ALSTOM

DTRF150217

Rev. F

ALSTOM STANDARD FOR RAILWAY APPLICATIONS

METALLIC PARTS CORROSION RESISTANCE REQUIREMENTS

Table of modifications

Revision	Publication	Summary of Changes
F	02/03/2020	Global review prior to publication – DTRF150400 cancellation
E	24/10/2013	Update
D	13/03/13	Complete revision of document
C	17/03/10	Update (entire document)
B	20/10/08	Update
A	13/03/08	Creation

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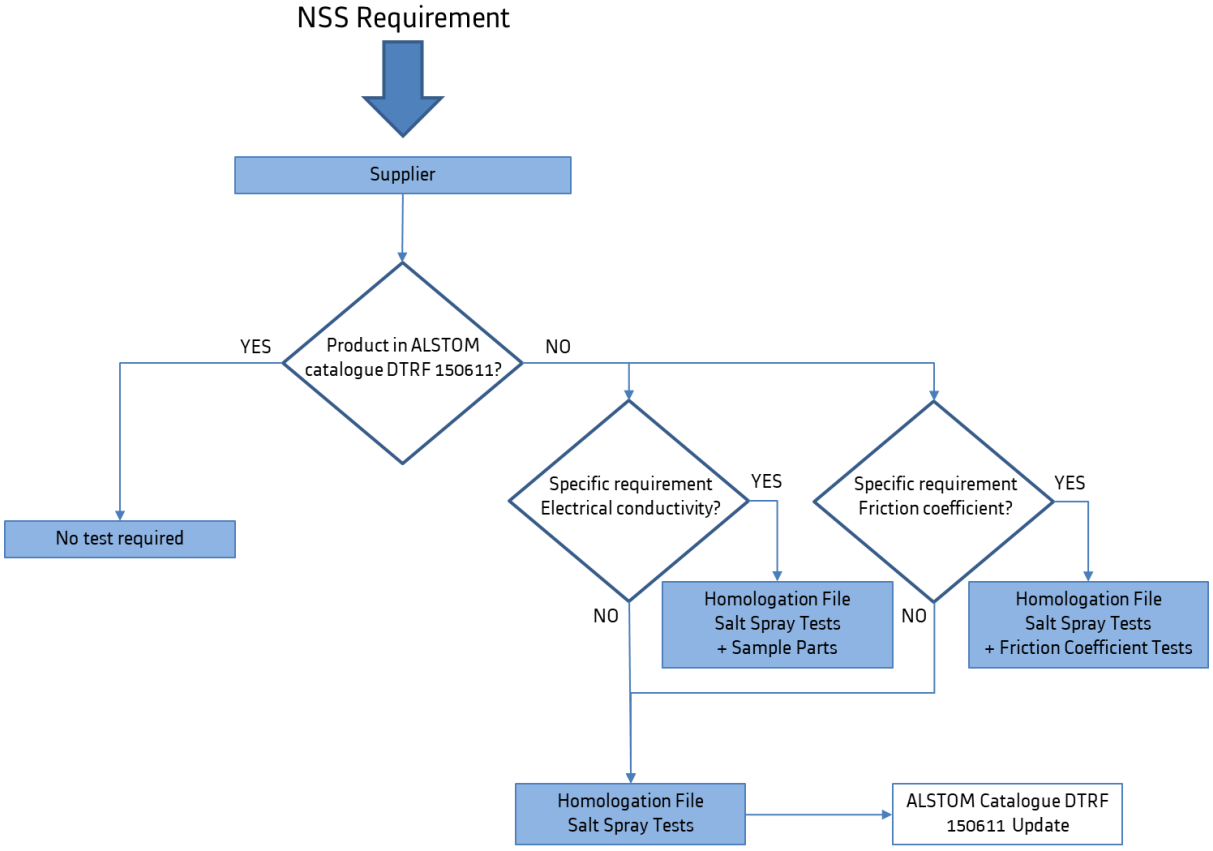
1. PURPOSE

The anti-corrosion performance required for non-painted part is specified either on the order, the purchase specification or the design documents by the requirement of salt spray test resistance (Neutral Salt Spray level). For example, Level NSS240H according to DTRF150217.

Treatment surface selection is described on the below figure (electronical/electrical equipment specific case is described in §7).



