BONDERITE M-NT 65000

Trivalent chromium conversion coating

Bilbao, June 2019

Agenda

1. Context and REACH

2. Substitution of BONDERITE M-CR 1200 AERO (Alodine 1200)
   - Process
   - Benefits
   - Bath analysis
   - Layer analysis

3. Touch and Prep with paintbrush: BONDERITE M-NT 65000

4. Touch and Prep coatings pen: BONDERITE M-CR 871 AERO

Context

Use for which authorization is requested	Times requested by the CTAC SUB consortium	Times recommended by RAC and SEAC
Passivation of tinned steels	**4 years**	**4 years**
Formulation of the mixtures	**12 years**	**7 years**
Hard chrome plating	**12 years**	**7 years**
Functional chrome-plating	**7 years**	**4 years**
Surface treatment for aeronautical and aerospace applications (except hard chromium plating and decorative chrome plating)	**12 years**	**7 years**
Surface treatment (except passivation of tinned steels) for applications in various fields of industry, including architecture, automotive, metal fabrication, engineering ... (other than functional chromium plating and decorative chrome plating)	**7 years**	**4 years**

Context
Henkel products

- The main products are:

Old name	New name	Feature
Alodine 1200	BONDERITE M-CR 1200 AERO	Powder
Alodine LIQUIDE 1200 S	BONDERITE M-CR 1200 S L	Liquid
Alodine 1200 S	BONDERITE M-CR 1200 S AERO	Powder
Alodine 1132 TNP	BONDERITE M-CR 1132 AERO	Touch and Prep pen
…		

Substitution
Overview

* CLP classification on 01.01.2018

BONDERITE M-CR 1200 AERO

Hexavalent chromium based conversion coating

Subject to authorization

✓ MIL-DTL-81706b et MIL-DTL-5541
Form II 1A et 3 approved (*)

BONDERITE M-NT 65000

Trivalent chromium based conversion coating

✓ Designed to meet MIL-DTL-81706b et MIL-DTL-5541 ; Form I 1A et 3 approved

(*)

BONDERITE M-CR 1132 AERO

Touch and Prep pen – Hexavalent chromium
Subject to authorization

✓ MIL-DTL-81706b et MIL-DTL-5541
Form VI 1A et 3 approved (*)

BONDERITE M-CR 871 AERO

Touch and Prep pen – Trivalent chromium

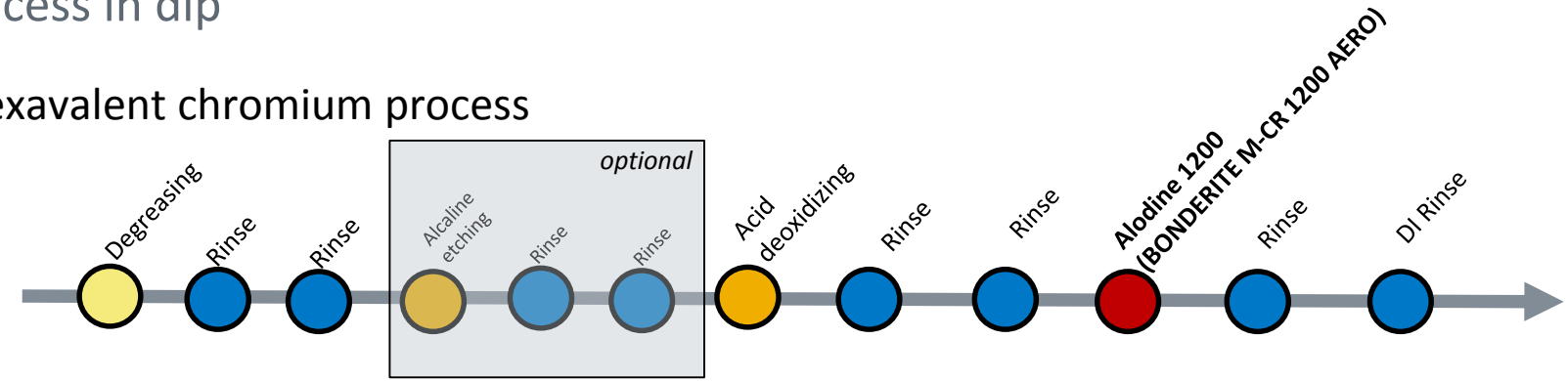
✓ MIL-DTL-81706b et MIL-DTL-5541
Form VI 1A et 3 approved

