Thales Nederland

THALES
Building a future we can all trust

Surface Treatment at Thales

KLAAR VOOR DE STRIJD

www.thalesgroup.com



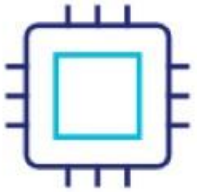
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About **Thales Group**



85.000

Employees worldwide



65

Countries



Over

€4bn

Self and Customer – Funded R&D



€22.1bn

Sales

€25.3bn

Order Intake

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Aerospace

Aeronautics

- Avionics
- Passenger experience
- Simulation and training
- UAVs & Urban Air Mobility
- Traffic management



Space

- Telecommunications
- Earth observation
- Orbital infrastructures and transport systems
- Satellite navigation solutions
- Exploration



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Defence

Defence systems, solutions, products and services for land, naval, air and cyberspace

- Spanning full chain of command, from surveillance and command & control to sensors and effectors
- Systems integration, and "systems of systems" expertise
- End-to-end connectivity, cloud & cybersecurity

Defence solutions for

- Smart cities
- Large events
- Critical infrastructures









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Cyber & Digital

Identity management

- Customer Identity & Management
- Workforce Identity & Access Management
- Broad range of authentication

Data security platforms

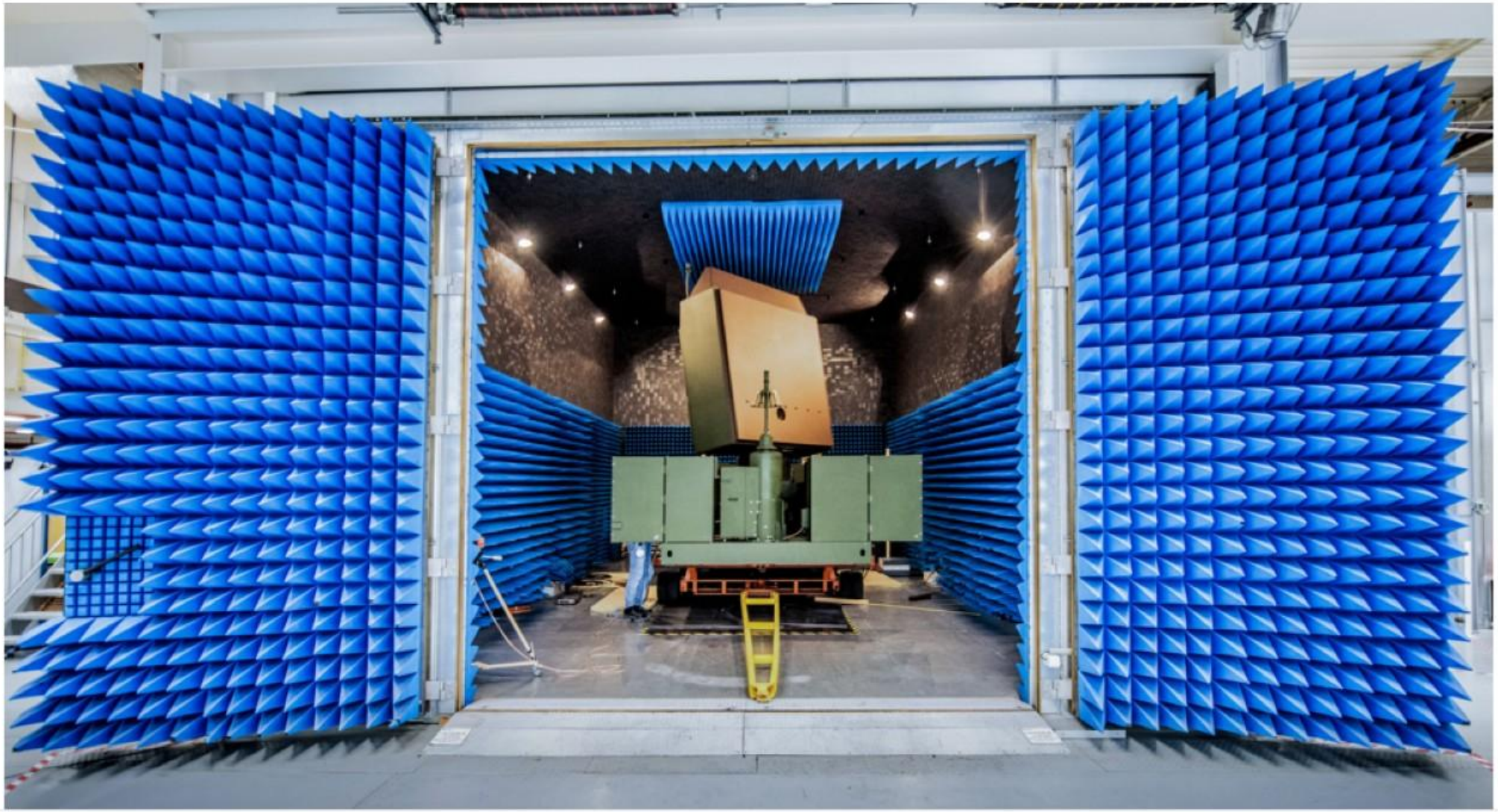
- Encryption
- Tokenization
- Key & Secret Management
- Hardware security modules
- Data access monitoring
- Data discovery & Classification
- Data Governance
- Threat detection





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Thales Nederland, diverse locaties grootste locatie in Hengelo



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Our 105-year history **in the Netherlands**

1922

Founding

N.V. Hazemeijer Fabriek van Signaalapparaten.

