





Expert Group 08 Environmental Testing

Final Report



Brussels, 1st of December 2022



Recommendations on best practice standards for Environmental Testing

Record of changes

Date	Issue	Changes	
2010/03/01	V1	First Final Report after CEN WS10	
2015	V2	Update for EDSTAR	
2022/12/01	V3	Update for EDSTAR	

Expert Group Members

Convenor: FRANCE – Mr. Pascal LELAN

Secretary: AFNOR – Mr. Alexandre COLOMBIER (alexandre.colombier@afnor.org)

Member	Name	Company/MoD
Austria	Ms PUCHER Irmina	Austrian MoD
Czech Rep.	Mr BEZDĚK Milan	Czech MoD
France	Mr COLIN Bruno	Nexter
France	Mr COLOMIES Bernard	Sopemea
France	Mr DEVAUX Julien	French MoD
France	Mr GRZESKOWIAK Henri	Independant expert
France	Mr LELAN Pascal	French MoD
Germany	Mr HUELSEBUSCH Roland	German MoD
Germany	Mr OTTERBACH Stefan	German MoD
Germany	Mrs ROHE Melanie	German MoD
Poland	Mr WOJTCZAK Radosław	Polish MoD
Poland	Ms KRZONKALLA Jarosław	Polish MoD
Spain	Mr GARCIA JIMENEZ Gonzalo	Instalaza
Sweden	Mr SUNDQVIST Odd	Swedish MoD



Content

1		Introduction4		
2		References and Terminology		
3		Scope 5		
4		Rationale for selecting a standard/standards-like document as "Best Practice" 5		
5		Recommendations on application and tailoring of a standard		
	5.1	List of Best practices selected6		
	5.2	Details about best practices standards selected6		
		5.2.1 Environmental Guidelines for Defence Materiel (follows AECTP-100)6		
		5.2.2 Environmental Conditions (follows AECTP-200 through 250)6		
		5.2.3 Climatic Environmental Tests (follows AECTP 300)		
		5.2.4 Mechanical Environmental Test (follows AECTP-400)		
6		Missing/Gaps in the BPS and Future Evolutions		
	6.1	Evolutions in standardization		
	6.2	Test severities from measured data		
	6.3	Evolutions on the STANAG 43709		
	6.4	Detailed Analysis of the Test and Associated Standards 10		
7		Conclusion 10		
	<u>7.1</u>	Annex A – List of referenced "Best Practice" standards associated to the technical domain Environmental Testing Erreur ! Signet non défini		



1 Introduction

Initially, the European Commission requested the European Committee for Standardisation (CEN) to establish the "Workshop 10" (CEN/WS10) for improving the efficiency and enhance the competitiveness of European Defence Industry. As a result, the European Handbook for Defence Procurement (EHDP) was developed by Experts Groups and reported to CEN Workshop 10. This former document was a guide designed as a tool for anyone involved in the European defence procurement contractual negotiations. The primary target audiences for the Handbook were:

- The staff in the ministries of defence who are producing procurement specifications and tenders' calls and invitations;
- The staff in defence companies who are responding to those requirements;
- The EHDP is designed by the CEN Workshop 10 to provide Defence Procurement Agencies and Defence;
- Industries with a preferential list of selected recommended standards qualified as best practices. Best practice's with purpose to be included in armament contracts together with concise recommendations for an optimum use of those standards in such a Defence Procurement context;
- Those types of resulting informative data could be used in the acquisition process by ministries of defence (MoD) and in the development process by Industry such that system will be built faster, better and cheaper.

The Handbook provided recommendations to develop good practices in the domain addressed by the Expert Group and to assist the final user in utilizing selected best practices standards in the best cost-effective way, aiming at:

- Increasing the controlled use of existing standardisation, a necessity to harmonise European practices used by defence procurement stakeholders;
- The objective to deploy a common approach through Nations Procurement agencies about an optimized utilization of standards: civil ones and military ones, the possible limitations of civilian standards with respect to military applications, etc.;
- To provide a useful guide to all stakeholders involved in defence procurement process;
- Description of how to implement standard s successfully in armament contracts;
- The overall result will be a better use of standards in armament contracts.

In 2012 the EHDP became the European Defence Standardisation Reference (EDSTAR) under responsibilities of the European Defence Agency (EDA). EDA manage the work of experts' groups selection in order to maintain the EDSTAR database updated and continuously make it as close as possible to the need of the users. The EDSTAR public website contain the entire document selected as European "best practices" recommendations. It is designed to provide to the final users the right information, allowing for timely and quickly acquiring the best control in writing procurement's clauses related to the European defence project.

Currently, based on the situation in 2022, EG 08 experts have reviewed the previously issued Final Report and list of "best practice" standards (BPS) for the EDSTAR Technical Domain "Environmental Testing" within the member states of the European Union. This document aims at providing recommendations on the best use selected BPS in armament contracts. The BPS here listed are



presented and commented as far as the reasons for its selection and the way of implementing them in contracts by a tailored approach.

2 <u>References and Terminology</u>

- IEV or International Electrotechnical Vocabulary is the standard IEC 60050. An online version is available at: <u>https://www.electropedia.org/</u>
- NATOTerm database: <u>https://nso.nato.int/natoterm/Web.mvc</u>

3 <u>Scope</u>

EDSTAR EG 08 has identified reference documents in the key area "**Environmental Testing**" used in the European defence sector. EDSTAR Environmental Testing domain scope comprises the selection process of horizontal standards, made considering 4 categories:

- Environmental Engineering Process
- Environmental Conditions
- Guidelines for Deriving Test Profiles
- Default or "Fall Back" Test Severities

The aim of Expert Group 08 is to identify and select "best practice" standards (BPS) in the EDSTAR Environmental Testing domain. Are excluded of EG 08 scope, standards and best practices in vertical environmental engineering developed for specific fields and technical domains, as they should be addressed in the concerned EDSTAR Expert Group or, are too specific in their application to be considered as horizontal. For example, specific ammunition testing is tackled by EDSTAR Expert Group 10 on Ammunition.

