as follows(i) termination of my access rights to Turkish Aerospace information systems under this access agreement; (ii) Turkish Aerospace may claim compensation from my employer for all of material losses resulting from my actions violating the law and/or this Non-Disclosure Commitment and/or the contract signed between Turkish Aerospace and the company I'm employed at, and (iii) in case of illegal actions for which a person can be punished by law, I may be subject to legal actions under applicable laws and/or judicial procedures.

Please **handwrite** the clause below and sign to admit and commit that you have read and understood the above.

I have read and understood this Non-Disclosure Commitment. I understand and commit to its terms.

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Date _____

User's Name _____

User's Signature _____

User ID _____

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**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ
ARASINDAKİ**

**PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II
SÖZLEŞMESİ**

EK-7 HARCAMA RAPORU SABLONU

Rapor Dönemi:				
İŞÇİLİK HARCAMALARI				
BÖLÜM	MDA İDA Kodu	Kişi İsim/Soyisim	GÖREV	GERÇEKLEŞEN DİREKT İŞÇİLİK SAATİ
(Dönem Tarih) Ara Toplam				0,00
(Dönem Tarih) Genel Toplam				20,00

Direkt İşçilik Maliyeti (ABD Doları)	Genel Üretim Gideri (GÜG) (ABD Doları) (%10)	Genel Yönetim Gideri (GYG) (ABD Doları) (%5)	Toplam İşçilik Maliyeti (ABD Doları) (GYG Dahil)
100	10	55	165

Gerçekleşen Birim İşçilik Ücreti (GYG Dahil)	8,25
---	------

Rapor Dönemi:				
İŞÇİLİK HARCAMALARI				
BÖLÜM	MDA İDA Kodu	Kişi İsim/Soyisim	GÖREV	GERÇEKLEŞEN DİREKT İŞÇİLİK SAATİ
(Dönem Tarih) Ara Toplam				0,00
(Dönem Tarih) Genel Toplam				20,00

Direkt İşçilik Maliyeti (ABD Doları)	Genel Üretim Gideri (GÜG) (ABD Doları) (%10)	Genel Yönetim Gideri (GYG) (ABD Doları) (%5)	Toplam İşçilik Maliyeti (ABD Doları) (GYG Dahil)
100	10	55	165

Gerçekleşen Birim İşçilik Ücreti (GYG Dahil)	8,25
---	------

Rapor Dönemi:				
İŞÇİLİK HARCAMALARI				
BÖLÜM	MDA İDA Kodu	Kişi İsim/Soyisim	GÖREV	GERÇEKLEŞEN DİREKT İŞÇİLİK SAATİ
(Dönem Tarih) Ara Toplam				0,00
(Dönem Tarih) Genel Toplam				20,00

Direkt İşçilik Maliyeti (ABD Doları)	Genel Üretim Gideri (GÜG) (ABD Doları) (%10)	Genel Yönetim Gideri (GYG) (ABD Doları) (%5)	Toplam İşçilik Maliyeti (ABD Doları) (GYG Dahil)
100	10	55	165

Gerçekleşen Birim İşçilik Ücreti (GYG Dahil)	8,25
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DİĞER TEKRARLANMAYAN MALİYETLERE İLİŞKİN HARCAMALAR

TOPLAM	\$ -	\$ -	\$ -	\$ -
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PROTOTİP ÜRÜN MALİYETLERİNE İLİŞKİN HARCAMALAR

Ticarî Hassas	Ocak 2021	Revizyon No :-
Harcama Raporu Sablonu	3/4	Revizyon Tarihi :-

TESLİMAT ÜRÜNLERİ MALİYETLERİNE İLİŞKİN HARCAMALAR

Ticarî Hassas	Ocak 2021	Revizyon No :-
Harcama Raporu Sablonu	3/4	Revizyon Tarihi :-

Maliyet Takip Tablosu

Bu alanda, Ek-4 MDA'nın ilgili Evredeki güncel formatı kullanılacaktır.

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TUSAŞ-Türk Havacılık ve Uzay Sanayii A.Ş.
Turkish Aerospace

KAAN PROJECT

SUBCONTRACT

FOR

EXPLOSION PREVENTION SYSTEM PHASE-I, STAGE-II

Subcontract No: 202400217

APPENDIX-8 LIST OF EXPORT LICENSE(S)

2024

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KAAN Program		Subcontract for Explosion Prevention System Phase-I, Stage-II

1. LIST OF EXPORT LICENCES

Contractor shall provide List of Critical Export Licence(s).

TASNİF DIŐI	Sözleşme No: 202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

MİLLİ MUHARİP UÇAK GELİŐTİRİLMESİ (KAAN) PROJESİ



TUSAŐ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ő.

İLE

TÜBİTAK MAM – MARMARA ARAŐTIRMA MERKEZİ

ARASINDAKİ

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŐAMA-II

SÖZLEŐMESİ

Ek-9

DENETİM ESASLARI

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Denetim Esasları	Sayfa 1 / 12	Revizyon Tarihi:

TASNİF DIŐI	Sözleşme No: 202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

İÇİNDEKİLER

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3. EVRE ÖDEMELERİNİN DENETİMİ; 4

EKLER:

Lahika 1: Ayrılmıştır.

Lahika 2: Stok Transfer Raporu Formatı

Lahika 3: Ayrılmıştır.

Lahika 4: Maliyet Gözden Geçirme Toplantıları Tutanak Formatı

Lahika 5: Denetim Esasları Uygulamaları

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Denetim Esasları	Sayfa 2 / 12	Revizyon Tarihi:

TASNİF DIŐI	Sözleşme No: 202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

TANIMLAR:

Proje İşçilik Denetim ve Eğitim Takip Sistemi: Yüklenici personelinin Proje faaliyetleri için ayırdığı sürenin ilgili faaliyet için Yüklenici tarafından önceden belirlenmiş olan iş emirlerinde kaydedildiği sistemi tanımlar. Yüklenici bu iş için kurulu mevcut bir sistemi varsa kullanabilir, Yüklenici işçilik denetim ve takibi için kurulu bir sistemi olmaması durumunda gerekli sistemin kurulmasından sorumludur.

KISALTMALAR:

EPT	: Entegre Proje Takımı
GÜG	: Genel Üretim Gideri
GYG	: Genel Yönetim Gideri/ Maliyeti
MDA	: Maliyet Dağılım Ağacı
MGGT	: Maliyet Gözden Geçirme Toplantısı
MMU	: Milli Muharip Uçak
PIDETS	: Proje İşçilik Denetim ve Eğitim Takip Sistemi
TUSAŞ	: Türk Havacılık ve Uzay Sanayii A.Ş.

TASNİF DIŐI	2024	Revizyon No :
Denetim Esasları	Sayfa 3 / 12	Revizyon Tarihi:

TASNİF DIŐI	Sözleşme No: 202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

1. KAPSAM:

- 1.1. İşbu doküman, Yüklenici'nin Patlama Önleme Sistemi Dönem-I Aşama-II Sözleşmesinde belirtilen koşullar çerçevesinde yapmış olacağı harcamaların ve/veya ödemelerin, Sözleşmeye uygunluğunun ve doğruluğunun kontrol edilmesi ve hatalı işlemlerin düzeltilmesi sırasında izlenecek denetim metotlarını ve usullerini içerir. Söz konusu denetim TUSAŞ tarafından yapılacaktır. TUSAŞ, Yüklenici'nin onayını alarak, Proje gizlilik isterlerine aykırı olmayacak şekilde üçüncü kişi ya da kuruluşları bu iş için yetkilendirilebilir.
- 1.2. Kar ve Teşvik ödemeleri, bir harcamaya istinaden yapılmayacağından bu kalemlerin doğruluğunun kontrol edilmesi Sözleşme'nin ilgili maddelerinde belirtilen şartların yerine getirilip getirilmediğinin kontrolünden ibaret olacaktır.
- 1.3. Sözleşme madde 13'te belirtilen ve Kar Ödemesi, Teşvik Ödemesi ile Avans Ödemesi haricinde kalan tüm ödemeler işbu dokümanda belirtilen denetime tabi olacaktır.
- 1.4. İşbu dokümanda Yüklenici'nin kullanacağı belirtilen Proje İşçilik Denetim ve Eğitim Takip Sistemi'nde (PIDETS) Ek-9 Lahika-2 Stok Transfer Raporu Şablonu'nda, Ek-9 Lahika-3 Tedarik Masrafları Raporu Şablonu ve Ek-9 Lahika-4 Maliyet Gözden Geçirme Toplantıları Tutanak Şablonu'nda değişiklik olması durumunda TUSAŞ onayı ile Sözleşme Değişikliğine gerek kalmadan güncelleme yapılabilecektir.

2. AYRILMIŞTIR

3. EVRE ÖDEMELERİNİN DENETİMİ;

- 3.1. Sözleşmede Evre olarak tanımlanan süreler içerisindeki maliyetlere /harcamalara karşılık yapılacak ödemelerin kontrolünü kapsar. Yüklenici tarafından, Ek-7 Harcama Raporu Şablon'una uygun olarak ilgili Evre'de gerçekleşen İşçilik Maliyeti, Projeye Yönelik Diğer Tekrarlanmayan Maliyetler ile Genel Yönetim Maliyetlerine ve Prototip Ürünler ile Teslimat Ürünlerine ait Malzeme ve Test Hizmeti Maliyetlerine ilişkin rapor ve ödeme

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belgeleri İlgili Evreyi takip eden 15 (onbeş) gün içinde TUSAŐ'a sunulacak ve söz konusu rapor ile ilgili incelemeler aşağıdaki maddeler uyarınca TUSAŐ tarafından icra edilecektir.

3.2. İşçilik Maliyeti Kontrolü

3.2.1. İşçilik Maliyeti; T0'dan (Sözleşmenin Taraflarca imzalandığı tarih) itibaren içinde bulunulan Evre için Yüklenici tarafından beyan edilen gerçekleşen Direkt İşçilik maliyeti ile Genel Üretim Gideri (GÜG) maliyetlerinin toplamıdır. Gerçekleşen her bir işçilik saati için belirlenen tutar, bir Evre'de gerçekleşen toplam işçilik maliyetinin toplam işçilik saatine bölünmesi ile hesaplanacak olup, Gerçekleşen Birim İşçilik Ücreti olarak tanımlanmıştır. Yüklenici bünyesinde direktör üzeri yönetici seviyesinde (proje yöneticisi ve program yöneticisi hariç) görev yapmakta olan personele ait işçilik giderleri Genel Yönetim Maliyeti (GYG) içinde değerlendirilecek olup ilgili personele ait İşçilik Maliyeti içinde bildirilen maliyetler TUSAŐ tarafından kabul edilmeyecektir. İlgili Evre için GÜG bedeli gerçekleşen Direk İşçilik Maliyeti'nin %10 (yüzdeon)'u üzerinden belirlenerek toplam İşçilik Maliyeti hesaplanacaktır. Yüklenici'nin personel ihtiyaçları kapsamında alımını yapmış olduğu her türlü donanım ve bilgisayar kurulumu yazılımları (tüm MS Office Programları, Proje Yönetimi vb. programlar) maliyetleri GÜG içinde değerlendirilecek olup, Yüklenici ayrıca ilgili donanım ve yazılımlar için maliyet beyanı yapmayacaktır. Yüklenici Prototip Ürünler ve Teslimat Ürünleri kapsamı dışındaki faaliyetleri için sadece beyaz yaka işçiliği beyan edecek olup, Prototip Ürünler ve Teslimat Ürünleri kapsamında beyaz yaka ve mavi yaka işçiliği beyan edecektir.

3.2.2. Ayrılmıştır.

3.2.3. Ayrılmıştır.

3.2.4. Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi kapsamında çalışan Yüklenici personeli bulundukları yerleşkeye göre farklı parametrelerle denetime tabi olacaktır;

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- TUSAŐ'ın Yüklenici ile ortak çalıştığı yerleşkede ve/veya Yüklenicinin işbu Sözleşmede belirtilen adreste yer alan yerleşkesinde; Yüklenici'nin işçilik gerçekleştirmeleri işbu dokümanda belirtildiği şekilde denetlenecektir.
- TUSAŐ'ın Yüklenici ile ortak çalıştığı yerleşkeler dışında kalan ve Yüklenici'nin işbu Sözleşmede belirtilen adresinden farklı tesisleri içinde yapılan faaliyetler ile ilgili işçilik gerçekleştirmeleri Sözleşme alt madde 23.6'da belirtilen Maliyet Gözden Geçirme Toplantıları'nda detaylı olarak görülecek ve söz konusu gerçekleştirme değerleri TUSAŐ tarafından parafe edilecektir.
- Yüklenici'nin Sözleşme madde 16.3'e göre TUSAŐ'a sunduğu tam zamanlı kritik personel listesinde yer almayan personelleri için talep ettiği İşçilik Maliyetleri TUSAŐ tarafından incelenerek uygun görülmesi halinde Harcama Raporu içinde değerlendirilecektir.

3.2.5. TUSAŐ, rassal zamanlarda (mesai saatleri dahilinde) Sözleşme konusu işin yürütüldüğü Yüklenici tesislerine fiili ziyaretlerde bulunabilir. TUSAŐ, Sözleşme madde 28'da belirtilen hükümler uyarınca ilgili kayıtları inceleyebilecektir.

3.2.6. Yüklenici personelinin Proje faaliyetleri için ayırdığı süre ilgili faaliyet için Yüklenici tarafından önceden belirlenmiş olan iş emirlerinde tutulacaktır. (Söz konusu iş emirleri (ve olduğu takdirde güncellemeleri) TUSAŐ ile bilgi amaçlı paylaşılacaktır.) İlgili haftanın Proje işçiliklerine yapılan girişler, takip eden haftanın Çarşamba gününe kadar Yüklenici tesislerinde bulunan PIDETS'te TUSAŐ'ın görebileceği ekranlara aktarılacaktır. (Evre'nin son gününün takvimde hafta ortasına gelmesi durumunda ayın bittiği güne kadarki veriler PIDETS'e aktarılır. Yeni ayın ilk hafta verileri eski ayın son günleri hariç olarak sistemde izlenebilir.) Haftalık olarak TUSAŐ ekranlarına aktarılan işçilik gerçekleştirmeleri bir sonraki hafta verisi PIDETS'e aktarılan kadar TUSAŐ tarafından incelenir ve uygun bulunan verilere bu süre zarfında PIDETS üzerinden ara onay verilir. TUSAŐ'ın uygun olmadığını düşündüğü bir veri olması durumunda TUSAŐ sistem üstünden ilgili veri için

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görüşme talebini Yüklenici'ye iletacaktır. Bu talebe istinaden bir sonraki haftanın verileri sisteme aktarılan kadar Yüklenici ile TUSAŞ bir araya gelecektir. Söz konusu toplantıda mutabık kalınan değer Yüklenici tarafından sisteme aktarılacak ve sistemde gerekli güncellemeler yapılacaktır. Güncellenmiş veriye 1 (bir) hafta içinde TUSAŞ ara onay verecektir. PIDETS üzerinden ara onay verilmemesi veya görüşme talebi yapılmaması halinde onaylanmış sayılacaktır.

3.2.7. Ayrılmıştır.

3.2.8. Bazı istisnai hallerde (Örnek: acil bir seyahatte iç onayların sonradan tamamlanması...vb.) iş emirlerine yapılan girişler aynı ay içerisinde Yüklenici tarafından değiştirilebilecektir. TUSAŞ'ın haftalık olarak ara onay verdiği veri ile ay sonunda netleştirilen veri arasında farklılık olabilecek, haftalık olarak ara onay verilen veri ve ay sonunda netleştirilen veri sistem üzerinden takip edilebilecektir. TUSAŞ'ın talep etmesi halinde söz konusu değişiklik ile ilgili Yüklenici ve TUSAŞ bir araya gelecek olup, toplantıda mutabık kalınan değer Yüklenici tarafından sisteme aktarılacak ve sistemde gerekli güncellemeler yapılacaktır. Güncellenmiş veri TUSAŞ'a bir sonraki ayın ilk haftası içinde sunulacaktır. TUSAŞ'ın sistem üzerinde onay verdiği aylık veri ile ilgili sistemde bir değişiklik yapılmadan önce TUSAŞ'ın görüşü alınacaktır. Her bir Evre sonunda TUSAŞ'a sunulacak olan Harcama Raporları ile TUSAŞ'ın sistem üzerinde onaylamış olduğu aylık raporların uyumu TUSAŞ tarafından kontrol edilecektir.

3.2.9. Sisteme aktarılan işçilik gerçekleştirmelerinin, Proje kapsamında kurulmuş olan herhangi bir entegre proje takımı/grubu faaliyeti olması halinde; TUSAŞ denetim ekibi tarafından söz konusu ara onaylar ve/veya onaylar verilmeden önce ilgili entegre proje takımında/grubunda yetkilendirilmiş olan TUSAŞ personeli/personellerinden gerçekleşen işçilik saatine ilişkin teyit alınır ve daha sonra sistem üzerinden TUSAŞ ara onay ve/veya onay verir.

3.2.10. TUSAŞ'ın talep etmesi halinde; Yüklenici, ilgili Evrede işçilik gerçekleşmesi bulunan personelinin işçilik gerçekleşmesinin icra edildiği gündeki ofis giriş-

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çıkış bilgilerini talep edilen personel için TUSAŞ'a sunacaktır. İşçilik gerçekleştirmelerine personele tanınan günlük mola saatleri dahil edilmeyecektir.

3.2.11. Ayrılmıştır.

3.2.12. Ayrılmıştır.

3.2.13. Ayrılmıştır.

3.2.14. Sözleşme alt madde 7.9'da belirtildiği üzere; Sözleşme kapsamında olmayan eğitim ve toplantılar, fuar ve sergi katılım giderleri ile "First Class" ve "Business Class" uçak biletleri kabul edilmeyen maliyetler kapsamındadır.