1940

Safeguarding blueprints

Schagen van Leeuwen flees with important blueprints, later reopening the company.

1956

Philips

Acquired by Philips, name changed to Hollandse Signaalapparaten B.V.

1990

Thomson CSF

Acquired by Thomson CSF.

2000

Thales

Thomson becomes Thales.

2022

Centennial anniversary

Celebrated 100 years of building a future we can all trust in the Netherlands.

Present

Thales towards the future

Continuously working on futureproof solutions for our customers.

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About **Thales in the Netherlands**

+/-3000
Employees

€900M
Revenue

€160M
Research & Technology Development

Hengelo – Defence Radars
Huizen – Defence Communication
Eindhoven – Space
Amersfoort – Simulators
Delft - R&D
Breda – Digital and Security
Rotterdam – Digital and Security



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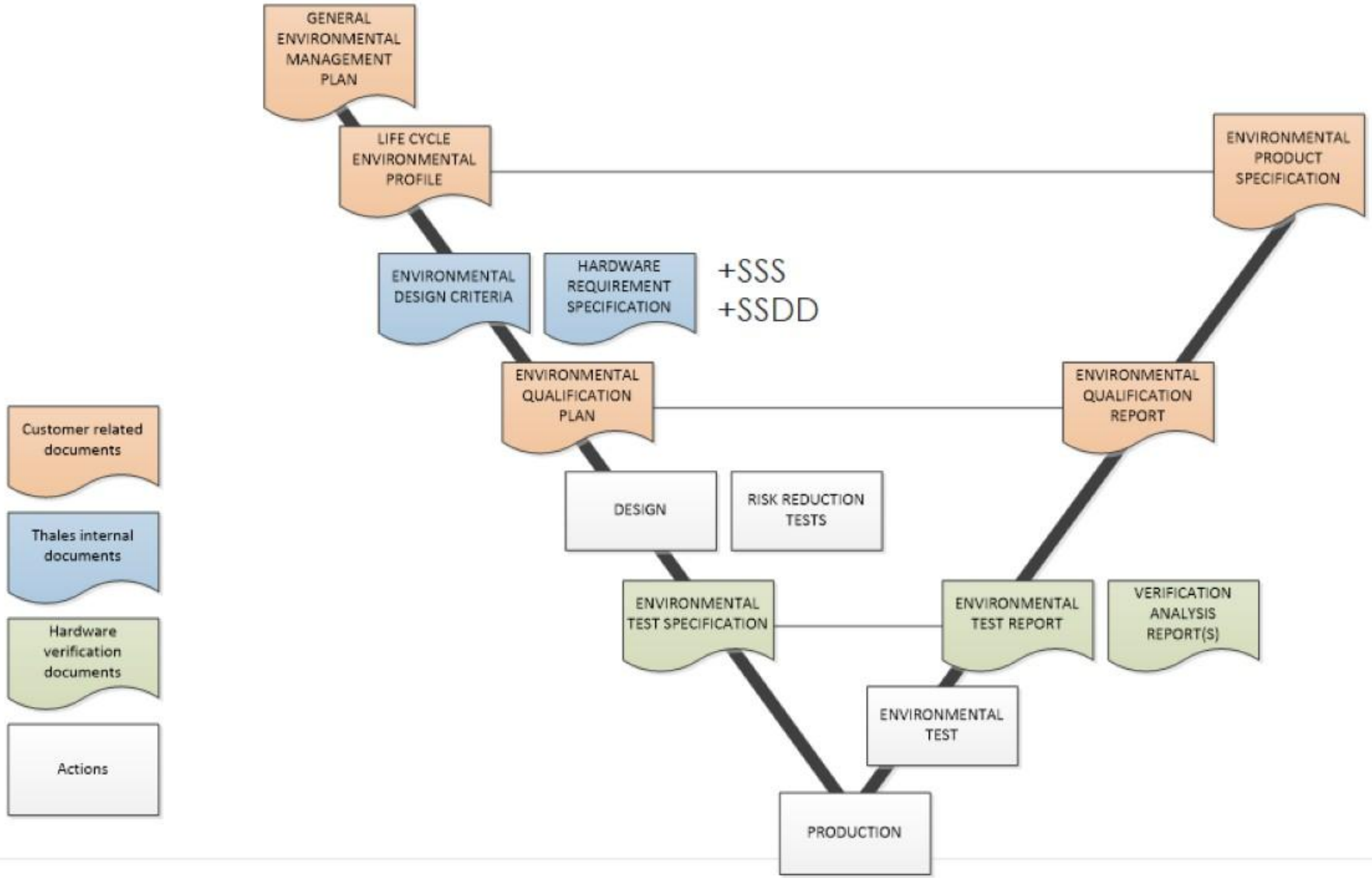
www.thales-ecc.nl

> Laboratory for environmental consulting and testing in the area of Electromagnetic Compatibility, Mechanical, Climatological and Surface Treatment