Based on this requirement, suppliers can either:

- Use surface treatment included in ALSTOM Transport catalogue DTRF 150611 without providing homologation file (salt spray test results as per ISO 9227 and REACH statement). Selected surface treatment must be provided to ALSTOM for validation and supplier must commit to strictly follow application conditions of selected surface treatment.

Applicators must be qualified by formulators.

- If suppliers wish to use a surface treatment that is not included in ALSTOM catalogue, they must to submit a homologation file to ALSTOM in accordance with the section "homologation file" of this ALSTOM Standard. After validation of the homologation file (salt spray test results as per ISO 9227 and REACH statement, an Approval Committee states on the surface treatments validity and if approved, they are then included into DTRF150611.

The proposed treatments must comply with ALSTOM standard ENG-STD-003 (Instructions dealing with the use of dangerous substances) and no coating may contain any substances of very high concern as far as REACH is concerned.

In case of additional requirement dealing with electrical conductivity (described in section 7) for earthing purpose, supplier can either:

- Select a surface treatment included into DTRF 150611
- Use a surface treatment not included into DTRF 150611 but sample part must be provided to ALSTOM for validation

In case of additional requirement dealing with friction coefficient, supplier can either:

- Select a surface treatment included into DTRF 150611
- Use a surface treatment not included into DTRF 150611 but homologation file must be provided to ALSTOM for validation to demonstrate surface treatment compliance with BS and friction coefficient requirement

This ALSTOM Standard describes the test methods to be applied to determine the main characteristics of products used to protect metal parts against corrosion as well as expected results.

This ALSTOM Standard is used by ALSTOM for approval of anti-corrosion treatments directly proposed by formulators, and to support protection systems selection for ALSTOM surface treatment catalogue.

This ALSTOM Standard supersedes any factory specification of the same type and must be mentioned whenever placing an order for the supply of the surface treatment corresponding with the description above.

Requirements of this ALSTOM do not concern paint protected parts which are specified in DTRF150608.

All mechanical, chemical, visual or dimensional characteristics not satisfying the regulations of this specification will result in the refusal of the corresponding product.

Even if International Standards exist in different languages, English version is considered as official reference.

2. NORMATIVE REFERENCES

2.1. STANDARD REFERENCES

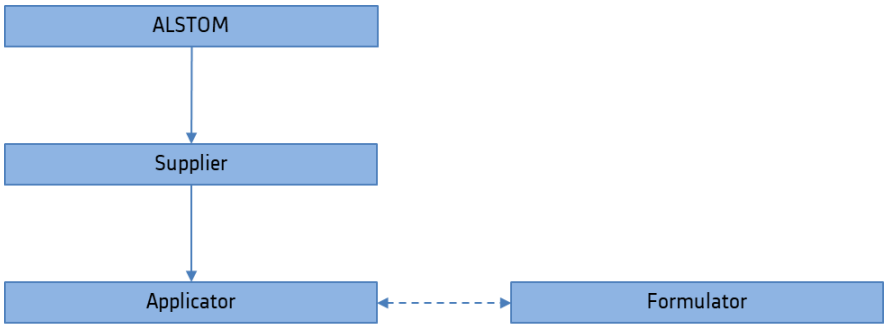
Reference	Title
ISO 9227	Corrosion tests in artificial atmospheres – Salt spray tests
EN 50155	Railway applications rolling stock electronic equipment

2.2. ALSTOM STANDARDS REFERENCES

Reference	Title
ENG-STD-003	Instructions to suppliers concerning the placing on the market and use of dangerous substances
ENG-FRM-001	Suppliers' declaration of conformity: Declaration of respect of specifications on dangerous substances
DTRF 150213	Fasteners purchasing specification
DTRF 150608	Standard painting process
DTRF 150611	Surface protection catalogue

3. TERMS AND DEFINITION

Term	Definition
NSS	Neutral Salt Spray Test
EEE	Electric and Electronic Equipment
Applicator	Person or company applying anti-corrosion surface treatment on the part
Formulator	Company manufacturing anti-corrosion surface treatment products
Supplier	Company realizing tasks on behalf of ALSTOM with formal contract



Former Designation	**New Designation**	Salt Spray Test Performance Level
BS0	**NSS1560H**	1560 hours
BS1	**NSS960H**	960 hours
BS2	**NSS600H**	600 hours
BS3	**NSS480H**	480 hours
BS4	**NSS240H**	240 hours
N/A	**NSS48H**	48 hours

The treatment industrial resistance must be considered by formulators so that these performance levels are met by the parts realized by applicators.