3.3. İşçilik Maliyeti dışındaki maliyetlerin kontrolü;

3.3.1. İşçilik Maliyeti dışında, Sözleşme Ek-4 MDA'da detayları belirtilen ve Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi kapsamındaki işlere ilişkin Yüklenici tarafından alınacak olan malzeme, hizmet ve yazılımlar ile eğitim, seyahat, bireysel ve kurumsal danışmanlıklar ile ilgili yapılan fatura karşılığı ürün/hizmet, kar, teşvik ödemeleri ile ödeme belgesi ile belgelenen ödemelerini içerir.

3.3.2. İşçilik Maliyeti dışındaki maliyet kalemleri ile ilgili olarak Evre içindeki tüm maliyetler Sözleşme ekinde yer alan Ek-7 Harcama Raporu Şablonu'na uygun ve eksiksiz olarak Yüklenici tarafından hazırlanır ve TUSAŞ'a sunulur.

3.3.3. Proje isterlerini karşılamak ve takvimini ötelememek adına Yüklenici'nin stoklarında yer alan bir malzemenin Proje faaliyetleri için kullanımı TUSAŞ'ın yazılı onayı ile mümkün olabilir. Bu gibi bir durumda Yüklenici TUSAŞ'a Ek-9 Lahika-2'de yer alan formatta Stok Transfer Raporu sunacaktır. Stok transfer raporunda yer alan malzemelerin "Muhasebe Fiş Tarihi" bir önceki Evrenin tarihinden hatta Sözleşme Yürürlük tarihinden önce olabilir.

3.3.4. Ayrılmıştır.

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- 3.3.5. TUSAŐ, Harcama Raporu'nda yer alan bilgiler ile Yüklenici onaylı alt yüklenicilerden alınan faturaların ve/veya ödeme belgelerinin kopyalarının uyumunu kontrol eder.
- 3.3.6. Herhangi bir uyumsuzluk tespit edilmesi halinde Maliyet Gözden Geçirme Toplantısı'nda söz konusu husus Yüklenici'ye bildirilecek ve tüm tarafların imzasının olduđu toplantı tutanağına alınan kararlar eklenecektir.
- 3.3.7. Yapılan harcama ve bu harcamaya karşılık Yüklenici'ye kesilen fatura bedeli/ödeme talebinde yer alan bedel Türk Lirası ise, ödeme tutarı, Yüklenici'ye kesilen fatura dönemine ait ayın 15. (onbeşinci) günü (ayın on dördü saat 15:30'da ilan edilen ve ayın on beşinci günü için geçerli olacak kur) için T.C. Merkez Bankası tarafından açıklanan ABD Doları döviz alış ve döviz satış kurlarının ortalama değeri üzerinden ABD Doları'na dönüőtürölerek hesaplanacaktır.
- 3.3.8. Yapılan harcama ve bu harcamaya karşılık Yüklenici'ye kesilen fatura bedeli/ödeme talebinde yer alan bedel ABD Doları dışında yabancı bir para birimi ise, ödeme tutarı, Yüklenici'ye kesilen fatura dönemine ait ayın 15. (onbeşinci) günü (ayın on dördü saat 15:30'da ilan edilen ve ayın on beşinci günü için geçerli olacak kur) için T.C. Merkez Bankası tarafından açıklanan yabancı para birimi ve ABD Doları arasındaki çapraz kur değeri üzerinden ABD Doları'na dönüőtürölerek hesaplanacaktır.
- 3.3.9. Ayrılmıştır.
- 3.3.10. Yüklenici, Sözleşme kapsamında Prototip Ürünler ve Teslimat Ürünlerine ait Ek-4 MDA'da belirtilen İşçilik, GÜG, Malzeme, Test Hizmeti ve GYG dışında TUSAŐ'dan ek bir maliyet talep etmeyecektir. Prototip Ürünler ve Teslimat Ürünlerine yönelik alt yapı ve yazılım maliyetleri Diğer Tekrarlanmayan Maliyetler içinde değerlendirilecektir.
- 3.3.11. Prototip Ürünler'e ait olanlar dışındaki Tekrarlanmayan mühendislik faaliyetleri kapsamında ihtiyaç duyulan her türlü malzeme maliyeti Genel Üretim Gideri içinde değerlendirilecektir.

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- 3.3.12. Sözleşme kapsamında alt yapı ve yatırım maliyeti dışında kalan her türlü donanım ve yazılım maliyeti (örn. personel bilgisayarları, ilk kurulum yazılımları, MS Office Yazılımları, proje takibi, üretim takip planlama vb. amaçlı yazılımlar) Genel Üretim Gideri içinde değerlendirilecektir.
- 3.3.13. Alt Yapı/Yatırım Maliyeti kapsamında yer alan her türlü maliyet bilgi amaçlı olarak ilgili Evre'ye ait Harcama Raporu'nda TUSAŞ'a sunulacaktır. İlgili maliyetlerin Harcama Raporunda sunulmuş olması TUSAŞ'ın ilgili harcamayı reddetme hakkını ortadan kaldırmaz.
- 3.4. Harcama Raporu Kontrolü, Maliyet Gözden Geçirme Toplantıları ve İşleyiői
- 3.4.1. Yüklenici, her bir evre sonunda Ek-7 Harcama Raporu Şablonu'nda ilgili Evreye ait Harcama Raporunu eksiksiz olarak hazırlayacak ve İlgili Evreyi takip eden 15 (onbeş) gün içinde, Yüklenici'nin kaşesi, yetkili kişilerin imzası ve imza sirküleri kopyası ve kümülatif MDA gerçekleştirme raporu ile birlikte TUSAŞ'a sunacaktır. Evreler arası süreçte imza sirkülerinde bir deęişiklik olmaması halinde imza sirküleri kopyası tekrar verilmeyecek olup, Yüklenici'nin TUSAŞ'a en son sunmuş olduęu sirküler geçerli sayılacaktır.
- 3.4.2. TUSAŞ, sunulan Harcama Raporunu inceleyerek varsa itirazlarını Harcama Raporu'nun sunulma tarihinden itibaren en geç 15 (onbeş) gün içerisinde gerçekleştirilecek Maliyet Gözden Geçirme Toplantısı'nda Yükleniciye bildirecektir. Bu denetimler kapsamında; Yüklenici, TUSAŞ tarafından talep edilen desteęi sağlayacaktır.
- 3.4.3. TUSAŞ tarafından, aylık olarak onay verilen işçilik gerçekleřmeleri ile Harcama Raporu'nda TUSAŞ'a sunulan verilerin uyumu kontrol edilir. İki veri arasında uyumsuzluk olması halinde, Maliyet Gözden Geçirme toplantısında Yüklenici'ye bildirilir.
- 3.4.4. Sözleşme alt madde 23.2 uyarınca, Söz konusu Harcama Raporunda tespit edilen uygunsuzluk ile ilgili olarak taraflarca mutabık kalınmaması durumunda yine de Yüklenici faturasında belirtilen ilgili Evre ödemesi gerçekleştirilecek, ancak bir sonraki Evre ödemesinde söz konusu durum değerlendirilecektir veya -varsa- hataya veya uygunsuzluęa ilişkin miktar

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Yüklenici faturasına eklenecek veya mahsup edilecektir. Bir sonraki Evre'ye ait Harcama Raporu anılan uygunsuzluk giderilerek tekrar TUSAŐ'a sunulacaktır.

- 3.4.5. TUSAŐ'ın Maliyet Gözden Geçirme Toplantısı'nda herhangi bir bildirimde bulunmaması halinde ise; Yüklenici gerçekleşen İşçilik Maliyeti ile Projeye Yönelik Diğer Tekrarlanmayan Maliyetlere ve ilgili Evre'ye dair Kar bedeline ilişkin harcamaların toplamından oluşan faturasını/faturalarını düzenleyerek Harcama Raporu ve Ödeme Talep yazısı ile birlikte TUSAŐ'a sunacak ve TUSAŐ tarafından Sözleşme alt madde 13.3.2 doğrultusunda ödeme işlemleri gerçekleştirilecektir.
- 3.4.6. Söz konusu toplantıya, TUSAŐ'dan ve Yüklenici'den asgari birer yetkili personel katılacaktır. Toplantıya ilişkin tutanaklar ve işlem maddeleri Yüklenici tarafından yürütölerek saklanacaktır.
- 3.4.7. Maliyet Gözden Geçirme Toplantıları; ihtiyaca uygun olarak Taraflarca aksi belirtilmedikçe TUSAŐ tesislerinde yapılacaktır. Yüklenici tesislerinde toplantı yapılmasına ihtiyaç duyulması durumunda, söz konusu evrenin bitiminden 15 (onbeş) gün önce TUSAŐ Yüklenici'yi bilgilendirecektir.
- 3.4.8. Her bir Maliyet Gözden Geçirme Toplantısı'nda Ek-9 Lahika-4'te yer alan formata uygun olarak Maliyet Gözden Geçirme Toplantı Tutanağı Formu doldurulacaktır. Söz konusu katılım formunun bir kopyası ödeme talep yazısı ile birlikte TUSAŐ'a sunulacaktır.
- 3.4.9. Harcama Raporu ile ilgili TUSAŐ tarafından herhangi bir itiraz/değişiklik talebi gelmezse; Yüklenici ilgili Evre Harcama Raporu'nda belirtilen tutar kadar faturayı (sadece avans karşılığı ödeme talep edilmesi halleri hariç), Harcama Raporunu ve Ödemesi talep edilecek tutarın (önceki evrelerde alınan avans tutarları mahsup edilerek hesaplanacak tutarların) yer aldığı Talep Yazısı ile birlikte TUSAŐ'a sunacak ve Sözleşme alt madde 13.3.2 doğrultusunda TUSAŐ tarafından ödeme gerçekleştirilecektir.
- 3.4.10. İlgili Evre'den en fazla 4 (dört) Evre içerisinde olmak üzere talep edilmemiş ancak gerçekleştirdiğı Maliyetler (işçilik hariç) ile İşçilik maliyetlerinin talep edilmesi durumunda ise en fazla ilgili Evre'den bir (1) önceki Evre içerisinde

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olmak üzere ilgili Evre ödemesi kapsamında değerlendirilecek olup, Harcama Raporu ile birlikte TUSAŐ'dan talep edilebilecektir.

- 3.4.11. Harcama Raporları ile birlikte her bir Evre sonunda TUSAŐ'a sunulan maliyetler kümülatif olarak toplanır ve Sözleşme Ek-4 MDA'da yer alan üst sınırlar içinde kalınıp kalınmadığı kontrol edilir.
- 3.4.12. Yüklenici, Sözleşme kapanışından önce Sözleşme madde 7.8.3'de tavan bedelleri belirtilen Projeye Yönelik Diğer Tekrarlanmayan Maliyetler'e ilişkin gerçekleşen maliyet bedellerini Ek-5 Gerçekleşen Toplam Maliyet Tablosu Şablonu'na uygun olarak TUSAŐ'a sunacaktır. İlgili, gerçekleşen maliyet bedellerinin, Gerçekleşen Direkt İşçilik bedeline oranının madde 7.8.3'de belirtilen oranları aşması durumunda, aradaki fark Sözleşme kapanışı öncesinde Yüklenici'den mahsup edilecektir. Söz konusunu mahsuplaşma işlemi öncelikli olarak Yüklenici'nin bakiye alacaklarından yapılacak olup, Yüklenici'nin bakiye alacağı olmaması durumunda mahsuplaşmaya konu bedel madde 13.5 kapsamında Yüklenici tarafından TUSAŐ'a ödenecektir. İşbu maddede yer alan uygulama Alt Yapı/Yatırım Maliyetleri ve Alt Yüklenici Sözleşmeleri için geçerli değildir.

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**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ**

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II

SÖZLEŞMESİ

EK-9 LAHİKA 1

AYRILMIŞTIR.

2024

**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ**

**PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II
SÖZLEŞMESİ**

EK-9 LAHİKA-2

STOK TRANSFER RAPORU FORMATI

2024

[illegible]

**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
TURKISH AEROSPACE**



**MİLLİ MUHARİP UÇAK GELİŞTİRİLMESİ (KAAN)
PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ**

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II

SÖZLEŞMESİ

EK-9 LAHİKA-3

Tedarik Masrafları Raporu Formatı

2024

Evre No
Evre Dönemi

[illegible]

UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II



**TUSAŞ-Türk Havacılık ve Uzay Sanayii A.Ş.
Turkish Aerospace**

**TURKISH FIGHTER DEVELOPMENT
(KAAN) PROGRAM**

CONTRACT

FOR

EXPLOSION PREVENTION SUBSYSTEM PHASE-I, STAGE-II

Contract No: 202400217

Appendix-9, Annex-4

COST REVIEW MEETING MEMORANDUM

2024

UNCLASSIFIED	2024	Revision No : --
Appendix-9, Annex-4	Sayfa 1 / 4	Revision Date : --

UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II

TOPLANTI TUTANAĞI	
Toplantının Konusu	
Toplantının Gizlilik Derecesi	
Toplantının Tarihi / Yeri	
1.Görüşülen Konular	
2.Kararlar	
#	Karar
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II

3.İşlem Maddeleri				
#	İşlem Maddesi Tanımı	Sorumlu	Miat	
1				
2				
3				
4				
5				
6				
7				
8				
9				
4.Ekler				
A	Toplantı Katılım Formu			
Önceki Toplantı Tarihi (GG/AA/YYYY)			Sonraki Toplantı Tarihi (GG/AA/YYYY)	
5. Tutanak Onayı (Bölümler/kuruluşlar arası yapılan toplantılar)				
#	İsim	Kuruluş	Ünvan	İmza
1				
2				
3				
4				
5				

UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II

UNCLASSIFIED	2024	Revision No : --
Appendix-9, Annex-4	Sayfa 4 / 4	Revision Date : --

TASNİF DIŐI	Sözleşme No:202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

MİLLİ MUHARİP UÇAK GELİŐTİRİLMESİ (KAAN) PROJESİ



TUSAŐ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ő.

İLE

TÜBİTAK MAM – MARMARA ARAŐTIRMA MERKEZİ

ARASINDAKİ

PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŐAMA-II

SÖZLEŐMESİ

Ek-9 Lahika-5

DENETİM ESASLARI UYGULAMALARI

İşbu Ek-9 Lahika-5 Denetim Esasları Uygulamaları içinde yapılacak güncellemeler bir Sözleşme Değişikliğine ihtiyaç duyulmadan uygulanacaktır.

TASNİF DIŐI	2024	Revizyon No :
Denetim Esasları Uygulamaları	Sayfa 1 / 10	Revizyon Tarihi:

TASNİF DIŐI	Sözleşme No:202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

KABUL EDİLEN MALİYETLERE YÖNELİK BEYAN VE DENETİM ESASLARI

- I. Yüklenici tarafından Sözleşme kapsamındaki öngörülen maliyetler için ilgili maliyet kalemine ilişkin Eklerde yer alan, söz konusu maliyet türüne ait bilgi formu doldurularak Harcama Raporu ile birlikte TUSAŞ'ın bilgisine sunulur. Yüklenici ilgili alımlar kapsamında Sözleşme madde 41'de belirtilen bilgi ve onay limitlerine uygun olarak ilgili maliyeti gerçekleştirmeden önce TUSAŞ'ın bilgisine/onayına sunmakla yükümlüdür.
- II. Harcama Raporu ile bilgileri sunulan maliyet kalemlerinin uygun bulunmaması durumunda, TUSAŞ'ın ilgili harcamayı reddetme hakkı saklıdır.
- III. Yüklenici, aşağıda sıralanan maliyet kalemlerini MMU Geliştirilmesi Projesi dışında başka projelerde de kullanacak ise, ilgili maliyet kalemine ait tutarı MMU Projesi işçilik gerçekleşmesi ile oranlayarak Harcama Raporuna ekleyecektir. İlgili maliyet kaleminin işçilik gerçekleşmesi oranında Harcama Raporuna yansıtılması konusunda nihai karar TUSAŞ'a aittir.
- IV. Yüklenici her bir Evre'ye ait Harcama Raporu'nda, Sözleşme kapsamında aşağıdaki başlıklarda belirtilen Diğer Tekrarlanmayan Maliyetlere ilişkin gerçekleşen maliyetlerin, Sözleşme madde 7.8.3'de belirtilen tavan bedelleri içinde yer alması ile ilgili kontrol ve raporlamayı TUSAŞ'a sunacaktır. Sözleşme kapanışından önce, aşağıdaki başlıklarda belirtilen herhangi bir maliyet kaleminin gerçekleşen bedelinin, ilgili maliyet kalemine dair Sözleşme madde 7.8.3'de belirtilen tavan bedeli aşması durumunda, Yüklenici'nin yazılı talebi ve TUSAŞ'ın onayı ile Ek-4 MDA'da yer alan diğer maliyet kalemlerinden bütçe aşımı söz konusu olan maliyet kalemine bütçe aktarımı yapılabilecektir. Söz konusu bütçe aktarımı bir Sözleşme Değişikliği'ne ihtiyaç duyulmadan gerçekleştirilecektir. İşçilik Maliyeti altında yer alan iş paketlerine yönelik bütçelerin kendi arasında, Diğer Tekrarlanmayan Maliyetler arasında yer alan bütçelerin kendi arasında aktarımı TUSAŞ'ın yazılı onayı ile yapılabilecektir. İşçilik bütçesinden Diğer Tekrarlanmayan Maliyetler altında yer alan maliyet kalemlerine bütçe aktarımı TUSAŞ'ın uygun görmesi halinde, TUSAŞ'ın yazılı onayı ile yapılabilecektir.

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Denetim Esasları Uygulamaları	Sayfa 2 / 10	Revizyon Tarihi:

TASNİF DIŞI	Sözleşme No:202400217
KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

1. Kabul Edilen Maliyetlere Yönelik Beyan Esasları

1.1. İlgili evre MGGT'si öncesinde kontrol edilmek üzere aşağıda belirtilen dokümanlar TUSAŞ onayına sunulur.