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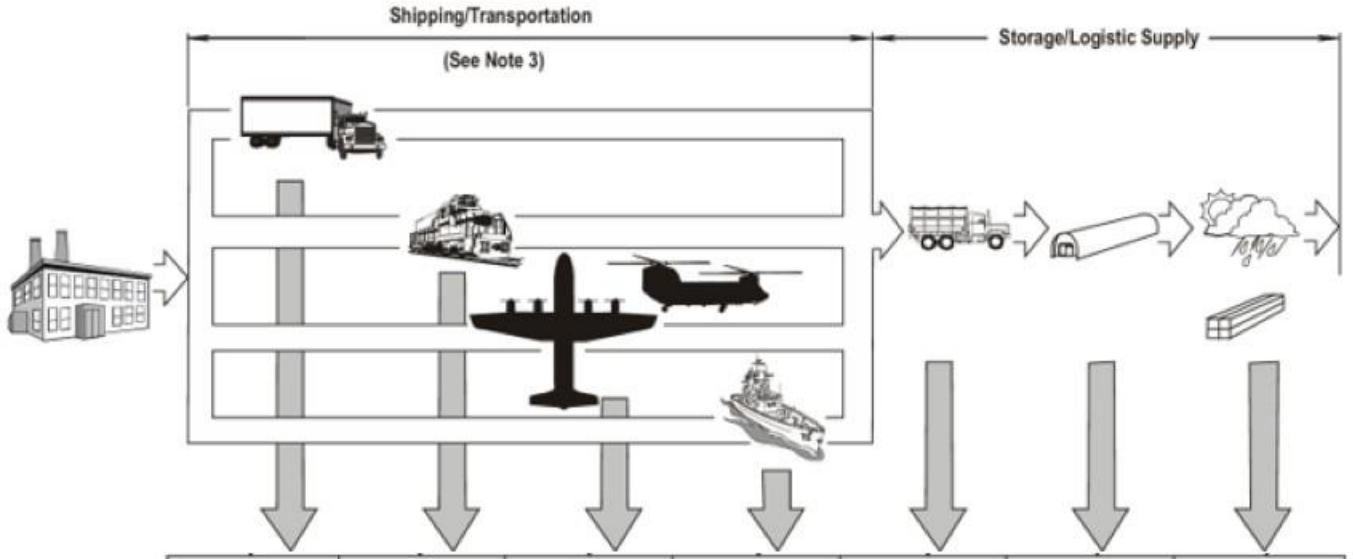
Basis of our process (AECTP methodology)



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Life Cycle Conditions – Handling, Storage & Transport

- AECTP 230:
  - Leaflet 231 General
  - Leaflet 232 Transportation
  - Leaflet 233 Handling and Storage



	Handling & Road Transportation	Handling & Rail Transportation	Handling & Air Transport	Handling & Ship Transport	Handling & Logistics Transport (Worst Route)	Storage, Sheltered (Tent, Shed, Igloo)	Storage, Open
Environmental Stress Generation Mechanisms (Induced)	Road Shock (Large Bumps/Potholes) Road Vibration (Random) Handling Shock (Dropping/Overturning)	Rail Shock (Humping) Rail Vibration Handling Shock (Dropping/Overturning)	In-Flight Vibration (Engine/Turbine Induced) Landing Shock Handling Shock (Dropping/Overturning)	Wave-Induced Vibration (Sinusoidal) Wave Sine Shock Mine/Blast Shock Handling Shock (Dropping/Overturning)	Road Shock (Large Bumps/Holes) Road Vibration (Random) Handling Shock (Dropping/Overturning) Thermal Shock (Air Drop)	None	None
Environmental Stress Generation Mechanisms (Natural)	High Temperature (Dry/Humid) Low Temperature Rain/Hail Sand/Dust	High Temperature (Dry/Humid) Low Temperature Rain/Hail Sand/Dust	Reduced Pressure Thermal Shock (Air Drop Only) Rapid Decompression	High Temperature (Humid) Low Temperature Rain Temporary Immersion Salt Fog	High Temperature (Dry/Humid) Low Temperature/ Freezing Rain/Hail Sand/Dust Salt Fog Solar Radiation Reduced Pressure	High Temperature (Dry/Humid) Low Temperature/ Freezing Salt Fog Fungus Growth Chemical Attack	High Temperature (Dry/Humid) Low Temperature/Freezing Rain/Hail Sand/Dust Salt Fog Solar Radiation Fungus Growth Chemical Attack

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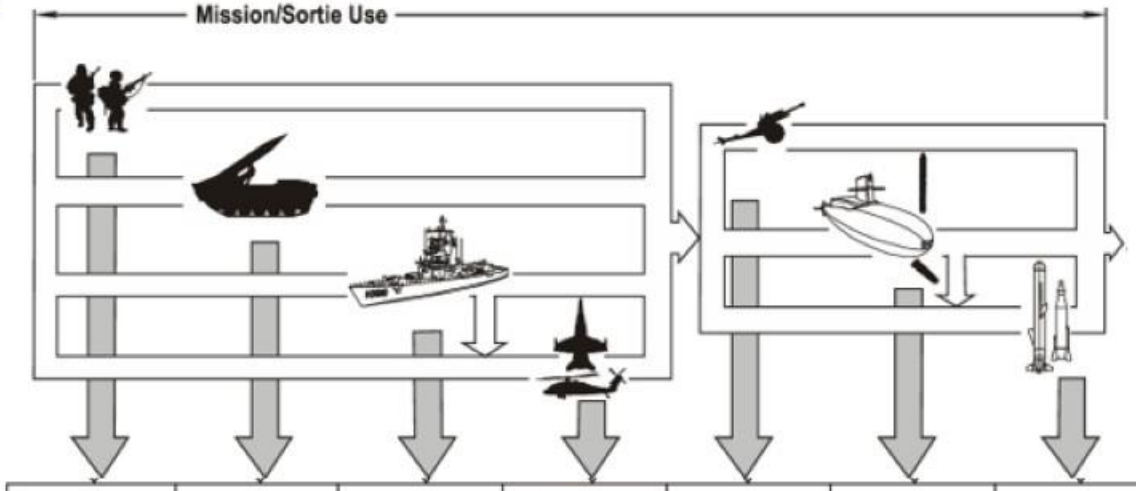
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Life Cycle Conditions - Deployment Phase