(*)

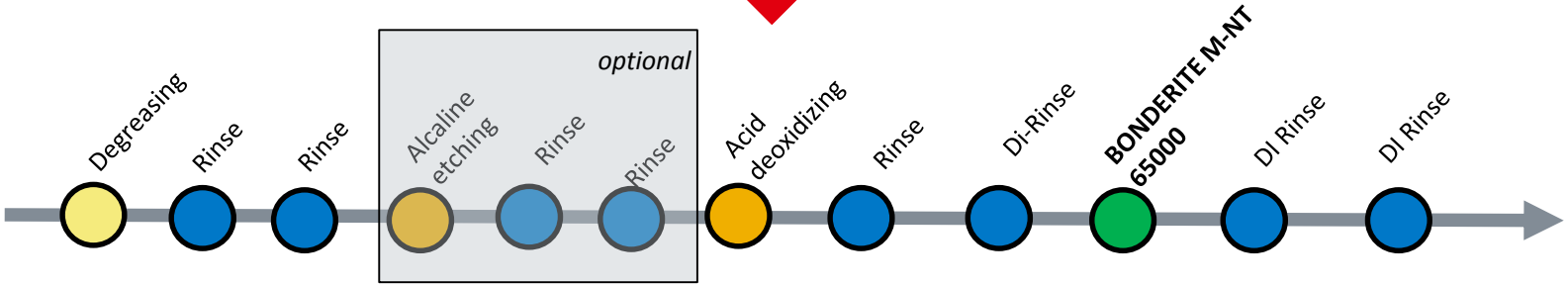
BONDERITE M-NT 65000

Process in dip

- Hexavalent chromium process



- Trivalent chromium process



Immersion time – depending of the alloy

	Alloy	Degreasing	Alcaling etching	Acid deoxidizing	Conversion
Laminated / Extruded Aluminium	2618	10 min	-	1 min	10 min
	2024	10 min	1 min	10 min	10 min
	7XXX	10 min	1 min	10 min	10 min
	6XXX	10 min	-	5 min	5 min
	5XXX	10 min	-	5 min	5 min
Machined Aluminium	2XXX	10 min	-	5 min	10 min
	7XXX	10 min	-	5 min	10 min
Cast alloy		10 min	-	30 s	10 min