- 1.1.1. Turnike giriş-çıkış verileri
- 1.1.2. İDA (WBS) kırılımlı işçilik gerçekleşmesi
- 1.1.3. Sözleşmede belirtilen formatta Harcama Raporu
- 1.1.4. İlgili evreye ait harcamaların faturalarının imzalanmış ve kaşelenmiş baskıları
- 1.1.5. Firma personelinin evden çalışma, görevli çalışma, proje kapsamında seyahat etmesi ve proje kapsamındaki eğitimlere katılması durumlarında ilgili personel adı, ilgili iş paketi ve çalışmaya ait tarih aralıklarını içeren yönetici onaylı resmi yazı

2. Kabul Edilen Maliyetlere Yönelik Denetim Esasları

2.1. İşçilik Saati Denetim Esasları

Gerçekleşen İşçilik Maliyeti kurgusu için aşağıdaki esaslar temel alınarak işçilik gerçekleştirmeleri kontrol edilecektir.

- 2.1.1. Günlük kişi bazlı Turnike giriş-çıkış verileri kontrol edilir.
- 2.1.2. Firmanın personeline fazla mesai ödemediği durumda firmanın günlük çalışma saati baz alınır, firmanın personeline fazla mesai ödediği durumda günlük çalışma saati azami 11 saat, aylık ise kanunen belirlenen azami süre olan 270 saat baz alınır.
- 2.1.3. Personelin günlük gerçekleşen çalışma saatleri TUSAŞ tarafından belirlenen dakika-saate tamamlama tablosuna göre saate çevrilir.
- 2.1.4. Günlük 4-7,5 saat çalışma olması durumunda öğle molası yarım saat, 7,5 saat ve üzeri olması durumunda öğle molası 1 saat olarak toplam çalışma saatinden düşülür.
- 2.1.5. Firma personelinin turnike giriş-çıkış saatleri ile projede gerçekleşen işçilik saatleri koordineli olarak kontrol edilir. Yüklenici, aylık 200 saat üzeri işçilik gerçekleşmesi olan personele ait personelin yaptığı çalışmalar ile ilgili TUSAŞ'a yazılı açıklama sunar.
- 2.1.6. Her bir iş paketi için gerçekleşen işçilik saatinin uygunluğu TUSAŞ'ın (program yönetimi ve teknik ekibin) görüşü (e-posta ile) alınarak teyit edilir.

2.2. İşçilik Maliyeti Denetim Esasları

- 2.2.1. Gerçekleşen İşçilik Maliyeti'ne dayalı sözleşme usulünde, proje kapsamında gerçekleşen toplam işçilik maliyeti; Direkt İşçilik ve sosyal hakları ile Genel Üretim Gideri maliyetleri toplamından oluşur. Bu kurguda her bir firma çalışanı için, proje kapsamında gerçekleşen işçilik maliyeti, personele ait toplam işçilik maliyetinin ilgili personele ait proje kapsamında gerçekleşen işçilik saatinin, toplam gerçekleşen işçilik saatine oranı ile çapılmasıyla elde edilir (bkz. Eşitlik-1).

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$$\text{Personelin İşçilik Maliyeti} = (\text{Direkt Maliyet} + \text{Sosyal Haklar}) \times \left(\frac{\text{MMU İşçilik Saati}}{\text{Toplam İşçilik Saati}} \right)$$

Eşitlik-1

- 2.2.2. İşçilik maliyeti çalışanın direkt maliyetler ile sosyal haklarından (Tablo-1) ve genel üretim gideri toplamından oluşmakta olup , çalışanın kendi adına yaptırdığı özel sağlık sigortası bu maliyete dâhil edilemez.
- 2.2.3. Yüklenici Prototip Ürünler ve Teslimat Ürünleri kapsamı dışındaki faaliyetleri için sadece beyaz yaka işçiliği beyan edecek olup, Prototip Ürünler ve Teslimat Ürünleri kapsamında beyaz yaka ve mavi yaka işçiliği beyan edecektir.

Tablo-1 Direkt İşçilik Giderleri Kalemleri

#	Direk işçilik maliyetleri (Beyaz yaka ve mavi yaka)
1	İşçilik
1.1	Ücretler ve Fazla Mesai*
2	Sosyal Haklar
2.2	Yemek Gideri
2.3	Ulaşım (Yüklenicinin sağladığı servis araçları)
2.4	SGK Primi
2.5	Sosyal Yardım
2.6	Sigorta Giderleri
2.7	Yakacak Yardımı

*Personele Fazla Mesai Ödenmesi Durumunda

- 2.2.4. Sözleşme kapsamındaki Genel Üretim Gideri, her bir Evre’de Gerçekleşen Direkt İşçilik Maliyeti’nin %10 (yüzdeon)’u oranında direkt işçilik maliyetine eklenir (Bknz. Eşitlik 2).

$$GÜG = \text{Gerçekleşen Direkt İşçilik Maliyeti} \times (0,1)$$

Eşitlik-2

- 2.2.5. Gerçekleşen Birim İşçilik Fiyatlandırma Oranı, proje kapsamındaki toplam gerçekleşen işçilik maliyetinin, proje kapsamında gerçekleşen işçilik saatine bölünmesi ile bulunur.
- 2.2.6. Yüklenici bünyesinde Tablo-2 Genel Yönetim Gideri (GYG) Kalemlerinde belirtilen birimlere ait tüm maliyetler Genel Yönetim Gideri Maliyeti içinde değerlendirilecektir.

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İlgili personele ait Saatlik Ücret Maliyetleri içinde bildirilen maliyetler TUSAŞ tarafından kabul edilmeyecektir.

Tablo-2 Genel Yönetim Gideri Kalemleri

#	Genel Yönetim Giderine Dâhil Kalemler
1	Genel Müdür
2	Yönetim Kurulu Üyeleri
3	İnsan Kaynakları
4	Hukuk İşleri
5	Güvenlik
6	Tesis Bakım Hizmetleri (Hizmet Alımı Durumunda GÜĞ içindedir)
7	Mali İşler ve Muhasebe

2.2.7. Yüklenici bünyesinde direktör, müdür, program yöneticisi, proje yöneticisi, şef mühendis vb. olarak görev yapan personele ait direkt işçilik maliyetleri, personelin ilgili iş paketi kapsamında gerçekleşen işçilik saatlerinin toplam işçilik saatine oranının ilgili personel maliyeti (maaş bordrosu toplamı ve sosyal haklar) ile çarpılmasıyla elde edilir. İlgili maliyet hesabında madde 2.2.4’de ve 2.2.5’de yer alan esaslar geçerlidir.

2.2.8. Projeye ait iş paketlerinde direkt işçilik gerçekleşmesi bulunmayan müdür, program yöneticisi, proje yöneticisi, şef mühendis vb. personelin maliyetleri Yüklenici tarafından beyan edilmeyecek olup, ilgili maliyetlerin Evre’ye ait Harcama Raporu içinde beyan edilmesi durumunda maliyet gerçekleştirmeleri TUSAŞ tarafından kabul edilmeyecektir.

2.3.Eğitim Maliyetleri Denetim Esasları

2.3.1. Yüklenici ilgili Evre içinde gerçekleştirmiş olduğu eğitim harcamaları Ek-9 Lahika-5 Zeyil-1 Eğitim Tedariki Detayları Tablosu’nu Harcama Raporu ile birlikte TUSAŞ’a iletir. İlgili tablo her bir Evre sonunda kümülatif olarak Yüklenici tarafından revize edilecektir.

2.3.2. Eğitime katılım sağlayacak personel sayısının belirlenmesi Yüklenici’nin uhdesindedir.

2.3.3. Yüklenici tarafından alınacak eğitimler, ilgili iş paketine yönelik teknik eğitimler olması durumunda Diğer Tekrarlanmayan Maliyetler altında yer alan eğitim bütçesi içinde kabul edilir. Kişisel gelişim, kurum içi gelişim, proje/program yönetimi ve kariyer gelişimi konulu eğitim maliyetleri kabul edilmeyecektir.

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- 2.3.4. Yüklenici'nin eğitim maliyetleri için belirlenen tavan bedel Ek-4 MDA'da belirtilmiş olup Öngörülen Direkt İşçilik Maliyetinin Ek-4 MDA'da belirtilen oranı ile sınırlıdır. Sözleşme sonunda ulaşılan gerçekleşen eğitim maliyetinin tavan bedeli aşması durumunda Sözleşme madde 13.3.2.7 esasları uygulanır.

2.4.Seyahat Maliyetleri Denetim Esasları

- 2.4.1. Yüklenici ilgili Evre içinde gerçekleşen seyahat maliyetlerine ilişkin Ek-9 Lahika-5 Zeyil-2 Seyahat Detayları Tablosu'nu Harcama Raporu ile birlikte TUSAŞ'a iletir. İlgili tablo her bir Evre sonunda kümülatif olarak Yüklenici tarafından revize edilecektir.
- 2.4.2. İlgili seyahate yönelik uçak bileti (First Class ve Business Class hariç), toplu taşıma, uber, taksi (toplu taşıma mümkün değilse), araç kirası ve yakıt ücreti (C sınıf ve altı), otopark ücreti kabul edilen maliyetler olarak belirlenmiştir.
- 2.4.3. Seyahat maliyetlerinin Harcama Raporuna dahil edilmesinde Sözleşme madde 7.9 esasları geçerlidir.
- 2.4.4. Yüklenici'nin seyahat maliyetleri için belirlenen tavan bedel Ek-4 MDA'da belirtilmiş olup Öngörülen Direkt İşçilik Maliyetinin Ek-4 MDA'da belirtilen oranı ile sınırlıdır. Sözleşme sonunda ulaşılan gerçekleşen seyahat maliyetinin tavan bedeli aşması durumunda Sözleşme madde 13.3.2.7 esasları uygulanır.

2.5.Donanım Maliyetleri Denetim Esasları

- 2.5.1. Yüklenici'nin Sözleşme kapsamında sadece Alt Yapı/Yatırım Maliyetleri kapsamında gerçekleştireceği donanım maliyetleri kabul edilecek olup, ilgili donanım maliyetleri Ek-4 MDA'da belirtilen Alt Yapı/Yatırım Maliyetleri bütçesi altında değerlendirilir. İşbu maddede belirtilen donanım maliyetleri dışında kalan her türlü donanım maliyeti GÜG veya GYG kapsamında değerlendirilecek olup Yüklenici'ye söz konusu donanım maliyetleri için ödeme yapılmayacaktır.

2.6.Mühendislik Yazılımları Maliyetleri Denetim Esasları

- 2.6.1. Yüklenici ilgili Evre içinde gerçekleşen yazılım maliyetlerine ilişkin Ek-9 Lahika-5 Zeyil-4 Yazılım Tedariki Detayları Tablosu'nu Harcama Raporu ile birlikte TUSAŞ'a iletir. İlgili tablo her bir Evre sonunda kümülatif olarak Yüklenici tarafından revize edilecektir.
- 2.6.2. Yüklenici'nin yazılım maliyetleri için belirlenen tavan bedel Ek-4 MDA'da belirtilmiş olup Öngörülen Direkt İşçilik Maliyetinin Ek-4 MDA'da belirtilen oranı ile sınırlıdır. Sözleşme sonunda ulaşılan gerçekleşen yazılım maliyetinin tavan bedeli aşması durumunda Sözleşme madde 13.3.2.7 esasları uygulanır.

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KAAN Projesi	Patlama Önleme Sistemi Dönem-I, Aşama-II Sözleşmesi

- 2.6.3. Bilgisayar kurulumu yazılımları (tüm MS Office Programları), Proje Yönetimi ve Yüklenici'nin bünyesindeki proje, maliyet, iç süreç takibi vb. için kullanacağı yazılım maliyetleri Genel Üretim Gideri içinde değerlendirilir.
- 2.6.4. Harcama Raporu'nda yer alan ve Ek-19 Mühendislik Yazılımları Listesi'nde yer alan yazılımlar dışında kalan yazılım maliyetlerinin kabulü TUSAŞ onayına tabiidir.

2.7. Hizmet Alımı Maliyetleri Denetim Esasları

- 2.7.1. Yüklenici ilgili Evre içinde gerçekleşen Danışmanlık, Bireysel Danışmanlık, Diğer Hizmet Alımları maliyetlerine ilişkin Ek-9 Lahika-5 Zeyil-5 Hizmet Detayları Tablosu'nu Harcama Raporu ile birlikte TUSAŞ'a iletir. İlgili tablo her bir Evre sonunda kümülatif olarak Yüklenici tarafından revize edilecektir.
- 2.7.2. Yüklenici tarafından Harcama Raporu ile birlikte sunulan, Hizmet alımlarının değerlendirilmesinde ilgili hizmetin sadece MMU Projesi kapsamına fayda verecek nitelikte olması esas alınır. Yüklenicinin bünyesinde alınacak hizmet kapsamında yetkin/yetmiş personel bulundurması durumunda hizmet alımı için gerekçeli açıklama talep edilir. Gelen açıklamaya göre yapılacak değerlendirme sonucunda hizmet alımının Harcama Raporu içinde yer almasına onay verilir.
- 2.7.3. İlgili hizmet alımlarında öncelik satın alımın yerli kaynaklar üzerinden yapılması yönünde olup, yurt dışı hizmet alımlarında gerekçeli açıklama talep edilir. Gelen açıklamaya göre yapılacak değerlendirme sonucunda hizmet alımının Harcama Raporu içinde yer almasına onay verilir.
- 2.7.4. Yüklenici'nin hizmet alımı maliyetleri için belirlenen tavan bedel Ek-4 MDA'da belirtilmiş olup Öngörülen Direkt İşçilik Maliyetinin Ek-4 MDA'da belirtilen oranı ile sınırlıdır. Sözleşme sonunda ulaşılan gerçekleşen hizmet alımları maliyetinin tavan bedeli aşması durumunda Sözleşme madde 13.3.2.7 esasları uygulanır.

2.8. Test ve Laboratuvar Ekipmanları Maliyetleri Denetim Esasları

- 2.8.1. Yüklenici Alt Yapı/Yatırım Maliyetleri kapsamında kullanılmak üzere tedarik ettiği her türlü donanım ve malzeme için Ek-9 Lahika-5 Zeyil-6 Test ve Laboratuvar Ekipmanları Detayları Tablosu'nu, Harcama Raporu ile birlikte TUSAŞ'a bilgi amaçlı iletir. İlgili maliyetler Ek-4 MDA'da belirtilen Alt Yapı/Yatırım Maliyetleri bütçesi altında değerlendirilir. İlgili tablo her bir Evre sonunda kümülatif olarak Yüklenici tarafından revize edilecektir.
- 2.8.2. Test ve Laboratuvar Ekipmanları maliyetleri, ilgili Test ve Laboratuvar Ekipmanlarının sadece MMU Projesi kapsamında kullanılacak olması ve Yüklenici bünyesinde daha önce alım yapılmamış olması durumunda kabul edilecektir.

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- 2.8.3. İlgili Test ve Laboratuvar Ekipmanları Yüklenicinin mevcut olan diğer projelerinde kullanılabilecek olması durumunda MMU Projesi'ne ait gerçekleşme oranındaki maliyeti kabul edilecektir. İlgili Test ve Laboratuvar Ekipmanlarının MMU Projesi kapanışından sonra ilerleyen dönemlerde de kullanılacak olması durumunda Sözleşme madde 30 Tekrarlanmayan Maliyetler'de yer alan şartlar geçerlidir.
- 2.8.4. Yüklenicinin hâlihazırda bünyesinde sahip olduğu Test ve Laboratuvar Ekipmanlarına, MMU Projesi istekleri kapsamında modifikasyon yapmak istemesi durumunda, Yüklenici ilgili modifikasyon maliyeti ile detaylı açıklama sunarak TUSAŞ onayına başvurur.
- 2.8.5. Yüklenici'nin Test ve Laboratuvar Ekipmanları maliyetleri için belirlenen tavan bedel Ek-4 MDA'da "Alt Yapı/ Yatırım Maliyeti" altında belirtilmiş olup Yüklenici'ye ilgili maliyetler için belirlenen GYG dahil tavan bedel dışında bir ödeme yapılmayacaktır.
- 2.8.6. Test ve Laboratuvar Ekipmanları Tedariki kapsamında alınan malzemenin proje süresinde başka projelerde kullanılması ya da proje süresi sonunda kalan malzeme olması durumunda Yüklenici Ek-9 Lahika-2 Stok Transfer Raporunu doldurarak ilgili malzeme bedelinin mahsuplaşmasını talep eder.

2.9. Malzeme Maliyetleri Denetim Esasları

- 2.9.1. Yüklenici Prototip Ürünler ve Teslimat Ürünleri kapsamında kullanılmak üzere tedarik ettiği her türlü malzeme için Ek-9 Lahika-5 Zeyil-7 Malzeme Tedariki Detayları Tablosu'nu Harcama Raporu ile birlikte TUSAŞ'a bilgi amaçlı iletir. İlgili maliyetler Ek-4 MDA'da belirtilen Prototip Ürünler ve/veya Teslimat Ürünleri Maliyetleri bütçesi altında değerlendirilir. İlgili tablo her bir Evre sonunda kümülatif olarak Yüklenici tarafından revize edilecektir.
- 2.9.2. İlgili malzeme maliyetleri, malzemenin sadece MMU Projesi kapsamında üretilmesi planlanan Prototip Ürünler ve Teslimat Ürünleri kapsamında kullanılması durumunda kabul edilecektir. Prototip Ürünler ve Teslimat Ürünleri üretimi dışında ihtiyaç duyulan tüm malzeme maliyetleri Genel Üretim Gideri (GÜG) altında değerlendirilir.
- 2.9.3. Tedariki yapılacak olan malzeme için yurtiçi ve yerli kaynakların tercih edilmesi öncelikli olup, yurtdışından ve/veya tek kaynaktan tedarik gerektiren durumlarda Yüklenici gerekçeli açıklama ile TUSAŞ onayına başvurur.
- 2.9.4. Yüklenici Sözleşme kapsamına tedarik ettiği malzeme kaydını Ek-9 Lahika-5 Zeyil-8 Depo Malzeme Kaydı Raporu formatına uygun olarak tutar ve her MGGT öncesinde Harcama Raporu ile birlikte TUSAŞ'a sunar.