- AECTP 230:
  - Leaflet 234 Man-mounted and portable
  - Leaflet 235 Deployment or installation on or in vehicles
  - Leaflet 238 Deployment on ships General



Deployment & Use by Foot Soldiers/Ground Personnel	Deployment & Use on Land Vehicles (Wheeled/Tracked)	Deployment & Use Aboard Ships	Deployment & Use on Aircraft Including Captive Stores (Fixed/ Rotary Wing)	Delivery to Target Projectile	Delivery to Target Torpedo/Underwater Launched Missile	Delivery to Target Missile/Rocket
Handling Shock (Dropping/Slamming/ Overturning) Firing/Blast Shock Acoustic Noise Explosive Atmosphere Electromagnetic Interference	Road/Off-Road Vibration (Surface Irregularities/ Tread Laying) Engine-Induced Vibration Acoustic Noise Handling Shock (Including Bench) Road/Off-Road Shock (Large Bumps/Holes) Land Mine/Blast Shock Weapon Firing Shock/ Vibration Explosive Atmosphere Electromagnetic Interference	Wave Induced Vibration (Sinusoidal) Engine-Induced Vibration Acoustic Noise Wave-Slam Shock Mine/Blast Shock Weapon Firing Shock Explosive Atmosphere Electromagnetic Interference Increased Pressure (Submarine)	Runway-Induced Vibration Aerodynamic Turbulence (Random Vibration) Maneuver Buffet Vibration Gunfire Vibration Engine-Induced Vibration Acoustic Noise Take-Off/Landing/ Maneuver Acceleration Air Blast Shock Catapult Launch/ Arrested Landing Shock Handling Shock (Including Bench) Aerodynamic Heating Explosive Atmosphere Electromagnetic Interference	Firing Shock Firing Acceleration Handling/Loading Shock Acoustic Noise Aerodynamic Heating Explosive Atmosphere Electromagnetic Interference	Launch Acceleration Handling/Launch Shock Engine-Induced Vibration Acoustic Noise Pyrotechnic Shock (Booster Separation) Explosive Atmosphere Electromagnetic Interference	Launch/Maneuver Acceleration Handling/Launch Shock Engine-Induce Vibration Aerodynamic Turbulence (Random Vibration) Acoustic Noise Aerodynamic Heating Explosive Atmosphere Electromagnetic Interference
High Temperature (Dry/Humid) Low Temperature/ Freezing Thermal Shock (Storage to Use) Rain/Hail Sand/Dust/Mud Salt Fog Solar Radiation Fungus Growth Chemical Attack	High Temperature (Dry/Humid) Low Temperature/ Freezing Thermal Shock (Storage to Use) Rain/Hail Sand/Dust/Mud Salt Fog Solar Radiation Fungus Growth Chemical Attack	High Temperature (Dry/Humid) Low Temperature/ Freezing Thermal Shock (Storage to Use) Rain Salt Fog Solar Radiation Fungus Growth Chemical Attack	High Temperature (Dry/Humid) Low Temperature/ Freezing Thermal Shock (Storage to Use) Rain Salt Fog Solar Radiation Rain Impingement Sand/Dust Impingement Fungus Growth Chemical Attack	Thermal Shock (Storage to Use) Rain Impingement Sand/Dust Impingement	Immersion Thermal Shock	Rain Impingement Sand/Dust Impingement

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Climatic, EMC, Mechanical Topics

1. High temperature
2. Low temperature
3. Thermal shock
4. Solar radiation
5. Humidity
6. Immersion
7. Fungus
8. Salt fog
9. Rain / Drip
10. Icing
11. Altitude (Low pressure)
12. Sand and dust
13. Snow
14. Wind
15. Hail
16. Electrical Surface Resistance
17. RF requirements
18. Exhaust fumes
19. Others
    - Contamination by fluids
    - Explosive atmosphere (due to enemy action)
    - Combination of topics