4. REFERENCE PART DEFINITION

For all tests performed (salt spray, resistivity measurement), samples or reference parts shall follow below requirements.

Recommended shades:

Carbon steel

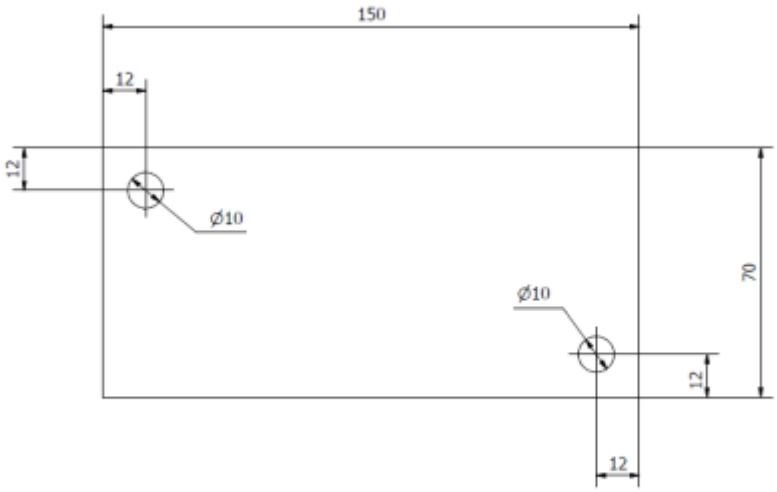
Aluminum: series 5000 (5754) and 6000 (former 6005, 6082)

Stainless steel: ferritic and austenitic

Reference part can be either a plate or any other part.

Plate reference part:

- Dimensions 100mm x 100mm
- Thickness 1 mm
- 1 hole of diameter 10 mm
- General tolerance ± 5 mm



Other Part:

Serie parts, prototypes,... already tested in salt spray test and designed for any kind of industry (automotive, railway, aeronautics,...). Part must include holes and openings.

5. SURFACE TREATMENTS CHARACTERISTICS

	Zinc coated Carbon Steel		Stainless Steel	Aluminum
Salt spray test conditions	NSS according to ISO 9227			
Acceptance Criteria	Without White Rust	Without Red Rust		Without White Rust
NSS240H	96 Hrs	240 Hrs		
NSS480H	120 Hrs	480 Hrs		
NSS600H	200 Hrs	600 Hrs		
NSS960H	200 Hrs	960 Hrs		
NSS1560H	200 Hrs	1560 Hrs		
NSS48H	Test Ka according to EN 60068-2-11* Visual inspection: an operational check shall not show any failure or damage. The equipment shall work as intended and within its specified limit			
In case of no rust appearance, the test shall continue up to 2000 Hrs.				
Safety and EHS restriction are according to ENG-FRM-001				
* To be closer to operational conditions, test Kb according to EN 60068-2-52 should be preferred (same acceptance criteria)				