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- 2.9.5. Tedariki yapılan malzemenin proje süresinde başka projelerde kullanılması ya da proje süresi sonunda kalan malzeme olması durumunda Yüklenici Ek-9 Lahika-2 Stok Transfer Raporunu doldurarak ilgili malzeme bedelinin mahsuplaşmasını talep eder.
- 2.9.6. İşbu Sözleşme kapsamında belirtilen özelliklerde ve adetlerdeki Prototip Ürünlerin ve Teslimat Ürünlerinin tamamının üretimlerinin tamamlanmasına müteakip Yüklenici Ek-9 Lahika-5 Zeyil-8 Depo Malzeme Kaydı Raporu'nda yer alan bilgilerden yola çıkarak kullanılan malzeme miktarını ilgili Prototip Ürün(ler) ve/veya Teslimat Ürün(ler)i'nin Ürün Ağacı (Bill of Material-BOM) ile eşleştirerek 15 (onbeş) gün içinde TUSAŞ'a sunar. Yüklenici tarafından sunulan Ürün Ağacı ve Ürün Ağacı'na göre belirlenen malzeme kullanım miktarı TUSAŞ tarafından 15 (onbeş) gün içinde incelenerek onaylanır. TUSAŞ tarafından ihtiyaç duyulması durumunda ilgili Ürün Ağacı'na bağlı olarak kullanılan malzeme miktarı ve hurda oranı için detaylı açıklama talep edilebilir. Ürün Ağacı'nın TUSAŞ tarafından onaylanmasına müteakip ilgili Prototip Ürün ve/veya Teslimat Ürünü'nün birim fiyatı hurda malzeme maliyeti eklenerek belirlenecek ve belirlenen birim fiyat üzerinden ilgili Ürün(ler)e ait Kar Ödemesi hesaplanacaktır.

TASNİF DIŐI	2024	Revizyon No :
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**TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
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PROJESİ**

**TUSAŞ-TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.
İLE
TÜBİTAK MAM-MARMARA ARAŞTIRMA MERKEZİ**

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EK-9 LAHİKA-5 ZEYİL-1

EĞİTİM TEDARİKİ DETAYLARI TABLOSU

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EĞİTİM TEDARİKİ DETAYLARI					

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EK-9 LAHİKA-5 ZEYİL-2

SEYAHAT DETAYLARI TABLOSU

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EK-9 LAHİKA-5 ZEYİL-3

AYRILMIŞTIR.

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SÖZLEŞMESİ**

EK-9 LAHİKA-5 ZEYİL-4

YAZILIM TEDARİKİ DETAYLARI TABLOSU

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EK-9 LAHİKA-5 ZEYİL-5

HİZMET DETAYLARI TABLOSU

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**PATLAMA ÖNLEME SİSTEMİ DÖNEM-I, AŞAMA-II
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EK-9 LAHİKA-5 ZEYİL-6

**TEST VE LABORATUVAR EKİPMANLARI
DETAYLARI TABLOSU
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SÖZLEŞMESİ**

EK-9 LAHİKA-5 ZEYİL-7

MALZEME TEDARİKİ DETAYLARI TABLOSU

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EK-9 LAHİKA-5 ZEYİL-8

DEPO MALZEME KAYDI RAPORU

2024

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YURTIÇİ KATMA DEĞER TABLOSU VE RAPOR ŞABLONU

2024

TABLO 1. YİKD YÜKÜMLÜLÜK TABLOSU					
Kategori	Yıllara Sari YİKD Yükümlülüğü				
	T0+12 AY (%)	T0+24 Ay (%)	T0+36 AY (%)	T0+48 Ay (%)	TOPLAM (%)
A					

TABLO 2. YILLIK YİKD RAPORU TABLOSU (...Program Yılı)*

TABLO 2.1

No	FATURA NO.	FATURA TARİHİ	ÜRETİCİ FİRMA	ÜRÜN ADI	FATURA TUTARI	YİKD ORANI (%)	YİKD TUTARI
1							
2							
3							
4							

TABLO 2.2

TABLO 2 SIRA NO					
ÜRÜN KODU					
ÜRÜN TANIMI					
ÜRÜN KIRILIMI	FİRMA İÇİ				
	İşçilik Saati	İşçilik Ücretleri	İşçilik Bedeli	Malzeme, Hizmet ve Yazılım	Diğer (Other)
	TOPLAM				
GENEL TOPLAM					

TABLO 3. YILLIK YİKD RAPORU FORMATI*

YİKD RAPORU (... PROGRAM DÖNEMİ)

Tablo-3.1: Rapor Dönemi Öncesinde Gerçekleştirilen YKİD Faaliyetleri			
Rapor Dönemi	YİKD	Gerçekleşen Kredilendirme	Fark
t _i -t ₀ arası			
Toplam			

Tablo-3.2: Rapor Dönemi İçerisinde Gerçekleştirilen Kategori-A YİKD Faaliyetleri					
No	YİKD Faaliyeti	Gerçekleştiren Firma	Gerçekleşen YİKD Miktarı	YİKD Oranı	YİKD Miktarı
1					
2					
...					
Toplam			-		

Tablo-3.3: Rapor Dönemi'nde Planlanan Ancak Gerçekleştirilemeyen YİKD Faaliyetleri					
No	YİKD Faaliyeti	Gerçekleştirecek Firma	Faydalanacak Yerli Firma	Tahmini YİKD Miktarı	Gerçekleştirilememe Nedeni
1					
2					
...					

Tablo-3.4: İzleyen Rapor Döneminde Planlanan YİKD Faaliyetleri						
No	YİKD Faaliyeti	Gerçekleştirecek Firma	Faydalanacak Yerli Firma	Gerçekleşme Tarihi	Tahmini YİKD Miktarı	Tahmini Kredi Miktarı
1						
2						
...						
Toplam						

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KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II



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**TURKISH FIGHTER DEVELOPMENT
(KAAN) PROGRAM**

CONTRACT

FOR

EXPLOSION PREVENTION SUBSYSTEM PHASE-I, STAGE-II

Contract No: 202400217

Appendix-11

TESİS GÜVENLİK BELGELERİ

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FİRMA TARAFINDAN PAYLAŞILACAKTIR.

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Appendix-12

**GOVERNMENT/TURKISH AEROSPACE FURNISHED
FACILITY/EQUIPMENT/DATA LIST**

2024

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KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Satage-II

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KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II



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APPENDIX-13

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KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II



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**TURKISH FIGHTER DEVELOPMENT
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APPENDIX-14

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KAAN Program		Contract for

DRAFT

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TÜRK HAVACILIK VE UZAY SANAYİİ A.Ş.

TURKISH AEROSPACE



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Ayrılmıştır.

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KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II



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Turkish Aerospace**

**TURKISH FIGHTER DEVELOPMENT
(KAAN) PROGRAM**

CONTRACT

FOR

EXPLOSION PREVENTION SUBSYSTEM PHASE-I, STAGE-II

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Appendix-17

**İŞ PLANI
(BUSINESS PLAN)**

2024

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Kaan Project
EXPS ATA 47 Explosion Prevention System
Business Model Review Report



BUSINESS MODEL REVIEW REPORT

KAAN PROJECT

EXPS ATA 47 EXPLOSION PREVENTION SYSTEM PROJECT

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Kaan Project
EXPS ATA 47 Explosion Prevention System
Business Model Review Report

EXPS ATA 47 EXPLOSION PREVENTION SYSTEM PROJECT

Plan Name	Business Model Review Report
Document Number	MAM-EXPS-RP-022
Revision Date	31.05.2023
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Information Security Degree	Unclassified



Kaan Project
EXPS ATA 47 Explosion Prevention System
Business Model Review Report

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BUSINESS PLAN CHANGE RECORDS

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3.0	24.03.2023	Test System detail requirements	5
4.0	31.05.2023	Verification approach has been added	Chapter 5.4

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5.0	16.09.2024	CDR update	All document
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DISTRIBUTION LIST

Distribution Number	Issue	Company	Department	Name	Title	Method
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1. APPLICABLE AND REFERENCE DOCUMENTS

For the documents listed herein, unless otherwise stated, latest issues are applicable.

1.1. Applicable Documents

Table 1 Applicable Documents

No	Document No	Document Title	Issue	Date
[AD10]	TUSAŞ-TÜBİTAK MAM-202400217	TUSAŞ- TÜBİTAK MAM Arasındaki Patlama Önleme Sistemi (EXPS) Dönem-I Aşama-II Projesi Sözleşmesi, Hüküm ve Şartlar	1.0	
[AD20]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 SOW	1.0	
[AD30]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-A Contract Data Requirements List (CDRL)	1.0	
[AD40]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-B Subcontract Design Review	1.0	
[AD50]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-1 Annex-E Engineering Coordination Memo (ECM) Format	1.0	
[AD60]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-2 Cardinal Points Specification (CPS)	1.0	
[AD70]	TUSAŞ-TÜBİTAK MAM-202400217	Contract Appendix-4 Project Implementation and Delivery Schedule (PIDS)	1.0	



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1.2. Reference Documents

Table 2 Reference Documents

No	Document No	Document Title	Issue
[RD01]	EXPS_PMP_02	Project Management Plan	2.0
[RD02]	EXPS_QMP_003	Quality Management Plan	3.0

2. PROJECT OVERVIEW

One of the objectives of the Turkish Fighter Development (TF-X) Program is design & development of EXPS ATA 47 Explosion Prevention System. The scope of this project is as mentioned in “Appendix-1 Explosion Prevention System Statement of Work (SOW)” to achieve a better product defined specification.

KAAN Project subcontractor design mainly consists following reviews:

- System Requirements Review (SRR)
- System Functional Review (SFR)
- Preliminary Design Review (PDR)
- Preliminary Design Optimization Review (PDOR)
- Critical Design Review (CDR)
- Test Readiness Review (TRR)
- System Verification Review (SVR)

System Requirements Review (SRR): For the KAAN Project the SRR is conducted to ensure that the Subcontractor is cognisant of and in agreement with the requirement set. Additionally it will review, and amend if necessary, the Subcontractor’s initial plans to ensure an effective output.

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System Functional Review (SFR): SFR is conducted to ensure that the System Design Description defines the functionality to cover the System Requirements and is at sufficient maturity to proceed with preliminary design activities. At SFR decision gate, the design descriptions are evaluated and a functional baseline is established for the system.

Preliminary Design Review (PDR): PDR is conducted to ensure the System preliminary design has reached the maturity to proceed with detailed design. At the PDR decision gate, the allocated baseline is evaluated.

Preliminary Design Optimization Review (PDOR): PDOR is conducted to optimize preliminary design to reach the maturity for proceeding with detailed design. At the PDOR decision gate, the allocated baseline is evaluated.

Critical Design Review (CDR): CDR is conducted to finalize detailed design to reach the maturity for proceeding with production activities. After CDR design data is baselined and change management process is started.

Test Readiness Review (TRR): TRR is conducted to review the preparation for the test activities including the test procedure, test infrastructure and production activities of system that will be tested. After TRR, test activities for system requirements verification is started.

System Verification Review (SVR): SVR is conducted to evaluate all the verification activities that are executed. After SVR, final DDP is released, and final delivery is executed.

The main objectives of this project agreement is;

- To mature and refine the requirement set
- To mature and refine architecture proposed
- To define equipment specifications,

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- To define performance characteristics of System and equipment,
- To perform the preliminary design of System and equipment.
- To optimization studies of the Preliminary Design of System and Equipment.
- To perform the preliminary design of System and equipment.
- To plan, develop, facilitate and realise the test infrastructure for development and verification aim
- To validate and verify the produced prototypes for Development Test Aircrafts (DTA)

In this business plan, the main studies that TÜBİTAK MAM shall follow in all processes starting from the design of the product to the use of the product in KAAN aircraft will be tried to be summarized.

Business Model Review Report gives information about the executed and planned roadmap starting from Phase-1 Stage-1, and in the later stages of the project, current domestic and international developments may vary depending on the alternative policies in the project general plan. In case of mentioned changes, the updates foreseen in the current versions of the business plan will be reflected in the current versions.

It is aimed that developed solution within the project to be sustained several decades. Throughout this long period, it is aimed to keep the availability of the platform at a higher level, keep the life cycle costs at a lower level. In this regard, TÜBİTAK MAM shall establish available media which creates local content which increases the availability rates of the KAAN system and decreases the sustainment costs.

Project technical activities will be carried out through various IPT's. Monitoring and organization of commercialization processes will also be carried out in parallel by the commercialization IPT (Com-IPT) to be determined as well as the technical integrated product teams.

It is envisaged that the processes to be carried out after Phase 2 of the project will be carried out by TÜBİTAK MARTEK in the studies carried out to date regarding commercialization activities. TÜBİTAK MARTEK shall follow *Value Added Local Content* Solution Considering Whole Life-

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cycle of KAAN Platform. In this context, preliminary meetings were held and preliminary plans were made. The unit that will carry out LSS activities within TÜBİTAK MARTEK will be able to purchase services from product developers for the production and integration of the product, as well as establishing a critical system/subsystem design and/or production and/or maintenance capability within its body. In case a decision is made to manufacture the product in a facility that it will establish within its own body, the necessary investment budget and the employment of experienced personnel will be realized by TÜBİTAK MARTEK. All MRO activities will be carried out by the relevant unit of TÜBİTAK MARTEK.

Throughout the business plan document, how the process will be handled at different stages has been evaluated. The Business Plan has been handled in two different stages as "Development Phase Project Organization" and "Implementation Stage Project Organization". While the Development Phase, defined as P1S1 and P1S2 processes, will be carried out by the existing project structure, the process, defined as the Implementation Stage, after P1S2 (in Phase 2) will be maintained by TÜBİTAK MARTEK.

This business model review report will be updated periodically during the development of equipment, the realization of prototype production activities and the completion of testing activities, and the feasibility analysis processes will be detailed.

DEFINITIONS

Term	Definition
Contract	The formal agreement between TUSAŞ and TÜBİTAK MAM Chemical Technology Institute named Turkish Fighter Development (TF-X) Project EXPS ATA 47 Explosion Prevention System.
Contractor	TUBITAK MAM
Customer	TUSAŞ-Turkish Aerospace

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Item	System, subsystem, unit and part thereof.
Project	EXPS ATA 47 Explosion Prevention System Project
User	Turkish Air Forces (TurAF)

ABBREVIATIONS

Abbreviation	Meaning
ASM	Air Separation Module
CDD	Capability Development Document
CDR	Critical Design Review
CPS	Cardinal Points Specification
EMD	Engineering and Manufacturing Development
FOC	Full Operational Capability
FRP	Full Rate Production
FOT&E	Follow-on Operational Test and Evaluation
FRD/FD	Full Rate Production/ Full Deployment
HMD	Helmet Mounted Display
KPP	Key Performance Parameter
KSA	Key System Attributes
LCSP	Life Cycle Sustainment Plan
EXPS	Explosion Prevention System
LRIP	Low Rate Initial Production
MAM	Marmara Research Centre (also referred as MRC)
MoC	Means of Compliance

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MDD	Material Development Decision
MSA	Material Solution Analysis
OBBIGS	On Board Inert Gas Generation System
O&S	Operation and Sustainment
OTRR	Operational Test Readiness Review
IOC	Initial Operational Capability
IOT&E	Initial Operational Test & Evaluation
ITRA	Independent Technical Risk Assessment
PBL	Performance-Based Logistics
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PHTS	Packing, Handling, Storage, and Transportation
PM	Project Manager
PS	Product Support
PSS	Product Support Strategy
SFR	System Functional Review
SRD	System Requirements Document
SRR	System Requirements Review
TF-X	Turkish Fighter Aircraft
SVR	System Verification Review
TMRR	Technology Maturation and Risk Reduction
TRR	Test Readiness Review
TUBITAK	The Scientific and Technological Research Council of Turkey
TUSAŞ	Turkish Aerospace Industries



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3. PURPOSE OF THE DOCUMENT

A detailed study about work sharing, model, testing process, etc. related to the ExPS project was published by P1S1 period. In this business plan, it is aimed to explain detailed information about the development and dissemination of the product. In this context, detailed information will be given about the ways to be followed within the scope of product development, testing and qualification, design and qualification responsibilities and roles to be assumed, procurement processes, product realization and certification processes. This plan document is prepared in order to define:

Methodology for design & development activities

- Methodology for production activities
- Methodology for testability activities
- The interaction between the design and development process and reliability, testability, and maintainability activities
- Methodology for commercialization activities

4. BUSINESS DESCRIPTION

4.1. MISSION STATEMENT

As a lead design responsible for the development of Explosion Prevention systems for the Turkish Fighter development program, TÜBİTAK MAM's main objective of this project is to determine the organization and approach related to the development and dissemination of the Explosion Prevention System for the KAAN program in line with the existing competencies. As a result of the study, it is planned to construct the business plan in order to make the product life cycle of the Explosion Prevention System, which will be designed and produced within the scope of the KAAN platform, as long, continuous and sustainable as possible.

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4.2. VALUES AND VISION

TÜBİTAK MAM has been developing its basic and practical R&D experience based on many years on a target and product basis. With this point of view, it increases the number of specific solutions and products with its target, customer and product-oriented approach, which has emerged especially with the defence sector studies in recent years.

It is aimed not only to develop technology, but also to establish an appropriate organization for the production, certification, maintenance and service activities of the product to be developed, by taking TÜBİTAK MAM's long-term domestic technology development capability to reduce foreign dependency one step further in the Explosion Prevention System project.

The main goal within the scope of the project is to carry out the necessary technical and administrative work to ensure that the Explosion Prevention System, which will have a high locality rate for Turkish Fighters, compete with equivalent products, as well as to establish a structure that can export technology with high added value in the long term.

4.3. INDUSTRY OVERVIEW

The Federal Aviation Administration (FAA) has addressed half of the explosive equation—sources of sparks or other ignition hazards—by requiring airlines to provide better insulation, move wiring, inspect fuel pumps, and take other actions. The FAA planned to order reductions in the flammability of gases that float in the void above Jet fuel in airliner tanks. Airlines and manufacturers started to show intensive efforts for improvements such systems which is able to meet the requirement by using systems based on an on-board inert-gas generation system (OBIGGS), which replaces much of the air in a fuel tank with nitrogen, a gas that does not support combustion.