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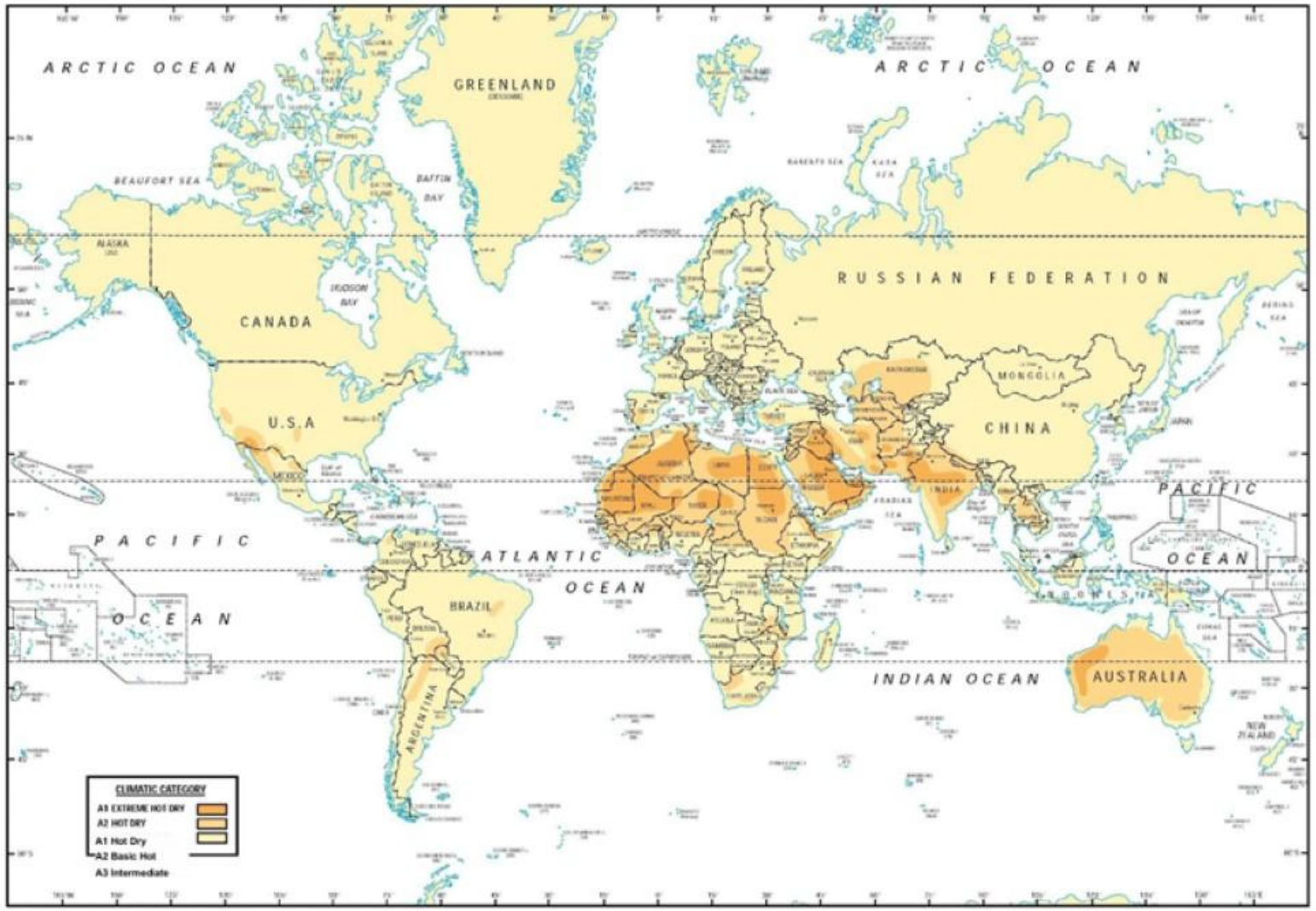
High temperature situations

> Storage

- Transport, sheltered or open air.
  - Optional: remove liquids and batteries
- For example storage in a hangar
  - A1 storage: max. 71 °C

> Operational

- Tactical stand-by to operational, operational
- For example for naval, above deck:
  - A1 hot dry: max. 49 °C
- Operational: full performance (max dissipation)
- Surface temperature (equator crossing)
- Maintenance (shut down cooling systems)



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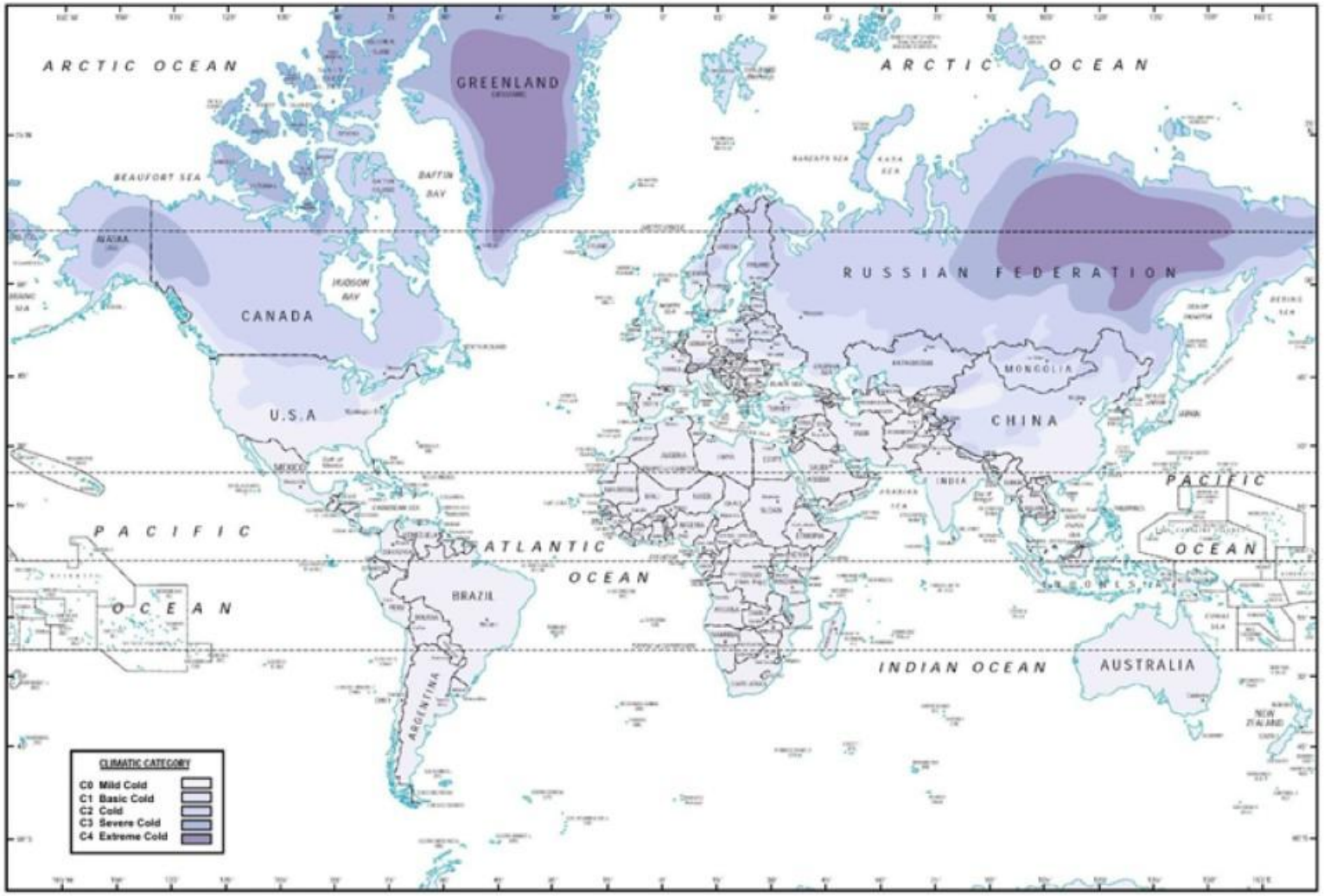
Low temperature situations