The subject of Electromagnetic Environment will not be dealt with, as this subject Is tackled by the EDSTAR Expert Group 07 on Electromagnetic Environment.

4 <u>Rationale for selecting a standard/standards-like document as "Best Practice"</u>

The work of this expert group followed the EDSTAR Expert Group Terms of Reference. Therefore the experts considered and reviewed the BPS based on the following steps:

- Identify all known standards that are of relevance for the given technical domain as the initial basic list for their selecting work;
- Benchmark the identified documents by applying the selection basic criteria mentioned under paragraph 3, comparing the identified standards with respect to their practical importance, including: technical excellence (stability and maturity), broadest audience, frequency of usage, availability, economic impact on European defence business, and influence on interoperability;
- The documents selection shall reflect the "state of the art" of knowledge and best practices in the service of European defence interests;
- Consider the documents of reference in defence (STANAG 4370) and civilian (EN IEC 60068) standardization;
- Select the BPS by consensus between the Experts Groups members;
- Include the rationale for the selection together with necessary advice for the application of the selected standard into the best practice's recommendations included in the reports by the expert group when delivering their final contributions;
- Propose way ahead for filling gaps identified during the expertise work.



5 <u>Recommendations on application and tailoring of a standard</u>

5.1 List of Best practices selected



5.2 Details about best practices standards selected

The selection of best practices standards has been made following the rationale depicted in sections 3 and 4 of this Report.

Previously in 2010, the consensus in this group was to make an exhaustive and representative analysis of the national practices and documents used throughout the industry and the military for Environmental Testing (for example: Def Stan 00-035 used in the UK, MIL-STD-810H used in the US).

For this current revision work, the choice was made across the references from both the military and civilian practices, with a choice of globally used references in Europe. They are declared here:

5.2.1 Environmental Guidelines for Defence Materiel (follows AECTP-100)

AECTP-100 contains the general introduction for the use of the complete series of AECTP-100 through 600. AECTP-100 also provides guidance on the management of the total environmental engineering task for materiel development projects.

The focus of this guidance is the environmental project tailoring process which can accommodate different methods of procurement and a range of test types including safety and reliability testing. The documentation that supports the management guidelines is also described.

Similarly, for the civilian standards EN IEC 60068-1 presents the guidance to use all the EN IEC 60068-2 test methods.

5.2.2 Environmental Conditions (follows AECTP-200 through 250)

AECTP-200 through 250, provide information and guidance on climatic, mechanical and electrical environments that materiel is exposed to during its life cycle. It describes conditions and data that have been compiled from established sources within NATO countries. Advice is given on the selection of suitable test methods used to derive test severities. Test procedures for the environments defined in AECTP-200 through 250 are presented in AECTP-300, AECTP-400 and AECTP-500.



5.2.3 <u>Climatic Environmental Tests (follows AECTP 300)</u>

AECTP-300 provides a series of climatic test methods for use during the design, development and qualification of materiel. The test methods are presented in a prescriptive style so that they can be readily invoked by the user. As far as has been possible the test methods included are those internationally agreed and published.

For each testing methodologies for each test, a table aligning references from the military and civilian standards are presented:

(10 be applied in procurement contracts) (Used a civil guidance reference) Low Pressure (Attitude) AECTP-300 Method 301: - Operation / Air Carriage - Rapid Decompression - Explosive Decompression - Explosive Decompression - Explosive Decompression - High Temperature Storage or Transport - Storat Storage Test - Operational Test - Storat Store S	Specific Test	Defence document	Civil document
Low Pressure (Altitude) AECTP-300 Method 301: - Storage / Air Transportation - Operation / Air Carriage - Radio Decompression - Explosive Decompression - Explosive Decompression - Explosive Decompression - Explosive Decompression - High Temperature Storage or Transport - High Temperature Operation - High Temperature Storage or Transport - High Temperature Storage Test - Operational Test EN 60068-2-13: Cold Low Temperature - Manipulation Test EN 50068-2-14: Change of temperature - Manipulation Test EN 60068-2-14: Change of temperature - Shock from Constant Extreme Temperatures EN 60068-2-14: Change of temperature - Shock from Constant Extreme Temperatures Solar Radiation AECTP-300 Method 305 - Cycling (Thermat Effects) - Steady State (Actinic Effects) EN 60068-2-3: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weathering Humid Heat AECTP-300 Method 307 - Steady State EN 60068-2-3: - Simulated solar radiation testing and weathering Mould Growth AECTP-300 Method 307 - Steady State Sali Mist: EN 60068-2-10 Mould Growth AECTP-300 Method 307 - Fording Salit Mist: EN 60068-2-11 Mould Growth AECTP-300 Method 302 - Fording Salit Mist: EN 60068-2-13 Mould Growth AECTP-300 Method 310 - Fording EN 60068-2-14: Water Mould Growth AECTP-300 Method 310 - Sagerated Rai		(To be applied in procurement contracts)	(Used a civil guidance reference)
(Altitude) - Storage / Air Transportation Operation / Air Carriage - Rapid Decompression - Rapid Decompression - Explosive Decompression High Temperature AECTP-300 Method 302: - High Temperature Sourage or Transport - High Temperature Sourage or Transport - High Temperature Operational - Bio Method 303: - Storage Test - Operational Low Temperature AECTP-300 Method 303: - Storage Test - Operational Test - Manipulation Test - Shock form Constant Extreme Thermal Shock AECTP-300 Method 304: - Shock toffrom Cyclic High Temperatures - Shock toffrom Cyclic High Temperatures - Shock toffrom Cyclic High Temperatures - Sincel Koffrom Cyclic High Temperatures - Shock toffrom Cyclic High Temperatures - Sincel Koffrom Cyclic High Temperatures - Storady State (Actinic Effects) - Steady State (Actinic Method 306 - Gycling (Thermal Effects) - Steady State Immersion AECTP-300 Method 307 - Steady State EN 60068-2-18 Mould Growth AECTP-300 Method 309 Salt Fog AECTP-300 Method 309 Salt Fog AECTP-300 Method 310	Low Pressure	AECTP-300 Method 301:	EN 60068-2-13: Low air pressure
- Operation / Air Carriage Rapid Decompression - Explosive Decompression High Temperature AECTP-300 Method 302: - High Temperature Operation - High Temperature Tactical Standby to Operational AECTP-300 Method 303: - Storage Test - Operational Test - Manipulation Test - Manipulation Test - Manipulation Test - Shock form Constant Extreme Temperatures - Shock form Constant Extreme Temperatures - Shock form Constant Extreme Temperatures - Stock form Constant Extreme Temperatures - Stock form Constant Extreme Temperatures - Steady State (Actinic Effects) - Steady State - Steady State Mould Growth AECTP-300 Method 307 - Steady State - Steady State Mould Growth AECTP-300 Method 308 - Steady State - Stait Fog AECTP-300 Method 309 - Sait Fog AECTP-300 Method 309 Sait Fog AECTP-300 Method 307 - Steady State - Stock Opere-2-	(Altitude)	- Storage / Air Transportation	
- Rapid Decompression - Explosive Decompression High Temperature AECTP-300 Method 302: - High Temperature Storage or Transport - High Temperature Operation - High Temperature Tactical Standby to Operational Low Temperature AECTP-300 Method 303: - Storage Test - Operational AECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock Krofm Cyclic High Temperatures - Stact Sy State (Actinic Effects) - Steady State (Actinic Effects) - Stact Sy State (Actinic Effects) - Stact Sy State (Actinic Effects) - Timmersion - AECTP-300 Method 307 - Seady State Mould Growth AECTP-300 Method 308 Mould Growth AECTP-300 Method 309 - Sait Fog AECTP-300 Method 308 Mould Growth AECTP-300 Method 309 - Sait Fog AECTP-300 Method 310 EN 60068-2-18: Water - Timmersion - For		- Operation / Air Carriage	
- Explosive Decompression High Temperature AECTP-300 Method 302: - High Temperature Operation - High Temperature Tacical Standby to Operational EN 60068-2-14: Change of temperature Low Temperature AECTP-300 Method 303: - Storage Test - Operational Test - Operational Test - Manipulation Test EN 60068-2-14: Change of temperature Thermal Shock AECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock trom Constant Extreme Temperatures - Shock trom Constant Extreme Temperatures - Shock to/from Cyclic High Temperatures EN 60068-2-14: Change of temperature - Shock to/from Cyclic High Temperatures AECTP-300 Method 304: - Steady State (Actinic Effects) - Steady State EN 60068-2-5: - Steady State - Simulated solar radiation at ground level - Guidance for solar radiation testing and weathering Humid Heat AECTP-300 Method 305 - Cycling - Steady State EN 60068-2-17 - Steady State EN 60068-2-10 - Steady State Mould Growth AECTP-300 Method 307 - Immersion Sealing: EN 60068-2-11 - Steady State Sealing: EN 60068-2-10 - Steady State Mould Growth AECTP-300 Method 309 - Sait Kis: EN 60068-2-11 - Stait Nist; CN 60068-2-11 - Stait Aist; CN 60068-2-11 - Stait Aist; CN 60068-2-11 - Stait Mist; CN 60068-2-11 - Stait Mist; CN 60068-2-11 - Stait Mist; CN 60068-2-13: Water EN 60068-2-18: Water Tightness AECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - Drip EN 60068-2-18: Water Sait Mist; Cyclic: EN 6006		- Rapid Decompression	
High Temperature AECTP-300 Method 302: High Temperature Storage or Transport		- Explosive Decompression	
- High Temperature Storage or Transport High Temperature Queration OperationalEN 60068-2-14: Change of temperatureLow TemperatureAECTP-300 Method 303: • Storage Test • Operational Test • Manipulation TestEN 60068-2-14: Change of temperatureThermal ShockAECTP-300 Method 304: • Shock form Constant Extreme Temperatures • Shock to/from Cyclic High Temperatures • Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 305 • Steady State (Actinic Effects) • Steady State (Actinic Effects) • Steady StateEN 60068-2-31: Cold EN 60068-2-13: Cold testing and weatheringHumid HeatAECTP-300 Method 306 • Cycling • Steady StateEN 60068-2-38: Composite temperature / humidity cycleMumid GrowthAECTP-300 Method 307 • Immersion • FordingEN 60068-2-18 · Steady StateMould GrowthAECTP-300 Method 309 • FordingSalt Hist: EN 60068-2-10 Salt Key Chic: EN 60068-2-10Mould GrowthAECTP-300 Method 310 • DripEN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 • Rain and Blowing/Driving Rain • Exaggerated Rain • DripEN 60068-2-18: WaterRain and Dust FluidsAECTP-300 Method 314 • Blowing SandEN 60068-2-18: Fluid contaminationFreeze ThawAECTP-300 Method 314 • Dural Cycling Effects • Diurnal Cycling Effects • Diurnal Cycling Effects • Cidid-to-Warm TransferEN 60068-2-74: Fluid contamination	High Temperature	AECTP-300 Method 302:	EN 60068-2-2: Dry Heat