The military aircrafts have used inerting systems for decades to reduce the chance of fire resulting from bullet or shrapnel impacts. The F-16, for example, injects Halon 1301 gas, a common fire suppression chemical, into its tanks, while the giant C-5 uses liquid nitrogen, which is denser than its gaseous form (and thus requires less storage space) and which can easily be warmed to

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expand into a gas. But these systems are expensive and heavy, and require extensive ground support, making them impractical for most commercial aircraft.

Explosion Prevention System (ExPS) is a device or set of components on an aircraft that utilizes one of several different types of technology to provide a supply inert gas for the primary purpose of removing or displacing the explosive atmosphere in the fuel tank ullage. The three primary types of technology that are currently in use today are first, a system that utilizes a stored supply of Liquid Nitrogen, second, PSA or Pressure Swing Absorption, and third, Polymeric Hollow Fibre Permeable Membranes (HFM).

TÜBİTAK MAM undertakes the responsibility to develop an Explosion Prevention System (ExPS) for aircraft fuel tank inerting to prevent hazardous in-flight conditions and to mitigate their effect when they do occur. Aircraft fires represent a small number of actual accident causes, but the number of fatalities due to in-flight, post-crash, and on-ground fires is large. The novel ExPS system will inert aircraft fuel tanks with nitrogen generated by a hollow fibre membrane module. The system will provide a cost effective method for fuel tank inerting, will be robust and resistant to chemical contamination. An ExPS system that is based on nitrogen generation is environmentally friendly and does not require hazardous chemicals for fire suppression. In addition to improving aircraft safety by mitigating hazardous in-flight and on the ground conditions the ExPS will also contribute to aircraft security and will mitigate aircraft damage from hostile attacks.

Today, major companies dominate the aviation sector with the solutions they offer for Explosion Prevention Systems, especially for combat aircraft. Companies do not only provide services for the application and integration of Explosion Prevention systems to aviation platforms, but also for testing, providing spare parts, warehouse level maintenance and servicing of the Explosion Prevention Systems during its entire product life cycle.

On the other hand, the solutions offered are mostly provided by the companies mentioned, there is still a need for development and improvement studies for the Explosion Prevention System in order to meet the requirements of aviation platforms completely and smoothly due to a number of problems allegedly originating from Explosion Prevention Systems.

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Due to their high commercial potential in terms of installation and service of Explosion Prevention systems, which are of critical and indispensable importance in order to adequately meet the requirements of fighter jets, in addition to the efforts to improve the solutions offered by existing providers in terms of reliability and sustainability, Intensive development activities of alternative providers on systems continue at an increasing pace today.

4.4. COMPANY DESCRIPTION

TÜBİTAK MAM is one of the leading organizations of the advanced technology world thanks to its ability and capacity of research, research infrastructure and world class administrative and operational process management. With its customer oriented approach, it offers original solutions to public, private and military agencies and institutions. These solutions are materialized through basic researches, applied research and development, technology transfer, innovation, system and facility construction, national standard and norm setting, professional consulting and training activities.

Since its establishment in 1972, TÜBİTAK Marmara Research Center (MAM) performs its operations in “TÜBİTAK Gebze Campus” in the city of Kocaeli, Turkey. As a non-profit research organization, the Center aims at becoming a world leader in science and technology production with its research, development and innovation capabilities widely shared mainly by its several research groups of Material Technologies, Energy Technologies, Climate Change and Sustainability and Life Sciences vice presidencies.

In parallel with the goals of TÜBİTAK Marmara Research Centre (TÜBİTAK MAM), It aims to meet the needs of its all stakeholders, particularly the Turkish industry, in accordance with national and international standards timely, duly and completely. TÜBİTAK MAM combines scientific researches with commercial-industrial activities and plays an important role in the improvement of the global competitive power of Turkey through sustainable development. TÜBİTAK MAM's fields of activities are Defence and Forensic Science, Production Technologies and Pharmaceutical and

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Medical Device Technologies. Various projects have been carried out to the relevant industries and authorities in the working areas of TÜBİTAK MAM.

Cooperation Models of TÜBİTAK MAM are as follows:

- R&D Projects with Private Companies
- R&D Projects with Public Institutions
- Joint Projects with International Institutions
- Test And Analysis Services
- Technology Transfer

Within the scope of the National Combat Aircraft Program (Turkish Fighter Development Program, TF-X) Explosion Prevention System development project, TÜBİTAK MAM is selected as responsible for the development, testing and maintenance of Explosion Prevention systems and performs inspections, maintenance and services for aircraft flight equipment.

Chemical Process Technologies Research Group, which is the sub-unit responsible for the technical activities of the Explosion Prevention System project under the roof of TÜBİTAK MAM, has been carried out various projects in the defence sector. Significant progress has been made in the development of critical products that are needed by the defence sector within the scope of the projects. The accumulation gained in the scope of defence projects can be combined with KAAN project in a single application area. Considering the degree of confidentiality, some of the related projects are currently carried out at the institute for the defence sector and clients are given below:

- a. Atmospheric Explosion Prevention System (AYDES) - SSB
- b. Production and Recycling of Palladium Catalyst for Hydrogen Combustion - MSB
- c. Development of atmospheric Explosion Prevention system within the scope of half-life modernization of PREVEZE class submarines – SSB/STM
- d. Development and Supply of Explosion Prevention System Calipatrons for New Type Submarines (REIS Class) – SSB/ThyssenKrupp Marine Systems / STM

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- e. Developing Explosion Prevention systems for Bomb Shelters and Underground Bunkers - *MSB*
- f. Oxygen Personal Rescues – *Private Enterprise*
- g. Personal Explosion Prevention Systems – *Private Enterprise*

4.5. HISTORY AND CURRENT STATUS OF EXPLOSION PREVENTION SYSTEMS IN FIGHTERS

Safety and survivability drive the requirements for fire suppression in aircraft. Whereas safety is concerned with mitigation of hazards associated with system or component failures or human error, survivability relates to susceptibility and vulnerability to threats directed at the aircraft.

A fire is deemed a safety-related fire when it results from component failures, which may be due to inadequate design, a mechanical failure mechanism such as fatigue, or maintenance error, and results in either a flammable fluid contacting an always-present ignition source, or the failures themselves provide both the flammable fluid and the ignition source. Fires that relate to aircraft survivability are those that are ballistically induced in areas on an aircraft that, if not protected by some means, are vulnerable to fire or even explosion.

Extensive literature compilations summarize investigations since 1922 of aircraft fire problems, fire prevention measures, fire detection, fire suppression, fuel tank explosion hazards, and inerting. Surveys conducted after World War II documented the obvious need for lower volatility fuels and separation of flammable fluid-carrying components from ignition sources with the engine emphasized as the principal ignition source. It was also then recognized that during flight the fuel-air mixture within fuel tanks could be alternately combustible and non-combustible, depending upon flight conditions. However, engine failures were still found to be the most frequent cause of flammable fluid ignition by an ignition source in flight.

The combat environment exposes military aircraft to ballistic and higher-level threats. These threats can be incendiary or non-incendiary. The military analysis of aircraft combat loss data from those conflicts indicated that the fires due to fuel-system-related damage were becoming the predominant fire vulnerability, as aircraft were lost mainly due to hits on the fuel system.

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The fuel tank ullage is that portion of the volume not occupied by liquid fuel but contains an air and fuel vapour mixture. Inerting, as applied to aircraft fuel tanks, can be defined as the inclusion of a gas in the ullage prior to ignition of the vapour that will suppress that ignition, independent of the fuel air mixture. The gas used can be one that simply reduces the oxygen available for combustion, such as nitrogen, or one that chemically interferes with the combustion process, such as Halon 1301.

Several technologies for providing inert gas were reviewed. Although the military has investigated and used many types of inerting systems (and gasses) the presently available and viable systems all use nitrogen as the inerting gas. Systems using exhaust gas (B-50), CO₂ and dry ice (B-47 and B-36) were used by the military but discontinued because of technical problems. Systems using flame suppressing agents (Halon 1301) are presently being used on some smaller military aircraft. However, the ban on the production of Halon 1301 and the lack of any replacement agent makes that a nonviable technology for commercial use. Therefore, the only presently viable and acceptable inerting gas is nitrogen.

Nitrogen inerting works by reducing the oxygen concentration in the fuel tank ullage below that necessary to support combustion. Literature indicates that at 9% oxygen or below no reaction will occur in a tank with Jet A fuel regardless of the fuel air mixture or the ignition energy. Some testing has indicated that for most conditions 10-11% oxygen levels provides the same level of protection. Oxygen levels above the no reaction level but below 16% have been shown to provide some protection and reduce the pressure rise in reactions that do occur.

In order to initially inert a fuel tank with nitrogen, the nitrogen must be introduced into the tank in such quantity as to reduce the oxygen level below the desired 9%. In order to maintain an inert tank additional nitrogen must be introduced to counter the oxygen in the air drawn into the tank due to pressure changes and fuel usage. In addition, dissolved oxygen in the fuel released into the ullage as the pressure on the fuel decreases must be diluted with additional nitrogen. In order to minimize the need for additional nitrogen, systems normally include check valves at the fuel tank vents to maintain a slight pressure differential to ambient. This minimizes the introduction of

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air (21% oxygen) during minor pressure changes. Scrubbing (bubbling nitrogen through the fuel) prior to takeoff can reduce dissolved oxygen in the fuel.

Present inerting systems require the use of additional nitrogen during flight. The nitrogen is either loaded prior to flight and stored in liquid or gaseous form on-board, or generated in-flight by separating the components of air. The liquid nitrogen systems require ground based refilling at all landing locations, and a cryogenic nitrogen storage vessel on-board. Additional valving and plumbing is necessary to make sure only gaseous nitrogen enters the fuel tanks. On-board inert gas generating systems (OBIGGS) can be of two types, the molecular sieve or the permeable membrane. Both types of systems require compressed air, usually engine bleed air, and produce a mixture of nitrogen enriched air (NEA) that is not pure nitrogen (but is usually less than 5% oxygen).

The permeable membrane system is comprised of many very small hollow tubes made of a material that allows all the constituents of air to pass through more easily than nitrogen. Air is supplied to the tubing under pressure. Oxygen from the air permeates the tubing walls and is collected and exhausted overboard. What is left is nitrogen enriched air (NEA) usable for inerting.

Initial inerting systems, such as on the C5, utilized stored liquid nitrogen. These systems are heavy and rely on a large ground support system. As technology has advanced, the OBIGGS systems have become more practical. The system weight and inlet airflow and pressure to volume of nitrogen produced has vastly improved. All of the recently designed and installed nitrogen inerting systems have been of the OBIGGS type.

In the 1980s, ASM OBIGGS work performed by the DoD culminated in a study that highlighted the favourable life cycle costs of an on-demand inert gas generation system over a stored inerting agent system and explosive suppressant foam. This study concluded that an inerting system using state-of-the-art ASMs with HFM technology was cost-effective when compared to other technologies and allowed for a relative performance increase of a factor of ten over previous ASM technology systems. The FAA evaluated the performance of a particular ASM in the 1990s in an attempt to gauge the ability of these devices to generate NEA for purposes of fire suppression and inerting. Recent FAA research has focused on determining the limiting oxygen concentration

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required to prevent a reaction in a flammable fuel tank ullage. Scale tests, using hydrocarbon based fuel vapours, have shown that an oxygen concentration below 12 percent by volume will prevent a reaction in a flammable tank ullage with a measurable pressure rise using a variety of ignition sources.

Nowadays, the supply of the most advanced OBIGGS based Explosion Prevention systems and their application to different platforms are carried out by a limited number of companies.

4.6. GOALS AND OBJECTIVES

Main objectives of Explosion Prevention System Project:

- To carry out the design activities of the Explosion Prevention system that can meet the requirements of the KAAN program
- To be able to produce solutions that meet the requirements at a high rate
- To develop product prototypes and demonstrate that the required performance criteria are met
- To achieve excellence in meeting requirements through continuous process improvement
- To ensure continuity and openness to development in production
- To carry out equipment and system level testing and qualification studies of products and to accurately describe the requirements of these studies
- To support necessary activities to support test flights
- To determine the design / test / calibration responsibilities of the subcontractor companies related to the production of the product
- To determine and establish the necessary infrastructure for the multiple production of the product
- To determine responsible industrial institutions and foundations for KAAN Depot Level Services (TurAF Air Supply Maintenance Centres and/or domestic defence partners)
- To establish a permanent organization for product maintenance, repair and service

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- To support Turkish Aerospace to perform Level of Repair Analysis by which maintenance levels shall be defined in a cost effective manner
- Increasing the market share through existing customers
- To create increased employee satisfaction within the scope of process development and improvement studies
- To determine Economic Level of Repair Analysis
- To determine the commercial organization that will take responsibility for all activities such as testing, certification, maintenance, repair, service starting from the production of the product to be developed and creating the organizational chart

4.7. PLANNING ACTIVITIES

Major Capability Acquisition path shall be used to acquire and modernize the Turkish Fighter Development program. This pathway typically follows a structured analyze, design, develop, integrate, test, evaluate, produce, and support approach.

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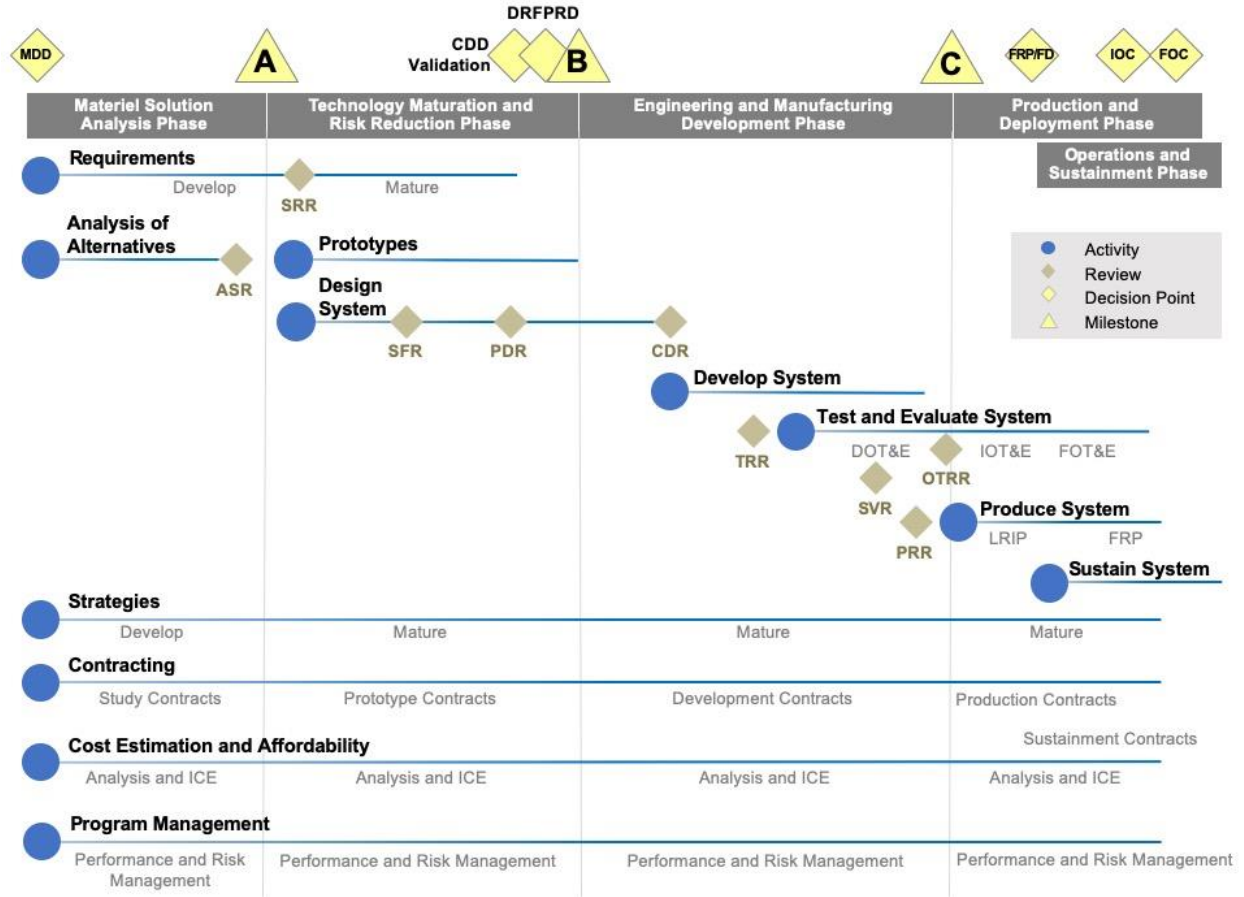


Figure 1. Lifecycle View of Major Capability Acquisition

Main pathway of the MCA lifecycle and their brief explanations are given below:

1. Materiel Development Decision (MDD) - Completed
2. Material Solution Analysis (MSA) Phase - Completed
 - 2.1. Develop Requirements
 - 2.2. Analysis of Alternatives
 - 2.3. Study Contracts
 - 2.4. Milestone A

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3. Technology Maturation and Risk Reduction (TMRR) Phase – In Progress
 - 3.1. *Mature Requirements*
 - 3.2. *Prototype Contracts*
 - 3.3. *Prototyping*
 - 3.4. *Develop Preliminary Design*
 - 3.5. *Capability Development Document (CDD) Validation*
 - 3.6. *Development RFP Release Decision (DRFPRD) Point*
 - 3.7. *Milestone B*
4. Engineering and Manufacturing Development (EMD) Phase
 - 4.1. *Development Contracts*
 - 4.2. *Complete System Design*
 - 4.3. *Develop System*
 - 4.4. *Developmental Testing*
 - 4.5. *Milestone C*
5. Production and Deployment (P&D) Phase
 - 5.1. *Production Contracts*
 - 5.2. *Low Rate Initial Production*
 - 5.3. *Operational Testing*
 - 5.4. *FRP Decision*
 - 5.5. *Full Rate Production/ Full Deployment (FRP/FD)*
6. Operation and Sustainment (O&S) Phase
 - 6.1. *Sustainment Contracts*
 - 6.2. *Sustain System*
7. Initial Operational Capability and Full Operational Capability (IOC/FOC)

The design reviews and brief explanations to be followed throughout the project are given below.