> Storage

- Transport, sheltered or open air.
  - Remove batteries
  - Remove liquids
- Conditions:
  - Naval: -33°C (C1)
  - Land based: -46°C (C2)

> Operations

- Tactical stand-by to operational
- Cold start – up
  - Pre heating necessary?
- Operational
  - Naval: -32°C (C1 natural)
  - Land based: -40°C
- Maintenance



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Humidity situations

> Warm, humid conditions can occur year-round in tropical areas, seasonally in mid-latitude areas, and in material subjected to combinations of changes in pressure, temperature, and relative humidity.

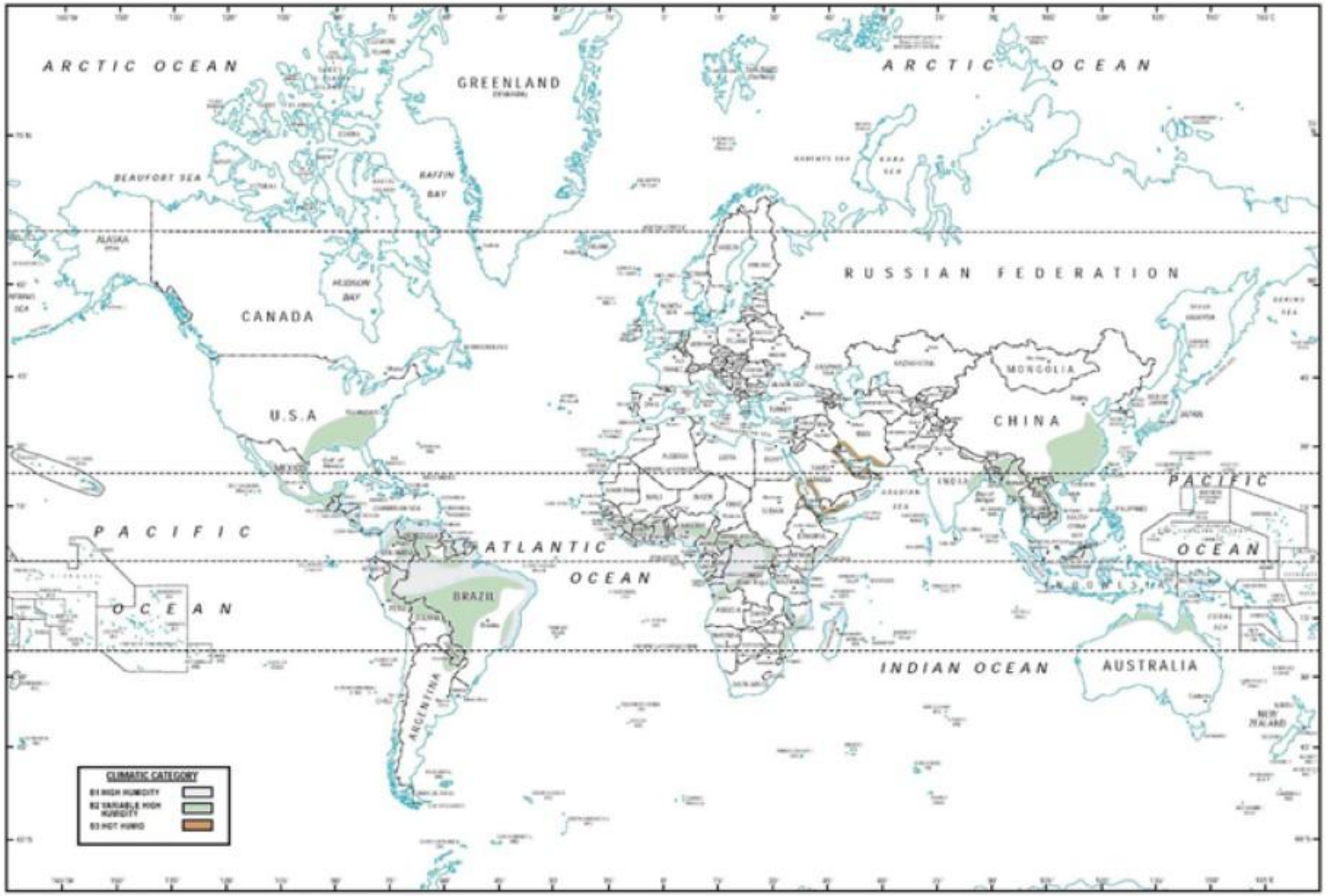
> Storage

- Transport, sheltered or open air.