I- High Temperature Operation High Temperature Tactical Standby to OperationalEN 60068-2-11 ColdLow TemperatureAECTP-300 Method 303: - Storage Test - Operational TestEN 60068-2-14: Change of temperatureThermal ShockAECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 304: - Shock to/from Cyclic High Temperatures - Shock to/from Cyclic High Temperatures - Steady State (Actinic Effects) - Steady State (Actinic Effects) - Steady State (Actinic Effects) - Steady StateEN 60068-2-53: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h Cycle)ImmersionAECTP-300 Method 307 - Sealing: EN 60068-2-13Sealing: EN 60068-2-17 Sealing: EN 60068-2-18Mould GrowthAECTP-300 Method 308 - FordingMould Growth: EN 60068-2-10Salt FogAECTP-300 Method 310 - Rain and Blowing/Driving Rain - bripEN 60068-2-18: WaterTightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - bripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-Cyclewarm TansferEN 60068-2-74: Fluid contamination		- High Temperature Storage or Transport	EN 60068-2-14: Change of temperature
Image: Initial Standby to OperationalImage: Strage Test - Storage Test - Operational Test - Manipulation Test - Shock to/from Constant Extreme Temperatures - Shock to/from Constant Extreme Temperatures - Shock to/from Cyclic High Temperatures - Steady State (Actinic Effects) - Steady StateEN 60068-2-14: Change of temperature EN 60068-2-30: Damp Heat, Cyclic (12h + 12/10, cycle) - Steady StateImmersionAECTP-300 Method 306 - Setady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12/10, cycle) - Steady StateMould GrowthAECTP-300 Method 307 - Immersion - FordingSalling: EN 60068-2-10 Salt Mist, EN 60068-2-10Mould GrowthAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterTightnessAECTP-300 Method 311 - DripEN 60068-2-18: WaterGondensation by FluidsAECTP-300 Method 314 - Blowing Data - Blowing Data - Blowing DataEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 314 - Diumal Cycling Effects - Diumal Cycling Ef		- High Temperature Operation	
Low TemperatureAECTP-300 Method 303: - Storage Test - Operational TestEN 60068-2-1: Cold EN 60068-2-14: Change of temperature EN 60068-2-14: Change of temperatureThermal ShockAECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 305 - Sycial (Thermal Effects) - Steady State (Actinic Effects) - Steady State (Actinic Effects) - Steady StateEN 60068-2-5: - Simulated solar radiation at ground level 		- High Temperature Tactical Standby to	
Low TemperatureAECTP-300 Method 303: - Operational Test - Manipulation Test - Shock from Constant Extreme Temperatures - Shock form Constant Extreme Temperatures - Shock topfrom Cyclic High Temperatures - Shock topfrom Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 304: - Shock topfrom Cyclic High Temperatures - Shock topfrom Cyclic High TemperaturesEN 60068-2-14: Change of temperatureMetrop 200- Shock from Constant Extreme Temperatures - Shock topfrom Cyclic High TemperaturesEN 60068-2-5: - Sinulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)ImmersionAECTP-300 Method 307 - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)Mould GrowthAECTP-300 Method 307 - TimmersionSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist, Cyclic: EN 60068-2-10Salt FogAECTP-300 Method 310 - FordingEN 60068-2-18Mould GrowthAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterTightnessAECTP-300 Method 313 - Blowing Daut - Blowing SandEN 60068-2-74: Fluid contaminationGontamination by FluidsAECTP-300 Method 314 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Durnal Cycling Effects - Cide/-Ovamn T	<u> </u>	Operational	
- Storage Test - Operational Test - Manipulation TestEN 60068-2-14: Change of temperatureThermal ShockAECTP-300 Method 304: - Shock to/from Cyclic High Temperatures - Shock to/from Cyclic High Temperatures - Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 305 - Cycling (Thermal Effects) - Steady State (Actinic Effects) - Steady State (Actinic Effects) - Steady State (Actinic Effects) - Steady StateEN 60068-2-5: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)ImmersionAECTP-300 Method 307 - Steady StateSealing: EN 60068-2-10: Saling: EN 60068-2-11 Salit FogMould GrowthAECTP-300 Method 309 - FordingSalt Hist: EN 60068-2-10: Salt Mist; EN 60068-2-10: Salt Mist; Cyclic: EN 60068-2-10: Salt Mist; Cyclic: EN 60068-2-10: Salt Mist; Cyclic: EN 60068-2-10: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-14: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-14: Salt Mist; Cyclic: EN 60068-2-10: Salt Mist; Cyclic: EN 60068-2-13: Salt Mist; Cyclic: EN 60068-2-14: Salt Mist; Cyclic: EN 60068-2-18: WaterCondensation and DrippAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripIcingAECTP-300 Method 313 - Blowing Dust - Blowing SandSand and Dust FluidsAECTP-300 Method 314 E	Low Temperature	AECTP-300 Method 303:	EN 60068-2-1: Cold
- Operational Test - Manipulation Test- Operational Test - Manipulation TestThermal ShockAECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 305 - Cycling (Thermal Effects) - Steady State (Actinic Effects) - Steady StateEN 60068-2-5: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)ImmersionAECTP-300 Method 307 - Steady StateSealing: EN 60068-2-17 Munidity cycleMould GrowthAECTP-300 Method 308 - FordingMould Growth: EN 60068-2-10Mould GrowthAECTP-300 Method 309 - FordingSalt Mist: EN 60068-2-10Mould GrowthAECTP-300 Method 309 - FordingSalt Mist: EN 60068-2-11 Salt Mist: EN 60068-2-11 Salt Mist: EN 60068-2-13Rain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exagerated Rain - DripEN 60068-2-18: WaterGontamination by FluidsAECTP-300 Method 313 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Olurnal Cycling Effects - Olurnal Cycling Effects - Olurnal Cycling Effects - Olurnal Cycling EffectsEN 60068-2-74: Fluid contamination	-	- Storage Test	EN 60068-2-14: Change of temperature
- Manipulation TestThermal ShockAECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 305 - Cycling (Thermal Effects) - Steady State (Actinic Effects) - Steady State (Actinic Effects)EN 60068-2-15: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Steady State (Actinic Effects) - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)Humid HeatAECTP-300 Method 307 - Steady StateSealing: EN 60068-2-38 : Composite temperature / humidity cycleMould GrowthAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-10Salt Kist, Cyclic: EN 60068-2-10Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 311 - DripEN 60068-2-18: WaterSand and DustAECTP-300 Method 313 - Blowing Dust - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 314 - Diurnal Cycling Effects - Cid/to-Warm TransferEN 60068-2-74: Fluid contamination		- Operational Test	