6. HOMOLOGATION FILE

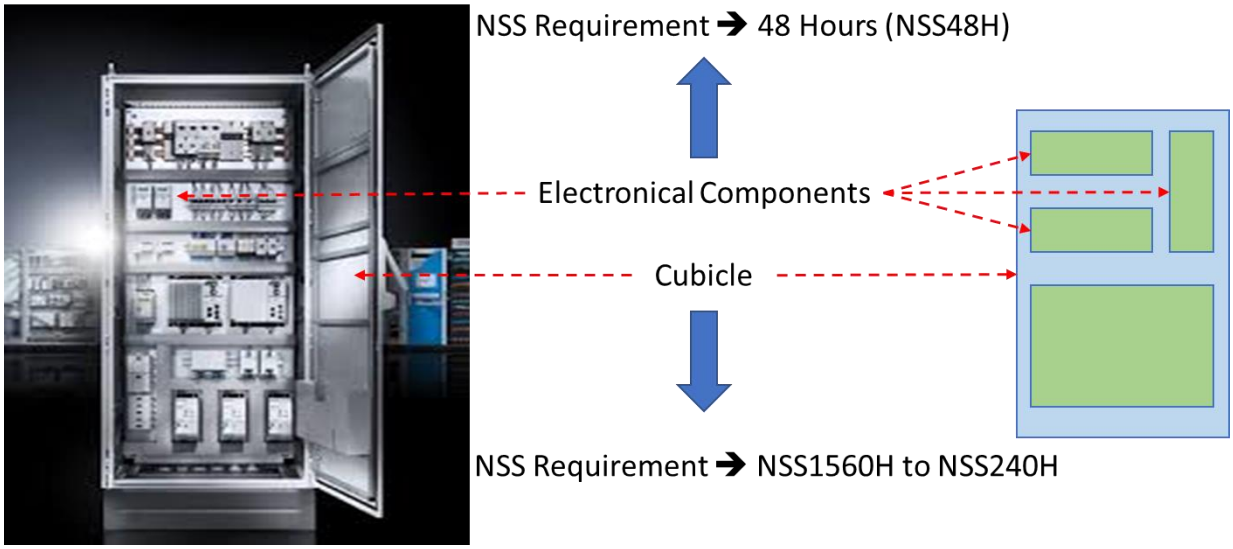
For homologation purpose, Supplier must provide:

- Detailed description of the treatment (range/product references, layer thickness or weight, color - grey or black)
- Compliance commitment with ENG-FRM-001 in accordance with Instruction ENG-STD-003.
- Treatment type: bulk, spray or dip.
- Test report related to performance in salt spray tests realized according to ISO 9227. Test report must include specimen parts pictures from the tests beginning until tests completion at regular interval (at least at each NSS level).

7. EEE CORROSION REQUIREMENTS

Due to water tightness, parts containing electronical/electrical equipment and electronic/electrical equipment itself must be considered separately:

- Non painted containing part will have a BS requirement level from NSS1560H to NSS240H
- Painted containing part must be compliant with DTRF 150608
- Electronical/electrical equipment not exposed to humidity will have to respect 48 hours salt spray resistance according to EN 50155 (§13.4.10)



For example:

- A not painted cubicle or electrical cabinet containing electronical cards will have requirement NSS1560H to NSS240H
- A painted cubicle or electrical cabinet containing electronical cards will comply with DTRF 150608 requirements
- Electronical cards inside cubicle will have requirement of 48 hours for NSS according to EN 50155

8. CONDUCTIVE SURFACE TREATMENT

8.1. OLD DRAWINGS EQUIVALENCE

For all drawings or documents mentioning surface treatment TREAT X (X from 1 to 9) from former DTRF 150400 (obsolete), please refer to DTRF 150611 to identify suitable surface treatments corresponding to previous TREAT X designation. Maximum NSS Level compliant with electrical conductivity is stated in "conductivity" column.
Updating old drawings to remove DTRF 150400 indication is not necessary.

Former Designation	New NSS Level (Minimum)
TREAT 1	NSS240H
TREAT 2	NSS240H
TREAT 3	NSS240H
TREAT 4	NSS240H
TREAT 5	NSS240H
TREAT 6	NSS480H
TREAT 7	NSS480H
TREAT 8	NSS240H
TREAT 9	NSS240H

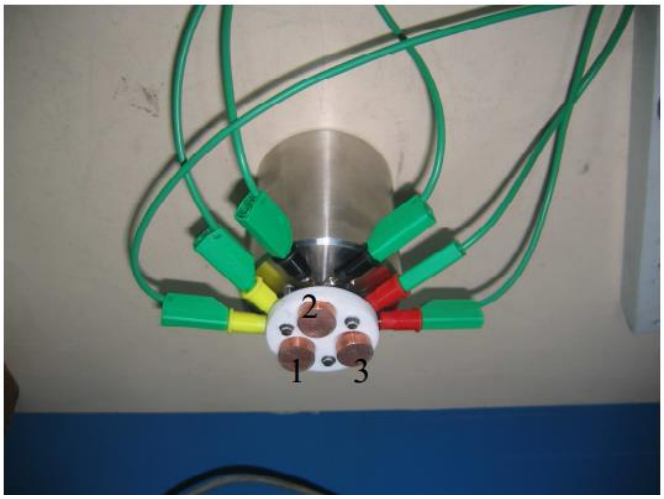
8.2. RESISTIVITY MEASUREMENT

Electrical resistivity is measured at each NSS level. For example, for a part with NSS960H requirement, electrical resistivity is measured at:

- NSS240 H
- NSS480 H
- NSS600 H
- NSS960 H
- NSS1560 H

Electrical resistivity measurement is performed by ALSTOM with following process.
Electrical resistivity is measured with a calibrated milliohmmeter (Digital microohmeter OM21 AOIP). Measures were done with 4 wires.