System Requirements Review (SRR)- Completed on 31.03.2022: Ensure that the developer understands the system requirements and is ready to proceed with the initial system design.

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System Functional Review (SFR) – Completed on 03.10.2022: Evaluate whether the functional baseline satisfies the end-user requirements and capability needs and whether functional requirements and verification methods will achieve performance requirements.

Preliminary Design Review (PDR) – In Progress: Ensures the preliminary design and system architecture are complete, there is technical confidence the capability need can be satisfied within cost and schedule goals, and risks mitigated.

Critical Design Review (CDR): Confirms the system design is stable, expected to meet system performance requirements and achieve affordability goals. Establish the initial product baseline.

Test Readiness Review (TRR): Verify the system is ready to enter the test and that the funding and execution of a test executes the test and gathers the required information.

System Verification Review (SVR): Verify the system performance meets the requirements in the system performance specification and is documented in the functional baseline.

Production Readiness Review (PRR): Determines whether the system design is ready for production, and whether the developer has accomplished adequate production planning for entering production.

Physical Configuration Audit (PCA): Examine the actual configuration of an item being produced in order to verify that the related design documentation matches the item as specified in the contract.

Independent Technical Risk Assessment (ITRA): Provide a view of program technical risk, independent of the program and the chain of command leading to the MDA.

There are some differences in the project organization depending on the stages within the scope of the project. The relevant part is explained in chapter 4.9 – project organization

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4.8. CRITICAL SUCCESS FACTORS

Successful product development and dissemination requires many good things to be done in harmony and simultaneously. In this context, in order to achieve the targeted outputs during the EXPS project carried out within the scope of the Turkish Fighter development program, the main critical success factors in product design and application, as well as product dissemination and service processes are listed below:

- Technical and financial feasibility
- Technical innovation and technology transfer
- Completion of the project on time, professional relationship between stakeholders
- Realization of validation and verification activities at high resolution level
- Personnel training and know-how transfer
- Trustiness between the parties
- Transparency and constant communication
- Efficiently and productivity management
- Operations safety
- Completing the construction within expected time and cost
- Strong private consortium
- Transparent competitive tender
- Strong and resilient contract
- Monitoring project management with performance indicators
- Knowledge production and know how transfer
- Harmonious execution of the partnership through the boards
- Appropriate risk sharing

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4.9. PROJECT ORGANISATION

EXPS project structuring will be handled in two different phases. Project structuring in the first phase is the *development phase project organization*, starting from the conceptual design of the EXPS and covering the design, test planning and realization steps. The phases which shall be followed by this organisation are:

- *Technology Maturation and Risk Reduction Phase*
- *Engineering and Manufacturing Development Phase*

This stage is the organization where the activities to be done during the execution of the activities in the SRR, SFR, PDR, CDR, TRR, SVR, PRR and OTRR stages of EXPS will be followed. This organization is a structure in which subcontractors undertake different responsibilities under the main management of TÜBİTAK MAM.

The second stage organization is the *implementation stage project organization* to be carried out by a commercial organization, where the ground and air tests of the solution, whose design stages have been successfully matured in the first stage, mass production organizations, depot level maintenance, and certification processes will be followed. The phases which shall be followed by this organization are:

- *Production and Deployment Phase*
- *Operations and Sustainment Phase*

In this organisation Test and Evaluation activities shall continue with Initial Operational Test & Evaluation (IOT&E) and Follow-on Operational Test and Evaluation (FOT&E), system production activities shall perform with Low Rate Initial Production (LRIP) and Limited Deployment and Full Rate Production (FRP) and System Sustaining activities will be followed. Full Rate Production or Full Deployment (FRP/FD), Initial Operational Capability (IOC) and Full Operational Capability (FOC) shall be reviewed in this period.

As of today, studies are planned for this organization to be undertaken by TÜBİTAK MARTEK, where similar studies are carried out. Details about this structuring will be given in the relevant section.

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Table 3. Workshare and targets throughout the program. P1S1 activities (blue), P1S2 activities (green), P2 and P3 activities (yellow)

NRE (PDR)	NRE (PDR to qualification)	Serial Production (including IOC/FOC)	Operational Sustainment/ Modernization	Depot Maintenance (MR&O)
Product/system Preliminary Development Cost	- Detail Design Development Cost - Prototype Costs - Verification/Testing Costs - Specific Development Costs <u>Notes:</u> Planned 6 (six) a/c as flying prototype There may be only lab usage equipment, it is to be stated. Specific costs are to be explained such as specific test/verification equipment or procedures, costly tooling or special investments.	- Serial recurring cost of equipment/system for final assembly line - Typical estimated assembly man-hour (if any) - Special assembly functional estimated testing cost/man-hour(if any) - Special flight/flight-line estimated testing cost (if any) <u>Notes:</u> 200 a/c production in a 10 years period to be assumed for the purposes of evaluation. Learning Curve effects (if any) to be stated by the proposal.	- Operational maintenance man-hour - Cost of major spares - Cost of life-limited parts - O-level special process/repair costs (if any) - Generic modernization - I-level process/repair costs (if any) <u>Notes:</u> 200 hr/year, 100 takeoff/year to be assumed for the purposes of evaluation. Exceptional usage/cycle count parameters are to be stated. Typical spare pricing are expected to be higher than the assembly line, estimation is to be stated. MTBR, MTBF and similar estimated data are assumed to be stated within the proposal.	- Overhaul cost (if any) - Typical depot level (D-level) repair costs (if any) <u>Notes:</u> The routine replacement items (if any) are to be stated. The major special testing or procedures for repair and overhaul to be stated. If the periodic overhaul/testing/check-out/special inspection is planned, the intervals are to be stated in detail.
Local NRE Content Amount	- Local NRE Content Amount - Planned local Industry Investments/Labs	Local content for serial recurring cost of equipment/system for final assembly line	Local content for major spares, life-limited items	Local content for D-level and/or MRO



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4.9.1. Development Phase Project Organisation

Within the scope of EXPS project, Phase 1 Stage 1 contract was signed on 27.01.2022. On contract signature Material Solution and Analysis Phase activities were completed by TA (Figure 1). Phases followed by this organization are

- *Technology Maturation and Risk Reduction (TMRR) Phase*
- *Engineering and Manufacturing Development (EMD) Phase*

The purpose of TMRR Phase is to reduce technology, engineering, integration and life-cycle cost risk to the point that the transition to EMD could be made with confidence in successful program execution for development, production and sustainment.

This phase includes a mix of activities intended to reduce program risks. These include the design and requirements trades necessary to ensure an affordable product and an executable development and production program. Close collaboration with the TA is essential in this phase.

In EXPS project TMRR phase activities are contracted as Phase 1 Stage 1 of the project.

The purpose of the EMD phase is to develop, build, test, and evaluate a materiel solution to verify that all operational and implied requirements, including those for security, have been met, and to support production, deployment and sustainment decisions.

The project shall complete all needed hardware and software detailed designs. A critical design review assesses design maturity, design build-to or code-to documentation, and remaining risks, and establishes the initial technical baseline. This phase activities will be used as the decision point that the system design is ready to begin pre-production prototype hardware fabrication or software coding with acceptable risk.

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Developmental testing and evaluation provides hardware and software feedback to the project management on the progress of the design process and on the product's compliance with contractual requirements, effective combat capability, and the ability to achieve key performance parameters (KPPs) and key system attributes (KSAs). TA's operational test organization will conduct independent evaluations, operational assessments, or limited user tests to provide initial assessments of operational effectiveness, suitability, survivability, and the ability to satisfy KPPs and KSAs. Opportunities to combine TÜBİTAK MAM and Government developmental testing should be maximized, and integrated developmental and operational testing will be conducted when feasible.

TÜBİTAK MAM shall finalize designs for product Support (PS) elements and integrate them into a comprehensive support package that is documented in a PS Strategy (PSS). The program will demonstrate PS performance through appropriate verification means that satisfy the sustainment requirements within the program goals established at Milestone A.

Training devices will be planned, funded, designed, and developed in parallel with the operational system to ensure that the training devices properly replicate the capability in development. The training strategy will be evaluated during testing and evaluation events.

The EMD phase will end when the design is stable; the system meets validated capability requirements demonstrated by developmental, live fire (as appropriate), and early operational testing; manufacturing processes have been effectively demonstrated and are under control; software sustainment processes are in place and functioning; industrial production capabilities are reasonably available; program security remains uncompromised; and the program has met or exceeds all directed EMD phase exit criteria and Milestone C entrance criteria.

In ExPS project EMD phase activities are contracted as Phase 1 Stage 2 of the project.

In addition to all development and planning activities within the scope of this contract, all other activities related to the Phase 1 Stage 2 contract will be carried out by the currently established project organization.

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Details of the development phase project organisation is given in Project Management Plan (PMP). Here, a brief explanation is also given. Figure 2 depicts the EXPS Project Organization.



Figure 2 ExPS Project Organisation

EXPS Project is a MAM Presidency Project performed by several institutes and units under MAM Presidency. The project will be executed under the supervision of the Project Steering Committee. The Project Steering Committee is composed of TÜBİTAK MAM President, Vice President in Charge of Business Development and Industrialisation, Vice President in Charge of Corporate Development, Vice President in Charge of Strategy and Technology Development, Vice President in Charge of Administrative and Financial Affairs, and Advisory Boards. The Project Manager and Technical Project Manager although not being members of the Project Steering Committee, will normally attend meetings of the Steering Committee to report on progress and answer any questions raised by members.

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An independent Quality Assurance Team is assigned to perform quality assurance and control activities of the Project.

An independent Contract Management team is assigned to carry out contractual work and periodically check the compliance of the project with the contract.

The Project Management Office (PMO) is the managing body of the Project. The Project Management Office is composed of the Project Manager, Assistant Project Managers representing Institutes and Project Management Specialists. The Project Manager is the interface between TÜBİTAK MAM and Turkish Aerospace. The Project Manager is assigned from PMO.

Various subgroups come together in line with their existing skills and experiences and contribute to the realization of the product. Subcontractors are responsible for carrying out the relevant activities of different units during the design phase and will be responsible to the executing institution/organization for supply, maintenance and service after all development phases of the product. The Key Contributing parties involved in the project and the configuration items they are responsible for are listed below.

Table 4. Responsibilities for ExPS project

Program Management Activities		
TÜBİTAK MAM		
System Engineering Responsibility		
TÜBİTAK MAM / AEROS		
Subsystem Responsibilities		
NAVIST	TÜBİTAK MAM	HTM
Modelling Activities	- NEA Generation Subsystem - Gas Conditioning	Tank Distribution Subsystem

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Responsible parties for the subsystems of the Explosion Prevention System specified in the table above are responsible for performing the design/test/calibration studies. In addition to the responsible parties above indicated, AEROS is also performs System Engineering responsibility within the project activities.

In addition to the Block-10 SRR, Block-10 SFR, Block-10 PDR activities carried out within the scope of Phase 1 Stage 1, the Block-10 CDR, Block -20 PDR, first flight for Block-10 configuration prototype aircraft, Block-20 CDR, the completion of the flight and qualification tests on the aircraft in the Block-10 configuration and all other related activities within the scope of these phases will be completed by the specified project structure.

4.9.2. Implementation stage project organization

After the successful completion of the stages specified in the previous section of the project and the determination of all relevant planning activities, all activities obtained for the purpose of commercialization and supply of the product as well as activities such as Serial Production (including IOC/FOC), Operational Sustainment/Modernization, Depot Maintenance (MR&O) knowledge and experience will be transferred to a commercial organization and these activities will be carried out by this organization.

Within this project organisation following activities shall be implemented:

- *Production and Deployment (P&D) Phase*
- *Operations and Sustainment Phase*

The purpose of the P&D Phase shall be to produce and deploy requirements-compliant EXPS solutions to receiving operating organizations.

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P&D phase shall include a number of key events: LRIP, personnel training, completion of developmental test and evaluation (if required), initial operational test and evaluation, and the full-rate production (FRP) or full-deployment (FD) decision. In this phase, all system sustainment and support activities shall be initiated if not already begun, and the appropriate operational authority will declare initial operational capability (IOC) when the defined operational organization has been equipped and trained and is determined to be capable of conducting mission operations. All related management strategies and other techniques will be used continuously to control and reduce costs.

During the P&D phase, the sustainment function in the program shall shift from planning to execution and oversight. The PM, with support from the PS IPT, shall execute the planned delivery, verification, and deployment of the product support package to support the early production items.

The PM shall refine and execute plans for initial fielding of the product support package for Operational Test events, IOC, interim support, and transition to FOC. Supply support and depot maintenance capabilities shall be put in place, and PSAs (such as Interim Contractor Support contracts, Public Private Partnerships, and Performance-Based Logistics [PBL] arrangements) shall be executed and monitored to ensure that providers are achieving required performance.

The P&D phase shall include the Full Rate Production Decision Review, which authorizes Full-Rate Production (or full deployment) of the system.

The PM shall use the Life Cycle Sustainment Plan (LCSP) during this phase to manage the program's fielding efforts and to execute the required product support infrastructure, including PSAs, maintenance and supply capabilities, and sustaining engineering and logistics functions. The LCSP shall be updated based on results from logistics evaluation reports on operating procedures, maintenance procedures, maintenance analysis reports, and Packing, Handling, Storage, and Transportation (PHST) verification reports.

The final phase shall be the Operations and Sustainment Phase.

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This phase executes the PSS, satisfies materiel readiness and operational support performance requirements including personnel training, and sustains the system over its life cycle, including disposal. The O&S phase shall begin upon fielding of the first system(s), which may precede IOC, and is based on an approved PSS. This phase includes two major efforts: sustainment and disposal. The approved PSS is the basis for the activities conducted during this phase.

Sustainment

During this phase the PM will deploy the support package and monitor its performance according to the PSS. The PM will ensure that resources will be programmed; IP deliverables and associated license rights, tools, equipment, and facilities have been programmed and acquired to support each of the levels of maintenance that will provide PS; and necessary organic depot maintenance capability, consistent with statute and the PSS, are established.

If program meets sustainment performance requirements without compromise to the security and integrity of the capability or service delivery, remains affordable, and continues to seek cost reductions by applying cost management and other cost reduction techniques, program shall be rated as successful.

Disposal

At the end of its useful life, a system will be demilitarized and disposed of in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment, in accordance with the PSS. Disposal planning will include consideration of retirement, disposition, and reclamation.

Management of the implementation stage of the EXPS project will be carried out by TÜBİTAK MARMARA TEKNOKENT Inc (MARTEK).

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The know-how and application information packages obtained following the execution of the "Technology Maturation and Risk Reduction Phase" and "Engineering and Manufacturing Development Phase" stages of the EXPS project, which are defined as Phase-1 Stage-1 and Phase-1 Stage-2 processes by TÜBİTAK MAM, It will be transferred to MARTEK for the realization of the "Production and Deployment Phase" and "Operations and Sustainment Phase" processes.

MARTEK is a technology development zone where R&D studies supported by creating a strong and effective entrepreneurial potential are transformed into high value-added high-tech products, methods or services, mass production is carried out, products are commercialized for export and turned into an international brand that can compete in the international market.

MARTEK carries out the processes targeted in this business plan with the studies it has already carried out on the implementation and dissemination of products and services for different sectors.

MARTEK will carry out the implementation stage activities detailed above in the EXPS project with the MMU EXPS subunit that it will include within its body. In this context, it will supply the professionals that the unit will need within the body of the relevant unit. Throughout the process, TÜBİTAK MAM and its subcontractors will also undertake the necessary service procurement activities within the scope of the process.

Detailed information about the company structuring and organisation is given in chapter 6 MANAGEMENT.

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5. PRODUCT / SERVICES

5.1. SYSTEM / SERVICE DESCRIPTION

The Explosion Prevention System consists of those systems, units, and components whose primary function is to pressurization and inerting of internal fuel tanks and pressurization of external fuel tanks in KAAN Platform. The inerting of internal fuel tanks is provided mainly with ASM, which is employed to separate the oxygen from the air flowing throughout the ASM, via a hollow fibre membrane (HFM), and generate a nitrogen-enriched air (NEA) flow. Since the ASM requires conditioned air to operate, the Explosion Prevention System (ExPS) involves a pressure reducing valve, a Flow control valve a heater and ASM inlet filter. ECS provides pre-conditioned bleed air to ExPS. ExPS conditions this air with heater up to ASM allowed temperature value. The Conditioned ExPS Air is provided to ASM under normal condition to pressurization and inerting of internal fuel tanks. Conditioned ExPS Air also is used to pressurize external fuel tanks. The internal fuel tanks pressurization is provided by NEA flow during normal ground and flight conditions. The Explosion Prevention System has also by-pass flow line only for pressurization purposes, which is used when the Conditioned ExPS air does not satisfy the specified limits for ASM operation. In addition, by-pass flow is also used for ASM blockage/failure condition to maintain internal fuel tank pressurization with Conditioned ExPS Air. Within ExPS, valves are used to distribute the NEA flow and by-pass pressurized air flow to the internal fuel tanks in accordance with operational needs. Temperature, pressure and oxygen sensors are used for controlling and health management of ExPS. ExPS is also responsible for pressurization of external fuel tanks. Since inerting function is not required for external fuel tanks, conditioned bleed air is directed to external fuel tanks via a pipeline which is controlled by a shut-off valve.

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The explosion prevention system is required to be in operation from starting the engines on the ground, throughout the whole mission profile, including climbing and diving. The ExPS is capable of inerting and maintaining inert state the internal fuel tanks with internal fuel load of at least 95% through reducing oxygen concentration in tank ullage below 9 %, within 10 minutes after engine start on ground. The ExPS also has the same capability after air to air refuel operation with internal fuel load of at least 95% through reducing oxygen concentration in tank ullage below 9%, within 10 minutes. The system is designed for performing its intended functions for at least 10 (ten) hours duration without interruption, hence none of the items within ExPS has a limit for continuous operation.

For achieving the required functionality, the Explosion Prevention System is divided into subsystems as follows:

- Bleed Air Conditioning Subsystem (BACS)
- NEA Generation Subsystem (NEAGS)
- Tank Distribution Subsystem (DISTS)

In addition to these subsystems, the ExPS is controlled by aircraft systems (such as VSCM, DCU etc) with embedded software of ExPS.