Salt spray results

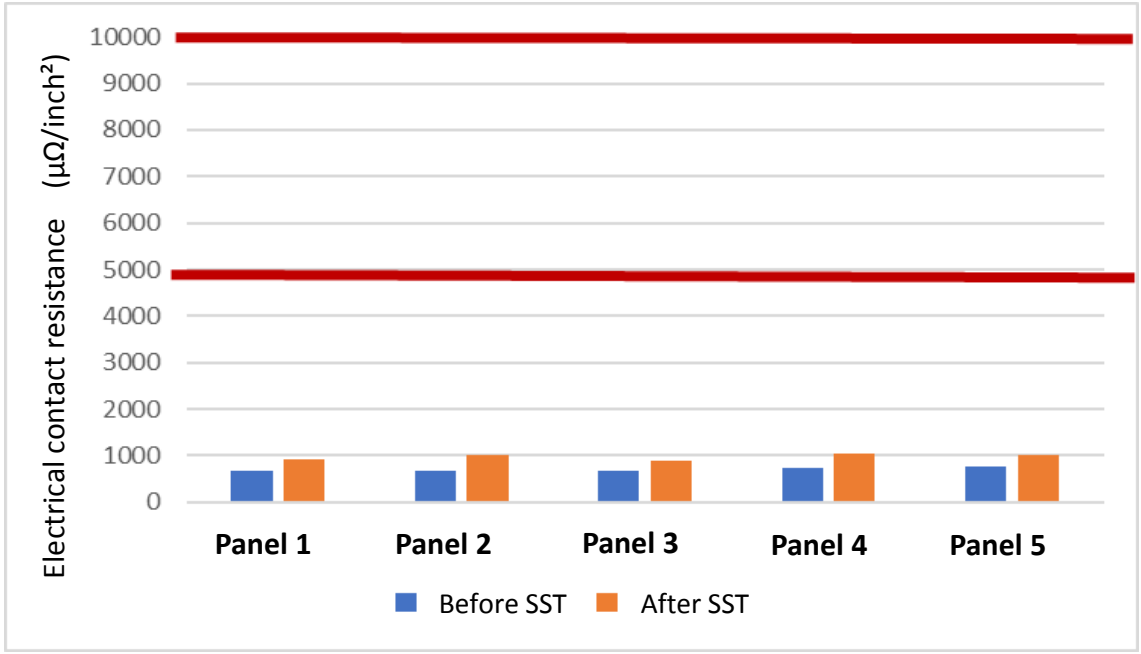
According to MIL-DTL-81706B

- Tests done for the MIL-DTL-81706B approval
- Alloys 2024-T3 and 7075-T6
- Results after 336h salt spray test

	Alloy	Number of pits
Panel 1A	2024-T3	0
Panel 2A	2024-T3	0
Panel 3A	2024-T3	0
Panel 4A	2024-T3	0
Panel 5A	2024-T3	0
Panel 1B	7075-T6	0
Panel 2B	7075-T6	0
Panel 3B	7075-T6	0
Panel 4B	7075-T6	0
Panel 5B	7075-T6	0

Electrical contact resistance

- Measured on 6061-T6 according to MIL-DTL-81706B*



- Homogeneous results
- meets the MIL requirements

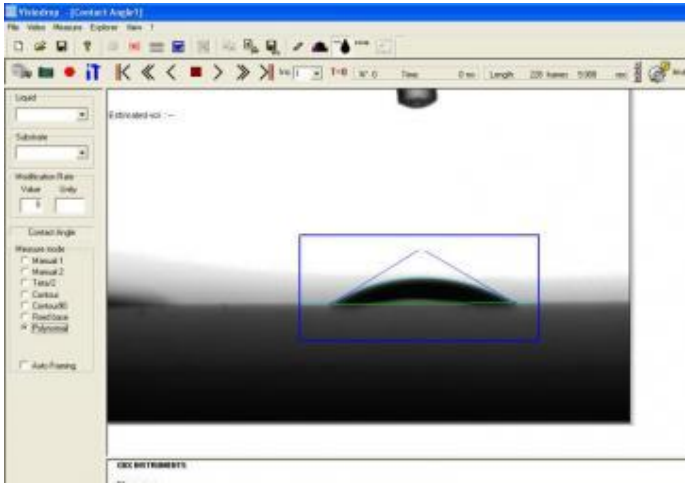
*test done by Canagrosa, external laboratory

Paint adhesion

- Surface tension of the coating after treatment, measured by a goniometer

  > 72 mN.m-1 (surface tension of water at 25 ° C)

- Perfect wettability of the surface
- Paint adhesion according to FED-STD-141, Method 6301.3



Henkel

Results and benefits

Excellent corrosion protection for unpainted surfaces

Electrical contact conductivity meets MIL-DTL-81706

Good preparation for paint adhesion

- Based on Cr^{3+} and Zr^{4+}
- Produced from Cr^{3+} salts
- Contains additives to complex copper
- Sulfate-free

Analysis of BONDERITE M-NT 65000

Bath analysis

- Concentration : by titration (analysis of Cr) or spectrophotometer
- pH : 4.0 – 4.2
- Aluminium content : 0.2 à 2 g/l