Thermal ShockAECTP-300 Method 304: - Shock from Constant Extreme Temperatures - Shock to/from Cyclic High TemperaturesEN 60068-2-14: Change of temperatureSolar RadiationAECTP-300 Method 305 - Cycling (Thermal Effects) - Steady State (Actinic Effects) - Steady State (Actinic Effects) - Cycling - Steady StateEN 60068-2-5: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-33: Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - FordingSealing: EN 60068-2-33: Composite temperature / humidity cycleMould GrowthAECTP-300 Method 307 - FordingSealing: EN 60068-2-17 Water: EN 60068-2-11 Salt Nist; EN 60068-2-10Mould GrowthAECTP-300 Method 309 - FordingSalt Mist; EN 60068-2-10 Salt Mist; EN 60068-2-11 Salt Mist; Cyclic: EN 60068-2-12Condensation and DripproofnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterSand and Dust - Blowing Dust - Blowing Dust - Blowing Dust - Blowing SandAECTP-300 Method 314 - EN 60068-2-74: Fluid contaminationFreeze Thaw - AECTP-300 Method 315 - Diurnal Cycling Effects - Diurnal Cycling Effects - Cycling Effects - Cycling Effects - Cycling Effects - Cycling EffectsEN 60068-2-74: Fluid contamination		- Manipulation Test	
 Solar Radiation Shock form Constant Extreme Temperatures Shock to/from Cyclic High Temperatures AECTP-300 Method 305 Cycling (Thermal Effects) Steady State (Actinic Effects) Steady State (Actinic Effects) Steady State (Actinic AECTP-300 Method 306 Cycling Steady State Steady State Steady State Sealing EN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) Steady State Steady State Sealing: EN 60068-2-33: Composite temperature / humidity cycle Mould Growth AECTP-300 Method 307 Sealing: EN 60068-2-17 Timmersion AECTP-300 Method 308 Mould Growth AECTP-300 Method 309 Salt Mist; EN 60068-2-10 Salt Mist; Cyclic: EN 60068-2-10 Salt Mist; Cyclic: EN 60068-2-52 Condensation and Dripproofness Rain and Water Tightness AECTP-300 Method 310 EN 60068-2-18: Water Bowing Dust - Bowing Dust - Bowing Dust - Bowing Dust - Blowing Sand AECTP-300 Method 313 EN 60068-2-68: Dust and Sand Bowing Sand EN 60068-2-74: Fluid contamination Freeze Thaw AECTP-300 Method 315 - Diurnal Cycling Effects - Cycline Effects Cold-to-Warm Transfer 	Thermal Shock	AECTP-300 Method 304:	EN 60068-2-14: Change of temperature
Temperatures - Shock toffrom Cyclic High Temperatures - Shock toffrom Cyclic High Temperatures AECTP-300 Method 305 - Cycling (Thermal Effects) - Steady State (Actinic Effects)EN 60068-2-5: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)ImmersionAECTP-300 Method 307 - Steady StateEN 60068-2-33: Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - Steady StateSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 309 - FordingSalt Mist: EN 60068-2-10Salt FogAECTP-300 Method 309 - FordingSalt Mist: EN 60068-2-11 Salt Mist; Cyclic: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-12Condensation and DripproofnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterSand and DustAECTP-300 Method 311 - Blowing Dust - Blowing Dust - Blowing Dust - Blowing Dust - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Old-to-Warm TransferEN 60068-2-74: Fluid contamination		- Shock from Constant Extreme	
Solar Radiation- Shock to/from Cyclic High TemperaturesAECTP-300 Method 305- Gycling (Thermal Effects)- Simulated solar radiation at ground level- Steady State (Actinic Effects)- Simulated solar radiation testing and weatheringHumid HeatAECTP-300 Method 306- Gycling- Cycling- Steady State- Steady State- Steady State- Cycling- EN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)ImmersionAECTP-300 Method 307Sealing: EN 60068-2-317- Immersion- FordingSealing: EN 60068-2-13- FordingMould GrowthAECTP-300 Method 309Salt Mist: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11Salt FogAECTP-300 Method 310EN 60068-2-18- FordingAECTP-300 Method 310EN 60068-2-18:Salt FogAECTP-300 Method 310EN 60068-2-18:Rain and Water Tightness- Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18:Sand and DustAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 314EN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Diurnal Cycling Effects - Old-to-Warm TransferEN 60068-2-74: Fluid contamination		Temperatures	
Solar RadiationAECTP-300 Method 305 - Cycling (Thermal Effects) - Siteady State (Actinic Effects) - Siteady State (Actinic Effects) - Cycling - Cycling - Cycling - Cycling - Steady StateEN 60068-2-5: - Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-38: Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309 - Salt Mist: EN 60068-2-18Rain and Water TightnessAECTP-300 Method 310 - DripEN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 311 - Exaggerated Rain - Blowing Dust - Blowing Dust - Blowing Dust - Blowing Dust - Blowing Dust - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandFreeze ThawAECTP-300 Method 314 - Durnal Cycling Effects - Durnal Cycling Effects - Durnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination		- Shock to/from Cyclic High Temperatures	
- Cycling (Thermal Effects) - Steady State (Actinic Effects)- Simulated solar radiation at ground level - Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle)ImmersionAECTP-300 Method 307 - Steady StateSealing: EN 60068-2-13 Water: EN 60068-2-18 - FordingMould GrowthAECTP-300 Method 308 - FordingMould Growth: EN 60068-2-10Mould GrowthAECTP-300 Method 309 - FordingSalt Mist: EN 60068-2-10Mould GrowthAECTP-300 Method 309 - FordingSalt Mist: EN 60068-2-11 Salt Mist: EN 60068-2-10Salt FogAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Rain and Blowing/Driving Rain - Blowing Dust - Blowing Dust - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314 - Blowing Cycling Effects - Diumal Cycling Effects - Code-to-Warm TransferEN 60068-2-74: Fluid contamination	Solar Radiation	AECTP-300 Method 305	EN 60068-2-5:
Humid Heat- Steady State (Actinic Effects)- Guidance for solar radiation testing and weatheringHumid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-38 : Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - Tamersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-10Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-10Salt FogAECTP-300 Method 310EN 60068-2-11 Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 314 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination		- Cycling (Thermal Effects)	- Simulated solar radiation at ground level
Humid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-33 : Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18 - FordingMould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterKain and DustAECTP-300 Method 311 - DripEN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 314 - Blowing Dust - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination		- Steady State (Actinic Effects)	- Guidance for solar radiation testing and