> Operations

- Tactical stand-by to operational
- Operational
- Maintenance

- Climate B1, B2 and B3
- Aggravated test



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Qualified surface treatments

> Stainless Steel

1. Passivating
2. Bond primer (Hexbond 112) in combination with pre-treatment Nitric Acid Anodizing
3. Spray coating (Epoxy primers, Polyurethane topcoat etc.)

> Copper, Gold, Silver, Nickel plating

> Aluminum

1. Anodizing: SAA & hard (PTFE)
2. Surtec 650
3. Nickel plating
4. Bond primer (Hexbond 112) in combination with pre-treatment Phosphoric Acid Anodizing
5. Spray coating (Epoxy primers, Polyurethane topcoat etc.)

> Composites

1. Spray coating (Epoxy primers, Polyurethane topcoat etc.)

> Carbon steel

1. Phosphating
2. Metal spraying (thermal spraying AL or ZnAL)
3. Spray coating

> Sealing

> Adhesive bonding

> Corrosion investigations

> Overhaul and maintenance procedures

> Supplier qualification

> Surface treatment process qualifications

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Markt analyses

- Thales products will operate 30 to 40 years (some even 60 years)
- Thales has to select products that is available in the free market
- Question is, do these products fits our requirements for our products
- Environmental (milieu) impact on products free available on the market
- Are todays surface treatment products become better or are the getting worse?

TO FIND OUT WE NEED TO ANALYSE AND QUALIFY SURFACETREATMENT PRODUCTS OUR SELVES

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ECC surface treatment test facilities