Addition of BONDERITE M-AD 101

Layer analysis

Destructive analysis

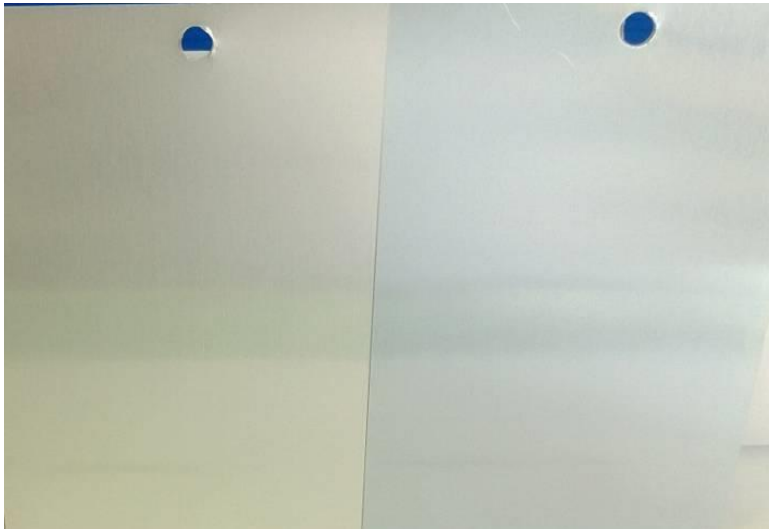
- By dissolution accorting to MIL-DTL-81706b: 0.2 – 0.4 g/m² (pour standard process)
- Drop test

Not destructive analysis

- Aspect : iridescent surface
- BONDERITE viewer : observation de la présence de revêtement par filtre polarisant
- X-Ray fluorescence spectrometry