Humid HeatAECTP-300 Method 306 - Cycling - Steady StateEN 60068-2-30: Damp Heat, Cyclic (12h + 12h cycle) EN 60068-2-38 : Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist; EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - DripEN 60068-2-18: WaterSand and DustAECTP-300 Method 311 - DripEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314EN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination			weathering
- Cycling - Steady State12h cycle) EN 60068-2-38 : Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-12Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Blowing Dust - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination	Humid Heat	AECTP-300 Method 306	EN 60068-2-30: Damp Heat, Cyclic (12h +
- Steady StateEN 60068-2-38 : Composite temperature / humidity cycleImmersionAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 314 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination		- Cycling	12h cycle)
ImmersionAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterSand and DustAECTP-300 Method 313 - Ekaggerated Rain - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314 - Diurnal Cycling Effects - OuldWarm TransferEN 60068-2-74: Fluid contamination		- Steady State	EN 60068-2-38 : Composite temperature /
ImmersionAECTP-300 Method 307 - Immersion - FordingSealing: EN 60068-2-17 Water: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination			humidity cycle
- Immersion - FordingWater: EN 60068-2-18Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 314 - Blowing Dust - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination	Immersion	AECTP-300 Method 307	Sealing: EN 60068-2-17
- FordingMould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Blowing/Driving Rain - Exaggerated Rain - DripAECTP-300 Method 311EN 60068-2-18: WaterSand and DustAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 313 - Blowing Dust - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination		- Immersion	Water: EN 60068-2-18
Mould GrowthAECTP-300 Method 308Mould Growth: EN 60068-2-10Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 313 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination		- Fording	
Salt FogAECTP-300 Method 309Salt Mist: EN 60068-2-11 Salt Mist, Cyclic: EN 60068-2-52Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 313 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination	Mould Growth	AECTP-300 Method 308	Mould Growth: EN 60068-2-10
Condensation and DripproofnessAECTP-300 Method 310Salt Mist, Cyclic: EN 60068-2-52Rain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination	Salt Fog	AECTP-300 Method 309	Salt Mist: EN 60068-2-11
Condensation and DripproofnessAECTP-300 Method 310EN 60068-2-18: WaterRain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 313 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314EN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination			Salt Mist, Cyclic: EN 60068-2-52
DripproofnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311 - Exaggerated Rain - DripEN 60068-2-68: Dust and SandIcingAECTP-300 Method 311 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314 - Blowing SandEN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination	Condensation and	AECTP-300 Method 310	EN 60068-2-18: Water
Rain and Water TightnessAECTP-300 Method 310 - Rain and Blowing/Driving Rain - Exaggerated Rain - DripEN 60068-2-18: WaterIcingAECTP-300 Method 311EN 60068-2-68: Dust and SandSand and DustAECTP-300 Method 313 - Blowing Dust - Blowing SandEN 60068-2-68: Dust and SandContamination by FluidsAECTP-300 Method 314EN 60068-2-74: Fluid contaminationFreeze ThawAECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm TransferEN 60068-2-74: Fluid contamination	Dripproofness		
Tightness - Rain and Blowing/Driving Rain - Exaggerated Rain - Exaggerated Rain - Drip - Drip Icing AECTP-300 Method 311 Sand and Dust AECTP-300 Method 313 - Blowing Dust - Blowing Sand - Blowing Sand - Blowing Sand Contamination by AECTP-300 Method 314 Fluids - Blowing Cust - Diurnal Cycling Effects - Diurnal Cycling Effects - Cold-to-Warm Transfer - Cold-to-Warm Transfer	Rain and Water	AECTP-300 Method 310	EN 60068-2-18: Water
- Exaggerated Rain - Drip Icing AECTP-300 Method 311 Sand and Dust AECTP-300 Method 313 - Blowing Dust - Blowing Sand - Blowing Sand EN 60068-2-68: Dust and Sand Contamination by Fluids AECTP-300 Method 314 Freeze Thaw AECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm Transfer	Tightness	- Rain and Blowing/Driving Rain	
- Drip - Drip Icing AECTP-300 Method 311 Sand and Dust AECTP-300 Method 313 EN 60068-2-68: Dust and Sand Blowing Dust Blowing Sand EN 60068-2-74: Fluid contamination Contamination by Fluids AECTP-300 Method 314 EN 60068-2-74: Fluid contamination Freeze Thaw AECTP-300 Method 315 EN 60068-2-74: Fluid contamination Contamination by Fluids AECTP-300 Method 314 EN 60068-2-74: Fluid contamination	·· ·	- Exaggerated Rain	
Icing AECTP-300 Method 311 Sand and Dust AECTP-300 Method 313 Blowing Dust Blowing Sand EN 60068-2-68: Dust and Sand Contamination by Fluids AECTP-300 Method 314 EN 60068-2-74: Fluid contamination Freeze Thaw AECTP-300 Method 315 Diurnal Cycling Effects Cold-to-Warm Transfer 		- Drip	
Sand and Dust AECTP-300 Method 313 EN 60068-2-68: Dust and Sand - Blowing Dust - Blowing Sand EN 60068-2-74: Fluid contamination Contamination by AECTP-300 Method 314 EN 60068-2-74: Fluid contamination Fluids AECTP-300 Method 315 EN 60068-2-74: Fluid contamination Freeze Thaw AECTP-300 Method 315 EN 60068-2-74: Fluid contamination - Diurnal Cycling Effects - Diurnal Cycling Effects - Cold-to-Warm Transfer	Icing	AECTP-300 Method 311	
- Blowing Dust - Blowing Sand Contamination by Fluids Freeze Thaw AECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm Transfer	Sand and Dust	AECTP-300 Method 313	EN 60068-2-68: Dust and Sand
- Blowing Sand Contamination by Fluids AECTP-300 Method 314 EN 60068-2-74: Fluid contamination Freeze Thaw AECTP-300 Method 315 - - Diurnal Cycling Effects - Cold-to-Warm Transfer -		- Blowing Dust	
Contamination by Fluids AECTP-300 Method 314 EN 60068-2-74: Fluid contamination Freeze Thaw AECTP-300 Method 315 - - Diurnal Cycling Effects - Cold-to-Warm Transfer		- Blowing Sand	
Fluids AECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm Transfer	Contamination by	AECTP-300 Method 314	EN 60068-2-74: Fluid contamination
Freeze Thaw AECTP-300 Method 315 - Diurnal Cycling Effects - Cold-to-Warm Transfer	, Fluids		
- Diurnal Cycling Effects - Cold-to-Warm Transfer	Freeze Thaw	AFCTP-300 Method 315	
- Cold-to-Warm Transfer		- Diurnal Cycling Effects	
		- Cold-to-Warm Transfer	
- Rapid Temperature Change		- Rapid Temperature Change	
Explosive AFCTP-300 Method 316	Explosive	AFCTP-300 Method 316	
	LAPIUSIVC		