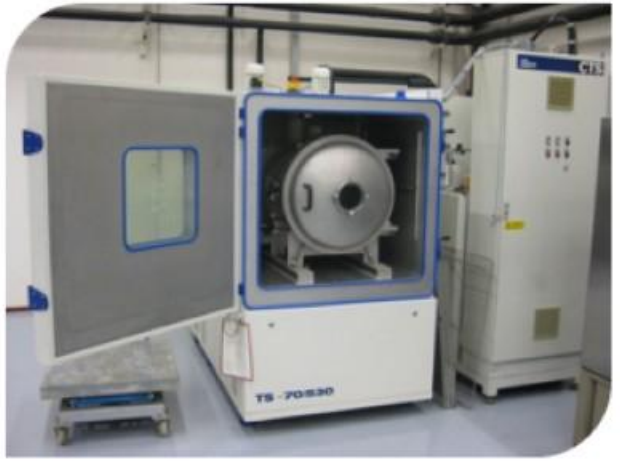












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Few Test experiences



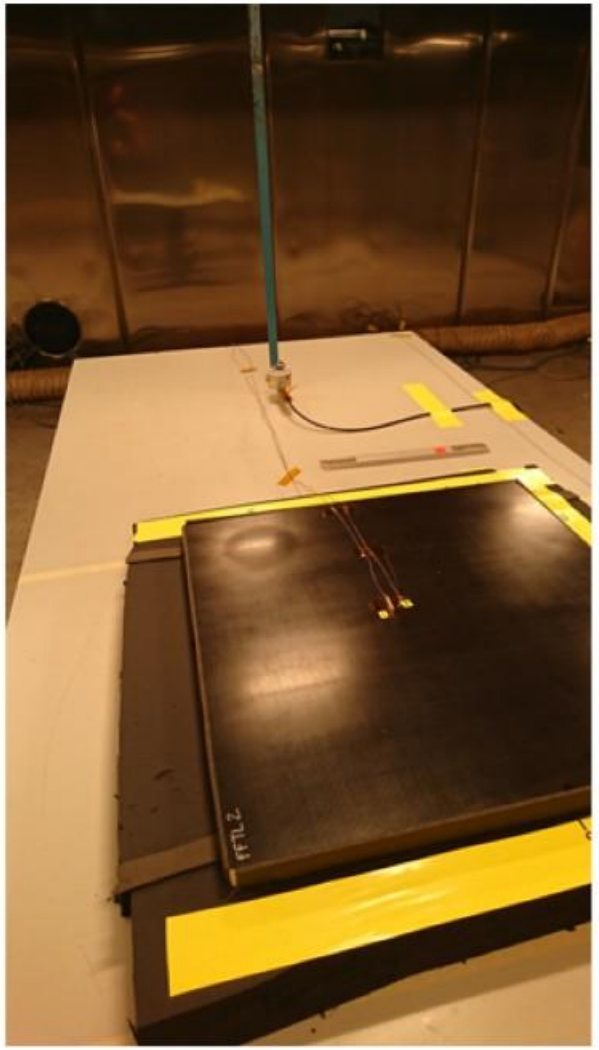
- Storage test: Epoxy



- Resin Lubricants become less viscous

Corrosion only by humidity





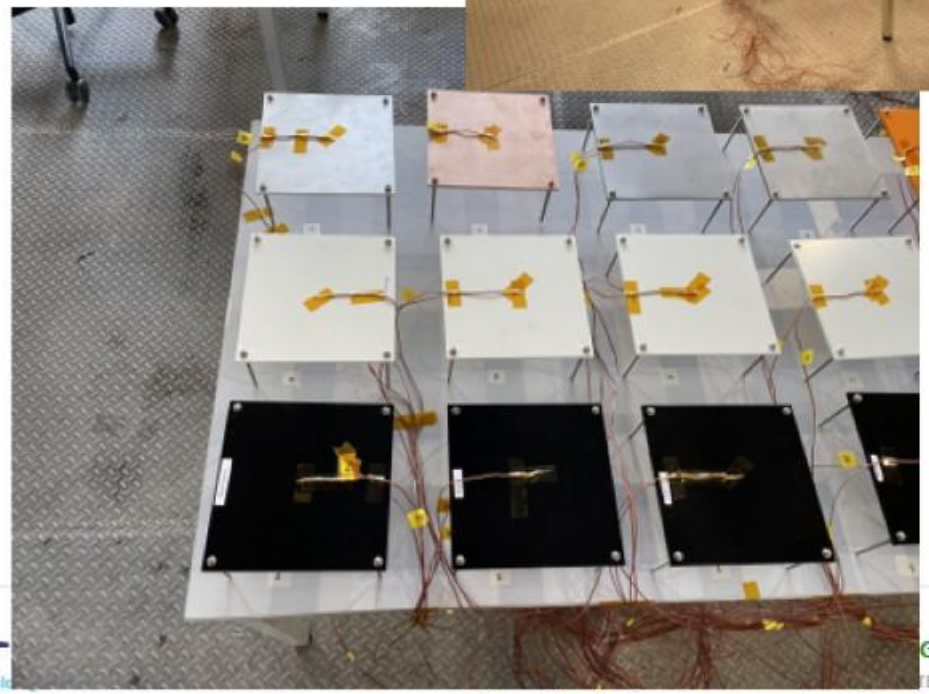
Delamination of materials

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Solar radiation safety considerations, examples:

> Manipulation / safety / use during solar radiation







Material	Paint	Temperature increase due to solar radiation (1120 W/m2)
Aluminum	Black	32
Copper	Black	36
Steel	Black	36
Stainless steel	Black	38
Aluminum	White	23
Copper	White	26
Steel	White	28
Stainless steel	White	29
Unknown	Blue (dark)	38
Unknown	Red	25
Unknown	Blue (light)	21
Unknown	Brown	30
Unknown	Yellow	21
Unknown	White	20
Silver	N.A.	21
Bronze	N.A.	27
Steel	N.A.	37
Stainless steel	N.A.	39

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Potential difference

(A larger potential difference increases the corrosion rate)



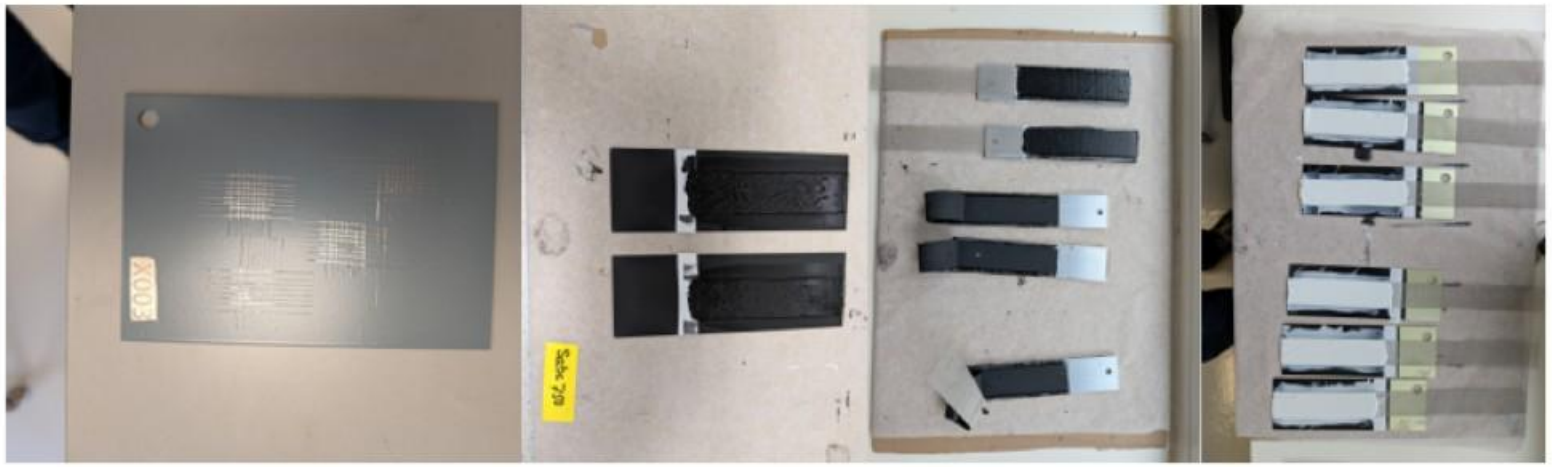




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Qualification tests on test samples

Neutral salt spray test
Humidity test
Temperature cycling test
SO2 Test
Cross Hatch test
Scribe test
Filiform test
Layer thickness (also non ferro)





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Lots of Field experience knowledge form customer installed base



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Thank you

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