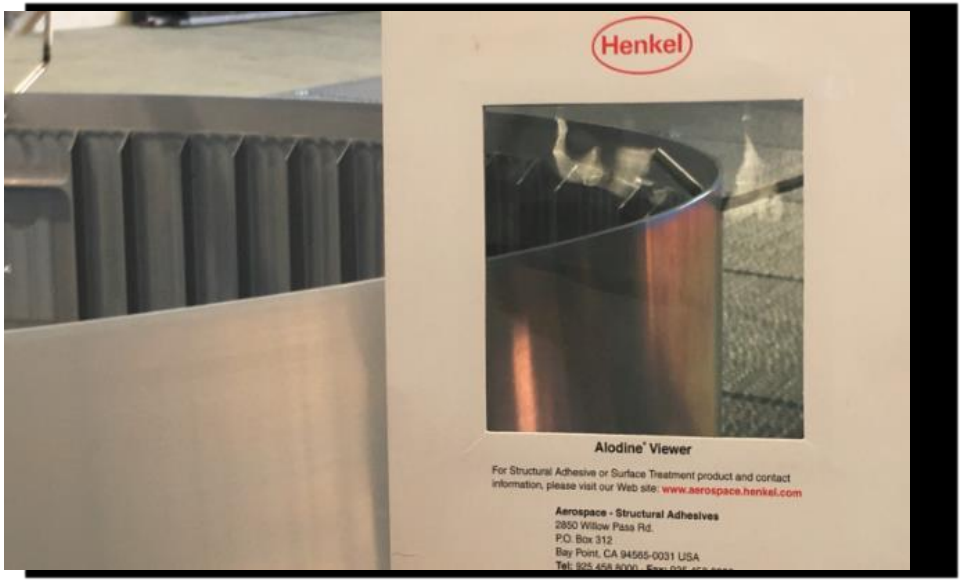
Layer visualization

To the naked eye



Before treatment **After treatment**

BONDERITE viewer



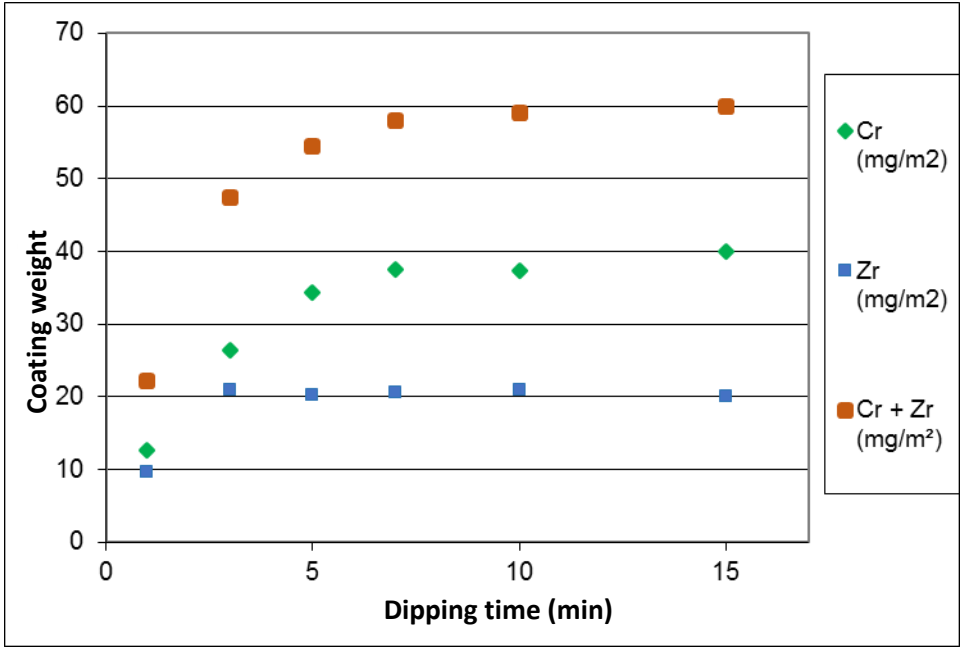
X-Ray fluorescence spectrometry

- Quantitative measure of Cr and Zr
- Not-destructive method
- ~10% error
- Make a “blank” of untreated panel

Substrate	Information Depth
CRS	~ 500 µm
HDG	~ 500 µm
AA 6014	~ 1000 µm

Niton® XRF analyser

BONDERITE M-NT 65000 : deposit according to immersion time



Touch and Prep with paintbrush

- Manual grinding with abrasive pad (like Abrada pads)
- Cleaning towel
- Application of BONDERITE M-NT 65000 pure with a paintbrush for at least 4 min
- Rinsing with demineralized water

Alloy 2024-T3
NSS 168h : no corrosion pits

BONDERITE M-NT 65000

Approvals and evaluation in progress

- Navair
- Airbus D&S
- Airbus Helicopter
- Hutchinson
- MBDA
- Thales
- Zodiac Aerospace
- Ratier Figeac
- Alstom
- Kalistrut

- CETIM report

(French Technical Centre for Mechanical Industry)

Qualification of the trivalent chromium conversion coating :
Bonderite M-NT 65000 - Henkel

Parameters	Acceptance criteria	Results
Visual aspect	-	Conform
Abrasion adhesion (according to NF EN ISO 3613)	Change of color	Conform
Corrosion protection (SST - 168h) (According to NF EN ISO 9227)	5 pits / 1,5 dm^2	Conform
Electrical contact resistance (According to MIL-DTL-81706)	< 5 mΩ/$inch^2$ before SST < 10 mΩ/$inch^2$ before SST	Conform

Approvals of the products

BONDERITE C-AK 6849 Aero

- ✓ Approved by BOEING
  BAC 5763, Type 2
- ✓ Approved by AIRBUS
  ABP 8-1290, AIPI 09-01-003
- ✓ Approved by BOMBARDIER
  180-001, 180-040
- ✓ Approved by EMBRAER
  MEP 21-021
- ✓ Approved by DASSAULT

BONDERITE C-IC Smutgo NC Aero

- ✓ Approved by AIRBUS
  - AIPI 02-01-003
  - AIPI 02-01-002
  - AIPI 02-05-001
- ✓ Approved by BOEING
  BAC 5765
- ✓ Used by DASSAULT suppliers

BONDERITE C-IC Deoxlm 2310 Aero

- ✓ Approved by BOEING
  - BAC 5555
  - BAC 5765
  - BAC 7771
- ✓ Approved by BOMBARDIER,
  MPS 180-32
- ✓ Approved by EMBRAER,
  MEP 13-093

Touch and Prep : BONDERITE M-CR 871 AERO

- Based on trivalent chromium (no hexavalent chromium)
- MIL – DTL 5541 approved and is listed on the QPL 81706 for the following use : Type II, class 1A et 3, form VI, method D
- No final rinse

2024 alloy
Picture after SST 168h

Operating mode

- ✓ Manual sanding with abrasive pad (e.g. Abrada pads)
- ✓ Paper towel cleaning
- ✓ Application of BONDERITE M-CR 871 AERO with at least 50% overlap
- ✓ Let the layer dry during 5 min
- ✓ Application of BONDERITE M-CR 871 AERO at 90° with at least 50% overlap
- ✓ Let the layer dry

Thank you !