Temperature, Humidity Altitude	AECTP-300 Method 317 - Logistic Air Transport (stabilized conditions) - Tactical Air Carriage (cycling conditions)	EN 60068-2-39: Combined temperature or temperature and humidity with low air pressure EN 60068-2-40: Combined Cold / Low air pressure EN 60068-2-41: Combined Dry heat / Low air pressure
Acidic Atmosphere	AECTP-300 Method 319	EN 60068-2-60: Flowing mixed gas corrosion

5.2.4 <u>Mechanical Environmental Test (follows AECTP-400)</u>

AECTP-400 provides a series of mechanical test methods for use during the design, development and qualification of materiel. The test methods are presented in a prescriptive style so that they can be readily invoked by the user. As far as has been possible the test methods included are those internationally agreed and published.

For each testing methodologies for each test, a table aligning references from the military and civilian standards are presented:

Specific Test	Defence document	Civil document	
	(To be applied in procurement contracts)	(Used a civil guidance reference)	
Vibration	AECTP-400 Method 401: Evaluate the effect of vibration environments that could arise during service life	EN 60068-2-6: Vibration (sinusoidal) EN 60068-2-57: Vibration - Time-history and sine-beat method EN 60068-2-64: Vibration, broadband random and guidance EN 60068-2-80 : Vibration - Mixed mode	
Vibration (Incl. combined with temperature and/or humidity)	AECTP-400 Method 401	EN 60068-2-53: - Combined climatic (temperature/humidity) - Dynamic (vibration/shock)	
Acoustic Noise	AECTP-400 Method 402: - Diffuse Field Acoustic Noise - Grazing Incidence Acoustic Noise - Cavity Resonance Acoustic Noise		
Acoustic Noise (Incl. combined with temperature & vibration)	AECTP-400 Method 413: - Precursor Test - Operational Test	EN 60068-2-65: Vibration - Acoustically induced method	
Classical Waveform Shock	AECTP-400 Method 403 - Fragility Shock - Pendulum Impact	EN 60068-2-27: Shock	
Shock Response Spectra	AECTP-400 Method 403	EN 60068-2-81	
Handling and Drop	AECTP-400 Method 403: - Bench Handling - Catapult Launch/Arrested Landing - Crash Hazard Shock - Functional Shock - Transportation Shock - Transit Drop	EN 60068-2-31: Rough handling shocks, primarily for equipment-type specimens UN ST/SG/AC.10/1: Recommendations on the Transport of Dangerous Goods - Model Regulations	
Constant Acceleration	AECTP-400 Method 404: - Centrifuge - Trolley (Sled)	EN 60068-2-7: Acceleration, steady state	
Gunfire	AECTP-400 Method 405: - Direct Reproduction of Measured Data Materiel Response - Statistically Generated Repetitive Pulse - Repetitive Pulse SRS - High Level Random, SOR, NBROR Vibration		
Bounce / Loose Cargo	AECTP-400 Method 406: - Equipment slide	EN 60068-2-55: Loose cargo testing including bounce	