Controlling of the ExPS will be provided by the aircraft systems according to the system behaviour model and sensor data. The pressure, temperature and oxygen concentration parameters of the air flow will be continuously monitored by the specified sensors and the outputs of these sensor data will be used to control the valves within the ExPS. Activation of the by-pass air flow line will also be decided according to the outputs of these sensors by the aircraft systems.

5.2. UNIQUE FEATURES / PROPRIETARY ASPECTS

The system to be developed within the scope of the EXPS project will be developed to fully meet all the requirements of the KAAN project. With this feature, the EXPS system will be developed specifically for the KAAN platform and it will be platform specific.

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In addition, the system to be developed will have a particularly high locality rate. Having a high local rate is an important gain, especially in terms of the continuity and accessibility of the product. In this direction, continuity will be ensured not only in the development and implementation of the product, but also in terms of maintenance, repair, service and spare parts supply throughout the entire product life cycle.

During the provision of all necessary processes for the product by MARTEK, it will be in continuous cooperation within the scope of service procurement with the project structuring in which the development phase of the product is carried out. This will lead to continuity in new advanced material and process improvement studies. Thus, it will be an important advantage in terms of accessibility to new versions of the product with advanced features.

5.3. RESEARCH AND DEVELOPMENT

The finding of a product in the application should not mean the end of the development activities. In order for the product to be in constant competition with its counterparts, technological developments should be followed and appropriate technologies should be applied for the next processes of the product. Thus, while maintaining the competitiveness of the product, it can contribute to the development activities of the platform it serves.

The development of pilot Explosion Prevention systems for fighter jets can be given as one of the best examples to explain this. In the "4.5. HISTORY AND CURRENT STATUS OF EXPLOSION PREVENTION SYSTEMS IN FIGHTERS" section, the development over the years is summarized. The continuity of R&D activities has led to the formation of this technological development process.

TÜBİTAK MAM, which is the executive of the development phase of the project, has been carrying out the technology and development activities used in the EXPS project for a long time for different platforms and sectors. Current developments with the existing personnel and device infrastructure of TÜBİTAK MAM are constantly followed and implemented. Especially for Explosion Prevention system based on a chemical process, the application of new and improved materials can increase

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process quality and efficiency. Therefore, the continuity of R&D activities is necessary for product development. In this context, the development of new materials and their application in the system, depending on technological developments, can be continued throughout the entire life cycle of the product. The fact that MARTEK and TÜBİTAK MAM will work in cooperation throughout the product life cycle will pave the way for continuous development for the R&D activities to be implemented and the versions that will follow the product developed in this project.

5.4. TESTING AND QUALIFICATION ACTIVITIES

The aim of the test studies is to observe the response of the test systems and Explosion Prevention system, which represent the various conditions experienced throughout the aircraft operating envelope, to make the necessary improvements.

Like the many localisation projects, Explosion Prevention System development test activities shall be performed in different level of fidelity and complexity. Tests can be classified as follows:

- Equipment Level Performance Tests
- Equipment Environmental Conditions and EMI/EMC Qualification Tests
- System Level Tests

Verification activities will be executed at different levels, such as:

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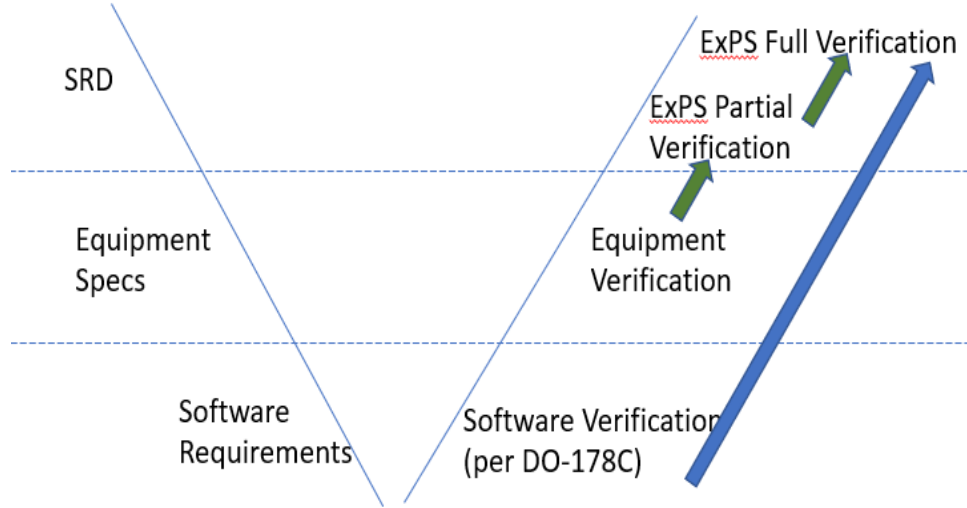


Figure 3. General Verification Activities Roadmap

Here, software verification will be the responsibility of Turkish Aerospace. Therefore, software verification activities are excluded from the responsibility of TÜBİTAK MAM within the scope of development activities.

System and equipment verification will be done by TÜBİTAK MAM with full coverage of Equipment Specifications. Laboratories will be used for testing functional, performance and interface parameters of equipment/items. Separately, environmental conditions and EMI/EMC testing will be done. The test article is supplied with independent ground power for instrumentation, heating and air conditioning, and equipment and accessories for complete operation of the instrumentation independent of the operation of the aircraft. The test units will be equipped with instrumentation to set test parameters and monitor test unit's health and performance. Test set up will also be equipped with gas sample ports to measure both NEA and OEA oxygen concentrations. Additionally, a totalizing mass flow meter was installed at the NEA output to measure the NEA flow rate.

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Hence, there need to be special Equipment Level Performance Test setup's such as BACS, DISTs and NEAGS Performance Test Rigs. Development tests shall take long duration and need specific test setups. For this reason, test equipment development activities started in Phase I and shall continue during Phase II.

During development and calibration activities, development items shall be tested extensively. For the Equipment Environmental Conditions and EMI/EMC Qualification Tests, accredited test laboratories and test set-up's shall be used for MIL-STD-810 and DO-160 equipment qualification. Test activities shall be performed in accordance with the Safety of Flight Priority.

The boundary conditions under which the test activities will be carried out are still under discussion with TA and will be mutually discussed and clarified until the end of Phase-1 Stage-1 activities.

In line with the scope of mutually agreed testing activities, the test facility to be established at TÜBİTAK MAM can be used for product development and periodic testing activities to be carried out throughout the entire product life cycle. As a result of product development and integration activities, MARTEK will be responsible for the planning of periodic tests and, if requested, the implementation.

The test system and approach envisaged within the scope of system development and validation tests is given below:

The test system to be developed will be established at the TÜBİTAK MAM laboratories and will be used in many test activities from the development of sub-units to the performance verification phase of the integrated ExPS system. Fundamental structure and features of the test system;

- The test system will create the necessary inlet air conditions (pressure, flow and temperature control) for the ExPS system and its components.
- Performance demonstration, debugging and scenario creation will be provided with the data collection and processing feature in the test system.
- With its modular structure, it will be possible to perform separate tests of the units.
- System capacity and features will allow Burst and Proof tests to be performed.

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- The control of the ExPS system will be made by the test system with the algorithm to be provided, and there will be no need for a separate system from TA for the control task to be provided from the aircraft.
- The test system will be in a structure that will allow the creation of error scenarios and scenarios.

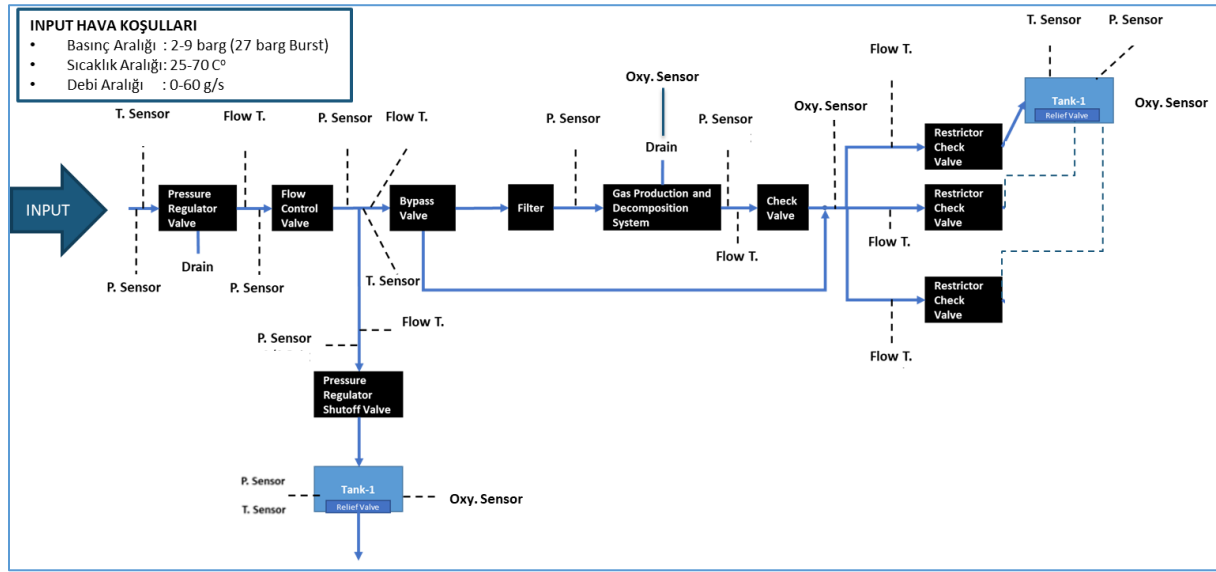


Figure 4. Test System Architecture

The test system will provide the necessary inlet air conditions from the ECS for the ExPS system. The test system will have all the necessary units for this operation. It will also have the necessary sensors and control units for running test scenarios and receiving data. Test system units can be listed as follows:

- Units for preparing the necessary inlet air conditions
 - Compressor system
 - Chiller
 - Filters for wet tank
 - Wet tank

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- Air dryer
 - Dry tank
 - Filters for dry tank
 - Heaters and Coolers
- Control system of air conditioning units
- Test sensors
- Data collection system
- Test software
 - Test system operation
 - Possibility of manual control
 - Programming warning and alarm and running events
 - Allow algorithm input
 - Running automatic test condition
- ExPS system controller
- Test setup
 - ExPS integrated system connections
 - Mechanical connections of sensors and other units
 - Piping and connections between Input air system and ExPS
- Pneumatic piping and accessories (will be provided with losses similar to aircraft layout)
- Representative fuel tanks (1 external, 1 Internal)

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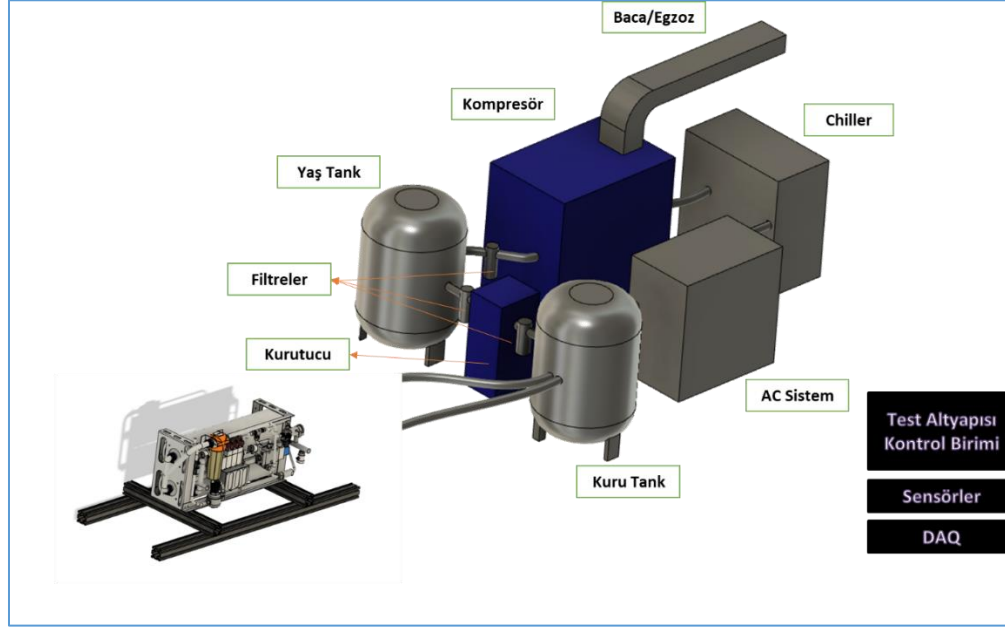


Figure 5. Test System Components

Detailed description, capabilities and execution plan of test infrastructures are in Test Assembly Infrastructure Plan. In addition to Test Assembly Infrastructure Plan, verification approach is outlined in System Verification Plan and finally, verification status of the System Requirements are given in TS Compliance Matrix.

5.5. PRODUCTION

Phase-1 Stage-2 activities of the Project will be carried out by TÜBİTAK MAM, the knowledge and experience obtained in the previous stages of the project will be transferred to MARTEK A.Ş. as stated throughout this document. “Production and Deployment” and “Operations and Sustainment” works will be carried out by MARTEK A.S. Among the activities to be carried out by the company is optimizing the production processes for the serial production of the product in an accurate and continuous manner.

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The production management to be implemented by MARTEK will include bringing together the existing material and manpower resources by using the limited raw material, producing at the desired quality, on time, and with the lowest budget.

The production planning department, to be determined by the MARTEK Inc., will analyse all stages from order to shipment, planning and guiding both TA/SSB/TurAF's expectations and business objectives, which ensures that the desired product or service is produced at the desired time, in the desired quantity and quality, as well as saving time and cost in coordinated with the other sub-units.

While preparing the production planning by the production planning department, the following items will be taken into consideration:

- Forecasting the demand level of the product
- Determination of the appropriate production planning period
- Grouping of materials to be used in the manufacture of suitable products
- Determining and scheduling subcontractors' procurement plans
- Accurate analysis of limited stocks
- Keeping stock for the subsystem or equipment in case of excess demand
- Controls of stock start and end levels, variability of production speed and determination of holiday losses and permits

Following the production planning, production activities will be carried out and equipment and system level testing and control activities will be carried out. Establishing a continuous structure in the supply of subsystems / components will be the main production target, and if deemed necessary by MARTEK, a special production line can be established for a certain sub-component / system.

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MARTEK will be able to establish a product-specific production facility for the production of ExPS to the extent of investment and technical requirements. Detailed production planning work related to this situation will be determined after the final version of the product is revealed at the end of the CDR stage. On the other hand, if the production costs are more economical as the company's decision, it will be able to procure the component-based supply of ExPS from the companies involved in the development process. In this case, the product integration can be realized from the companies that are in the development process or in the integration and test centre that it will establish within its own structure.

Production will be completed with the screening phase. Screening is the process of subjecting the manufactured or repaired product or component to stresses such as thermal cycling and vibration to force latent defects into permanent or catastrophic failures during the screening process.

Environmental Stress Screening (ESS) can be performed as part of the manufacturing process or it can be used in new product qualification testing. Main testing steps are outlined as follows:

- Visual Inspection
- Functional Testing
- Environmental Stress Screening (ESS)
- Qualification ESS
 - Production Unit Qualification Testing
 - Repaired Unit Qualification Testing
- Acceptance ESS
 - Production Unit Acceptance Testing
- Repaired Unit Acceptance Testing
- Reliability ESS
 - Reliability Qualification Testing
 - Reliability Acceptance Testing
 - Burn-In Testing

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5.6. NEW AND FOLLOW-ON PRODUCTS & SERVICES

Adding new and follow-on products or services to current EXPS offerings can serve as the catalyst that drives the solution to higher level of success for new generation EXPS. It takes time, effort, and money to create and successfully launch new products/services.

During the production of the product, the R&D activities mentioned in the previous sections and the continuous development activities in the product will continue, and the basic steps determined in this plan will be followed during the development and production stages of the products. Only improving the features of the product is not limited to this scope, but service activities in particular for the TFX EXPS project are also an open approach.

During the development of New and Follow-on products, evaluations from customers, performance metrics and applicability of technological developments on the existing product will be determined as basic process inputs. Here, the most important issue will be to stay focused on meeting your customers' needs. Conduct customer surveys to find out what they like and dislike about the EXPS solution. This will be the fundamental issue continually improve the EXPS solution so it meet customers' needs.

6. MANAGEMENT

Throughout the document, it is tried to give information about the planning to be applied in the production and implementation of the Explosion Prevention System, which will be developed within the scope of the KAAN program. The main purpose here is not only to develop the product, but also to establish the continuity of products and services in a dynamic structure and to create an organization that will respond quickly and effectively to the needs of the customer throughout the entire life cycle of the product.

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TÜBİTAK MAM's many years of experience in the development of a product or system is the most important driving force in the early stages of the project. On the other hand, in the KAAN program, the service activities to be provided after the emergence of the product and the necessary qualification processes may require a different organizational structure. For this purpose, the serial production of the product and the support activities throughout its life cycle are carried out by MARTEK A.Ş. and will be carried out by a main department and sub-units to be established specifically for the EXPS project.

In the current situation, Labour recruitment process has already started within the current project organisation. New technical personal have started the project activities in TÜBİTAK MAM facilities. In P1 S2 period, it is planned the increase the number of MARTEK staff and increase their familiarity for the project activities.

Also, negotiations with MARTEK regarding when and how this setup will be realized have been defined. The transfer of the process from TÜBİTAK MAM to MARTEK A.Ş. will be carried out after the EXPS solution reaches sufficient maturity. Specific to the project, it is envisaged that this transition will be realized towards the end of the Phase-1 Stage-2 contract. Regarding the realization of the transition, the relevant legislation to which TÜBİTAK MAM and MARTEK are subject has been examined. The fact that similar studies have been carried out between the two organizations before and the cooperation protocols within this scope provide information on how the process will be carried out.

The project structure in which the development activities of the project are carried out and Phase-1 Stage-1 and Phase-1 Stage-2 are carried out are given in the previous sections of the document. In this part of the document, MARTEK A.Ş. information will be provided.