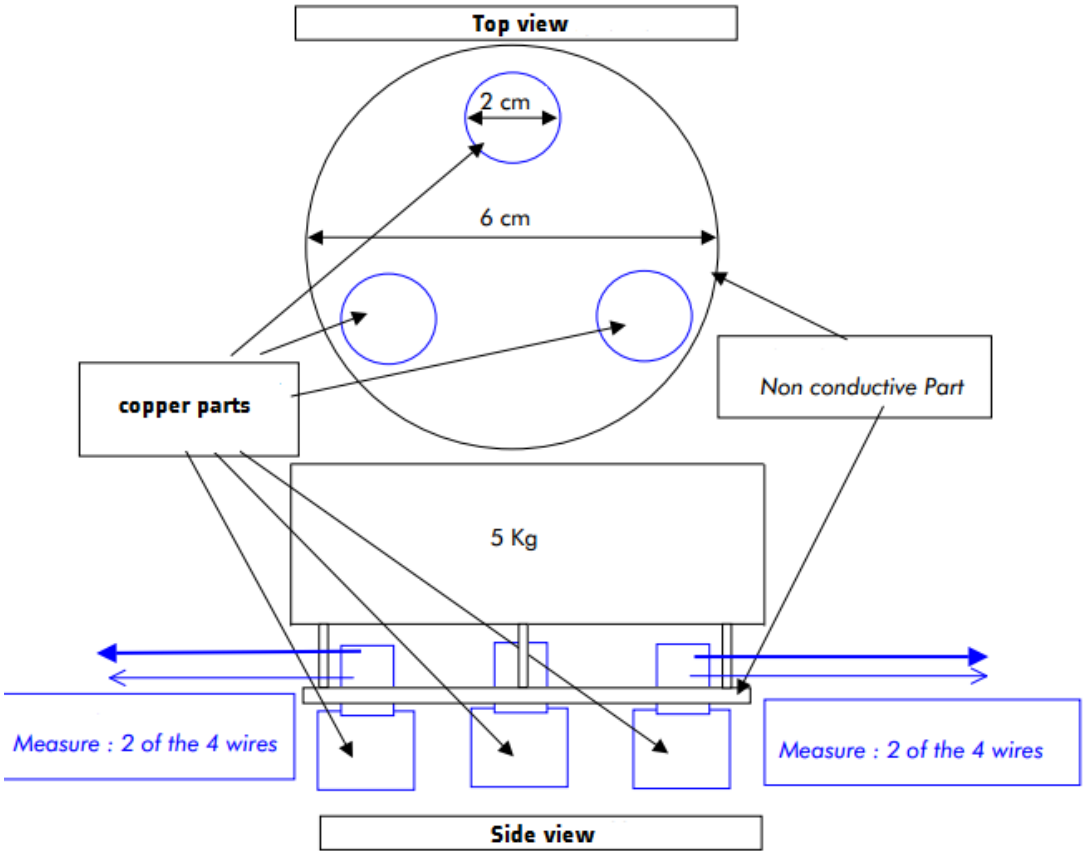
Measures are realized under load with the following apparatus:



The load is 5 kg, and the measures are done between 2 different copper plots:

- 3 measures between plot 1 and plot 2
- 3 mesaures between plot 2 and plot 3
- 3 measures between plot 3 and plot 1

Only the lowest measure is considered.



8.3. ACCEPTANCE CRITERIA

- For aluminum treatments:

Highest value accepted:10 mΩ with the apparatus, corresponding to 15 mΩ/cm²

- For steel treatments:

Highest value accepted: 66 mΩ with the apparatus, corresponding to 100 mΩ/cm²

	Aluminum	**Carbon / Steel**
Acceptance Criteria	10 mΩ	66 mΩ