	- Equipment roll	
Large Assembly	AECTP-400 Method 408	
Transport		
Pyroshock	AECTP-400 Method 415:	
_	- Near-Field with Actual Configuration	
	- Near-Field with Simulated Configuration	
	- Far-Field with Mechanical Test Device	
	- Far-Field with Electrodynamic Exciter	
Rail Impact	AECIP-400 Method 416:	EN 60068-2-27: Shock
	- US Cusnioned Coupler Car	
	- European Railway	
Motion Distigue	AECTD 400 Mothod 419:	
Motion Platform	- Aircraft Carrier	
	- Frigate	
	- Submarine	
Undex Test	AECTP-400 Method 419	
Aircraft Buffet	AECTP-400 Method 420	
Vibration		
Multi - Exciter	AECTP-400 Method 421:	
Vibration & Shock	- Time Domain Reference Criteria	
	- Frequency Domain Reference Criteria	
Ballistic Shock	AECTP-400 Method 422:	
	- Ballistic Hull and Turret (BH&T)	
	- Large Scale Ballistic Shock Simulator	
	(LSBSS)	
	- Light Weight Shock Machine (LWSM)	
	- Medium Weight Shock Machine (MWSM)	
Timo History	AFCTP-400 Method 423	EN 60068-2-57: Vibration - Time-history and
Replication		sine-beat method
Materiel Bending	AECTP-400 Method 424	
Materiel Lifting	AECTP-400 Method 424	UN ST/SG/AC.10/1: Recommendations on
		the Transport of Dangerous Goods - Model
		Regulations
Materiel Racking	AECTP-400 Method 424	
Materiel Stacking	AECTP-400 Method 424	
Materiel Tiedown	AECTP-400 Method 424	

6 <u>Missing/Gaps in the BPS and Future Evolutions</u>

6.1 Evolutions in standardization

With raising concerns on climate change, temperature rising, new meteorological events, the standardized climate reference models for the tests are out-dated (models were defined in the 1990s). It could be relevant to review the models for the environmental testing to acknowledge such evolutions. This topic should be brought up in standardization in these fields.

6.2 <u>Test severities from measured data</u>

As stated in previous EG 08 Final Reports, there is still a concern on test severities from measured data in the current presented list of standards. STANAG 4370 being under review, the use of the French standards NF X50-144 (part 1 to 6) are crucial to ensure reliable European defence procurement contracts.

6.3 Evolutions on the STANAG 4370

The Life Cycle Management Group (LCMG WG6) in charge of STANAG 4370 evolution, has validated in October 2022 a main change in the organization of the current standard. The AECTP numbering will be kept, but the AECTP will be re-organized in 4 different STANAGs.



The current STANAG 4370 will stay in place with only AECTP-100, 200 and 600 as supporting standards. The new STANAG 4866 will be dedicated to climatic activity with AECTP 230 and 300. In a same way, the new STANAG 4867 will be created for mechanical testing (AECTP-240 and 400). Finally, the new STANAG 4868 will be dedicated to EEC domain, not covered in the scope of EG 08.

The table below shows the global re-organization of STANAG 4370 for EG08 scope:

Order	Current organization in 2022	New organization (expected in 2023)
1	STANAG 4370 AECTP 100 Ed. F	STANAG 4370 Ed. 8 AECTP 100 Ed. F Ver. 1
2	STANAG 4370 AECTP 200 Ed. E	STANAG 4370 Ed. 8 AECTP 200 Ed. E Ver. 1
3	STANAG 4370 AECTP 600 Ed. C	STANAG 4370 Ed. 8 AECTP 600 Ed. C Ver. 1
4	STANAG 4370 AECTP 230 Ed. B	STANAG 4866 Ed. 8 AECTP 230 Ed. B Ver. 1
5	STANAG 4370 AECTP 300 Ed. E	STANAG 4866 Ed. 8 AECTP 300 Ed. E Ver. 1
6	STANAG 4370 AECTP 240 Ed. B	STANAG 4867 Ed. 8 AECTP 240 Ed. B Ver. 1
7	STANAG 4370 AECTP 400 Ed. E	STANAG 4867 Ed. 8 AECTP 400 Ed. E Ver. 1

6.4 Detailed Analysis of the Test and Associated Standards

For the future work of revision in EDSTAR EG 08, it is recommended to perform a full review of the detailed analysis presented in the first Final Report annex. This valuable material can be of use for any environmental engineer for an overview of the work of standardization linked to defence procurement.

7 <u>Conclusion</u>

As a conclusion to this work, EG 08 strongly recommends standardization and defence procurement ecosystems to consider the challenges of climate change and its implications for environmental testing. The work of review and refinement undergone here to list the BPS on the Technical Domain "Environmental Testing" in Europe should be followed, with all expected changes in the industry. Many updates in the listed documents are expected in the short term and a review of this work should be done in not more than five years.

7.1 <u>Annex A – List of referenced "Best Practice" standards associated to the technical domain</u> <u>Environmental Testing.</u>