6.1. COMPANY

MARTEK is a technology development zone where R&D studies supported by creating a strong and effective entrepreneurial potential are transformed into high value-added high-tech products, methods or services, mass production is carried out, products are commercialized for export and turned into an international brand that can compete in the international market.

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It was established as a TÜBİTAK Technology Development Center in TÜBİTAK Gebze campus in 1992. 25.73 hectares of Marmara Teknokent, which has a total area of 62 hectares, is a "Technology Development Zone" (TEKGEB), and 36.27 hectares of it is structured as a Technology Free Zone (TEKSEB).

Among its partners are TUBITAK (96%), Turkey Technology Development Foundation (TTGV) (1%), Kocaeli Chamber of Industry (KSO) (1%), Sakarya Chamber of Commerce and Industry (SATSO) (1%) and Istanbul Chamber of Industry (ISO) (1%) is included.

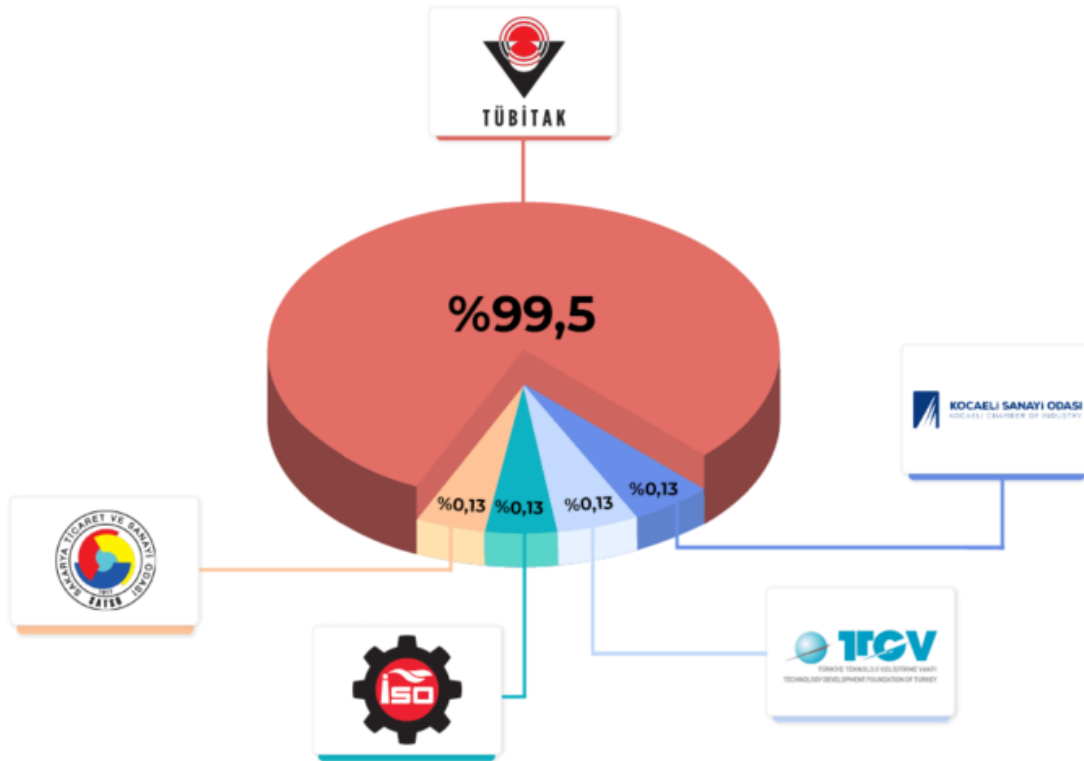


Figure 6. Shareholders of MARTEK

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6.2. OPERATIONS

The sample organizational structure to be established for the management and monitoring of company-specific processes within the scope of product production and development processes within the scope of MARTEK is given below. The organizational structure may vary depending on the development of needs and requirements in the developing process.

Every functional department is shaped as a pyramid, with a head of that group at the top. Chief Engineer reports directly to the Head of Product, each with a specific mission or focus area to develop a strategy for, and the contributing Subdivision Chiefs report into the Chief Engineer, supporting those strategic missions.

The Head of Product is the top of the Product organizational pyramid. In a smaller starter up, this person wears many hats and is as tactical as they are strategic. For EXPS unit, Head of Product is typically equal to a Director of Product. This role typically report to the President of the company and work with the President and other executives on the overall product portfolio strategy, determining high-level allocation of resources and initiatives that the Product team will pursue.

The advisory board will consist of experts from both engineering, aviation and medical fields. Experts may be from academia, army or the private sector.

Certification is a unit that will consist of expert staff in aviation certification. Issues such as Initial Airworthiness Standards & Specifications, Safety Information, Design Organization & Policy issues and Design Organization & outsourcing will be the main areas of the unit.

Flight standards is a unit that will consist of expert staff in aviation flight standards. It will work in coordination with other units in line with the requirements of the aviation industry on issues such as Maintenance and Production, Air operations and Aircrew & Medical.

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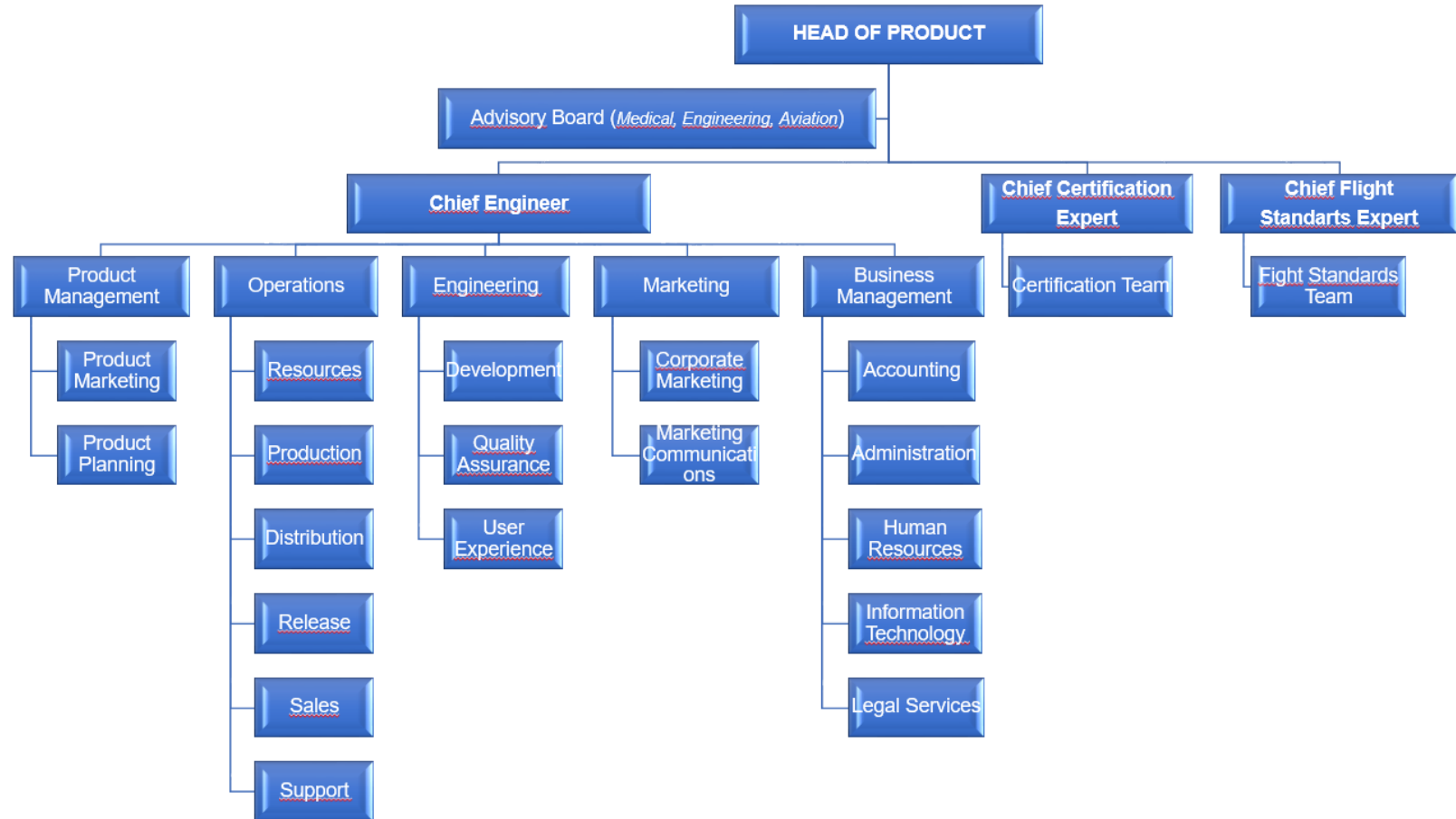


Figure 7. Sample Organizational Chart for EXPS Unit at MARTEK

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The general master plan of the works to be carried out in line with the contributions of all units within the scope of operational studies can be summarized as follows:

- Operations Strategy
- Scope of Operations
- Ongoing Operations
- Test & Qualification Operations
- Certification Operations
- Life Cycle Sustainment Planning
- Location(s)
- Personnel
- Serial Production (including IOC/FOC)
- Packing, Handling, Storage, and Transportation Operations
- Depot Maintenance (MR&O) Operations
- Operational Sustainment/ Modernization
- Operation Expenses
 - Legal Environment
 - Inventory
 - Suppliers
- Quality Operations
 - Quality Checks
 - Configuration Checks
 - Certification Operations
- Implementation
 - Year-1
 - Subsequent Years
 - Contingency Plan
- The Market
 - Industry Analysis

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- Market Analyses
- Competitor Analyses
- Marketing and Sales
 - Market Segmentation Strategy
 - Targeting Strategy
 - Positioning Strategy
 - Product/Service Strategy
 - Pricing Strategy
 - Distribution Channels
 - Promotion And Advertising Strategy
 - Sales Strategy
 - Sales Forecasts

7. CONCLUSION

Within the scope of this business plan, starting from the development of the Explosion Prevention System, which is being carried out under the main subcontractor of TÜBİTAK MAM, its entry into the inventory of the Turkish Air Force and how the subsequent work will be carried out is given. Planning activities will be matured during the Phase-1 Stage-2 process of the project, and activities will be carried out to create the commercial structure, in which the activities will be carried out especially after Phase-1 Stage-2. At the end of the relevant stage, the necessary activities will be carried out by the organization to be established, as described in this plan.

This work plan may vary depending on the developments and changes that may occur in the future of the project or optimizations may be defined in the planning.

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Turkish Aerospace**

**TURKISH FIGHTER DEVELOPMENT
(KAAN) PROGRAM**

CONTRACT

FOR

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Appendix-18

3rd COUNTRY COMPONENTS/PARTS

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NOTE: Please fill in this section for each system/solution offered separately.

3rd Country Components/Parts

Please fill in the following table for components which require 3rd country export control other than Subcontractor's country.

Name	Part of Subsystem	Country of Origin	Export License or any specific restriction (e.g. if USA ITAR etc.)	Alternative Supplier Available or Not (If yes, please provide info)
Component A				
Component B				
...				

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Appendix-19

MÜHENDİSLİK YAZILIMLARI LİSTESİ

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FORM-A
REQUEST FOR VISIT FORM

2024

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REQUEST FOR VISIT FORM

- ☐ One-time
☐ Recurring
☐ Emergency
☐ Amendment

Annex(es)
☐ Yes: ---
☐ No

ADMINISTRATIVE DATA	
1. REQUESTER TO:	DATE : _ / _ / _ VISIT ID :
2. REQUESTING GOVERNMENT AGENCY OR INDUSTRIAL FACILITY NAME : POSTAL ADDRESS : TELEX/FAX NO. : TELEPHONE NO.: POINT OF CONTACT:	
3. GOVERNMENT AGENCY OR INDUSTRIAL FACILITY TO BE VISITED NAME : ADDRESS : TELEX/FAX NO. : TELEPHONE NO.: POINT OF CONTACT:	
4. DATE OF VISIT : TO:	
5. TYPE OF VISIT : (SELECT ONE FROM EACH COLUMN) ☐ GOVERNMENT INITIATIVE ☐ INITIATED BY REQUESTING AGENCY OR FACILITY ☐ COMMERCIAL INITIATIVE ☐ BY INVITATION OF THE FACILITY TO BE VISITED	
6. SUBJECT TO BE DISCUSSED/JUSTIFICATION:	
7. ANTICIPATED LEVEL OF CLASSIFIED INFORMATION TO BE INVOLVED:	
8. IS THE VISIT PERTINENT TO: SPECIFY: A SPECIFIC EQUIPMENT OR WEAPON SYSTEM ☐ FOREIGN MILITARY SALES OR WEAPON SYSTEMS ☐ A PROGRAMME OR AGREEMENT ☐ A DEFENCE ACQUISITION PROCESS ☐ OTHER ☐	
9. PARTICULARS OF VISITORS NAME : DATE OF BIRTH : _ / _ / _ SECURITY CLEARANCE: ID/PP NUMBER: POSITION : COMPANY/AGENCY : PLACE OF BIRTH : NATIONALITY :	

COMMERCIALLY SENSITIVE	Contract No: 202400217
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REQUEST FOR VISIT (CONTINUATION)

NAME : DATE OF BIRTH : - / - / - SECURITY CLEARANCE: ID/PP NUMBER: PLACE OF BIRTH : POSITION : NATIONALITY : COMPANY/AGENCY :	
10.	THE SECURITY OFFICER OF THE REQUESTING GOVERNMENT AGENCY OR INDUSTRIAL FACILITY NAME : TELEPHONE NUMBER : ADDRESS : SIGNATURE :
11.	CERTIFICATION OF SECURITY CLEARANCE : NAME : ADDRESS : TELEPHONE : SIGNATURE : FAX : STAMP
12.	REQUESTING NATIONAL SECURITY AUTHORITY : NAME : ADDRESS : TELEPHONE : SIGNATURE : FAX : STAMP
13.	REMARKS:

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FORM-B

CERTIFICATE OF ACCEPTANCE (COA) FOR GOODS

2024

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Form B COA	Page 1 / 2	Revision Date : --

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FORM-C
CERTIFICATE OF SUCCESSFUL SERVICE COMPLETION
(COSC)

2024

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NOTE: Turkish Aerospace, based on the agreed Payment Plan in PBS, will review the current status between the Parties and shall provide following COSC. Bidder then provides its payment request & invoice, upon receipt of this COSC.

Certificate of Successful Service Completion

In accordance with Article/service number ____, as per Appendix/Annex _ of the..... Subcontract Agreement No: ...Company-.....

Turkish Aerospace, hereby approves that Article/service number / milestone _____, has been successfully delivered/completed.

Mr./Ms. _____ Program Mgr. (Turkish Aerospace) Date.....

Mr./Ms. _____ Technical Mgr.(Turkish Aerospace) Date.....

Mr./Ms. _____ ...Mgr. (Turkish Aerospace) Date.....

Appendices:

1. Open Action Items (if any)
2. Other Documents (if any)

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FORM-D

**AUTHORIZED RELEASE CERTIFICATE, CERTIFICATE OF
CONFORMANCE (COC)**

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UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I Stage-II

NOTE: *Subcontractor's form of Authorized Release Certificate and/or Certificate of Conformance (CoC) shall be inserted into this exhibit before Subcontract signature. .*

Bidder shall provide its sample forms along with proposal submission.

UNCLASSIFIED	2024	Revision No : --
Form of ARC, CoC	Page 2 / 2	Revision Date : --

UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I, Stage-II



TUSAŞ-Türk Havacılık ve Uzay Sanayii A.Ş.
Turkish Aerospace

**TURKISH FIGHTER DEVELOPMENT
(KAAN) PROGRAM**

CONTRACT

FOR

EXPLOSION PREVENTION SUBSYSTEM PHASE-I, STAGE-II

Contract No: 202400217

FORM-E

CERTIFICATE OF APPROVAL FOR DATA (COAP)

2024

UNCLASSIFIED	2024	Revision No : --
FORM-E	Page 1 / 2	Revision Date : --

UNCLASSIFIED		Contract No: 202400217
KAAN Program		Contract for Explosion Prevention Subsystem Phase-I Stage-II

Format of Certificate of Approval (COAP) for DATA

NOTE: This COAP shall be filled and signed by Turkish Aerospace for DATA delivery as stated in respective appendices, annexes and/or exhibits after the verification of conformity of each DATA per respective sections of the Subcontract.
Parties may tailor the format given hereto per the needs.

<u>CERTIFICATE OF APPROVAL FOR DATA</u>															
In accordance with Article/service number ____, as per Appendix __ /Annex __ ofSubcontract No:, Turkish Aerospace hereby approves that Appendix-..... / Table CDRL/Article number ____. <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Doc. Name:</th> <th style="width: 25%;">Document #</th> <th style="width: 25%;">Rev#</th> <th style="width: 25%;">Notes:</th> </tr> </thead> <tbody> <tr> <td>1-</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>2-</td> <td>.....</td> <td>...</td> <td></td> </tr> </tbody> </table> Note: If Approval with Open Action Items (determined defects and/or failures are not obstacle to approve Article/service which are given in Appendix-..... attached hereto) are agreed to be closed in agreed due dates. Mr./Ms. _____ Technical Mgr.(Turkish Aerospace) Date..... Mr./Ms. _____ Program Mgr.(Turkish Aerospace) Date..... Mr./Ms. _____ Subcontract Mgr. ...(Turkish Aerospace) Date..... Appendices: 1. Open Action Items (if any) 2. Other Documents (if any)				Doc. Name:	Document #	Rev#	Notes:	1-				2-		...	
Doc. Name:	Document #	Rev#	Notes:												
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KAAN PROJESİ DÖNEM-I AŞAMA-II
202400217 NOLU PATLAMA ÖNLEME
SİSTEMİ ALT SÖZLEŞMESİ

TUSAŞ-TÜBİTAK MAM
PARAFE TABLOSU

No	Ad Soyad	Bölüm/Ünvan	Şirket Adı	Paraf	İmza
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