

**ELECTROLYTIC ZINC COATINGS  
AND ASSOCIATED FINISHES  
SHERARDIZING PROCESS (IN BULK)**

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**This norme PARTIALLY REPLACES norm B15 4101***This is a translation, the French original shall be used in all cases of litigation**Date of translation : 30/06/2009***WARNING**

This PSA norme has been translated by RHN / NCF into English using the automatic translation software Systran (approved by PSA).

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## RECORDS

<b>Suffix</b>	<b>Date</b>	<b>Type of modifications</b>
OR	14/12/2001	CREATION OF THE NORME.
A	25/01/2006	EDITORIAL MODIFICATIONS AIMED AT PROHIBITING CR 6 IN COATINGS CONFORMING TO THIS NORME. NEW PARAGRAPH 8 ADDED. REWRITE OF APPENDICES 1 AND 2
B	08/12/2006	DETAILS ADDED TO PARAGRAPH "FINISH" ADDITIONS TO PARAGRAPH "SYMBOLS" UP-DATE OF APPENDIX 1.
C	30/06/2009	ADDITION OF A REQUIREMENT OF GRIP AND RESISTANCE TO THERMAL SHOCK FOR THE PARTICULAR CASES OF THE § 7; ENGINEERING CHANGE OF THE § 9; ENGINEERING CHANGE OF APPENDIX 1 AND REMOVAL OF APPENDIX 2 FOLLOWING THE REHANDLING OF THE ACTIVITIES OF SURFACE TREATMENT OF SIDASA BY ATOTECH

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## 1.OBJECT AND FIELD OF APPLICATION

This norm:

- Replaces for new designs norme B15 4101 for zinc plated parts subjected to the sherardizing process (in bulk).
- Defines the type of electrolytic zinc-based coatings produced by the "sherardized" process or "in bulk" and used for the anticorrosion protection of steel parts : **the electrolytic zinc coating with 12 to 15% nickel in alkaline bath without cyanide is mandatory with the exclusion of any other electrolytic zinc coating (except in specific cases mentioned in paragraph 7).**

These electrolytic zinc coatings must be exempt from any prohibited or regulated substance stated in norme B20 0250 (and in particular exempt of Cr 6).

- Defines, for these electrolytic coatings, the symbols to be used on drawings or on standard documents.
- Specifies the requirements to be met by these coatings.
- States in the Appendix the commercial references of products approved by PSA which must be used by the Suppliers or Sub-contractors producing these coatings.

**Note 1 :** *Lamellar zinc coating (norme B15 3320) may also be used for the anticorrosion protection of the same parts if these parts come into the field of application of norme B15 3320.*

**Note 2 :** *The requirements of this norme should enable the PSA corrosion objectives defined in February 1999 to be observed, in particular :*

- *Suitability for dismantling > 6 years.*
- *No Red Rust under bodywork > 3 years.*
- *No Red Rust under bonnet and access panels > 5 years.*

**Note 3 :** *Producing mandatory Zinc Nickel electrolytic coatings enable Cr6-based passivations to be replaced by Cr3-based passivations (observance of the European Directive for End-Of-Life vehicles : see Note 1 of § 6.4) while improving the resistance to corrosion on vehicle compared with pure dichromated Zinc coatings.*

## 2.REFERENCE DOCUMENTS

### 2.1.NORMS

B15 3320	LAMELLAR ZINC BASED COATINGS – BULK OR TIE PROCESS
B20 0250	MATERIALS SUBJECT TO REGULATIONS - USE RESTRICTIONS WITHIN THE PSA PEUGEOT-CITROEN GROUP
C10 0054	SCREWS STUDS NUTS – APTITUDE TO FRICTION "CONTINUOUS" TEST METHOD
D17 1058	MATERIALS AND COATINGS SALT SPRAY TEST OF 5% NaCl AND METHODS OF GRADING
D26 5316	ORGANIC COATINGS ON MAGNETIC OR NON-MAGNETIC METAL SUPPORT NON-DESTRUCTIVE MEASUREMENT OF THE THICKNESS
ISO 1463	METALLIC COATINGS AND OXIDE LAYERS – MEASUREMENT OF THE COATING THICKNESS – MICROSTRUCTURAL SECTION METHOD
ISO 3497	METALLIC COATINGS – MEASUREMENT OF THE COATING THICKNESS – X-RAY SPECTROMETRY METHODS
ISO 3613	CHROMATE CONVERSION LAYERS ON ZINC, CADMIUM ET ALUMINIUM-ZINC AND ZINC-ALUMINIUM ALLOYS – TEST METHODS

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## 2.2.REGULATIONS

[CE 2000/53](#)

END-OF-LIFE VEHICLES

## 2.3.OTHER DOCUMENTS

Not applicable

## 2.4.EXPRESSION ON DOCUMENTS

Not applicable

## 3.TERMINOLOGY AND DEFINITION

A dictionary (glossary) of the main terms and their definitions used within the activities of the Department "Amont Technico-Industriel" can be consulted in-house via the glossary [Nectar](http://nectar.inetpsa.com) (<http://nectar.inetpsa.com>). This glossary is constantly up-dated.

### 3.1.DEFINITIONS

<b>Electrolytic zinc coating by the sherardizing process (in bulk) :</b>	Process of electrodepositing a zinc based coating which consists of introducing parts in bulk into a perforated drum which is then immersed (in rotation) into various baths of the zinc coating installation.
<b>Lamellar zinc coating :</b>	Process of depositing (not electrolytically) a zinc lamellar based (and if applicable aluminium) coating.
<b>Chromium plating to Cr 6 (or dichromating) :</b>	Operation which consists of immersing zinc coated parts in a chromic acid based bath to strengthen the resistance to corrosion of the coating ; this operation is from now on prohibited as it leads to the formation of a complex chromium oxides (Cr 6) and zinc layer. This operation has to be replaced by a passivation in Cr3 based product baths.
<b>Plater :</b>	Supplier or sub-contractor producing the coatings.

### 3.2.ACRONYMS

**BS :** Salt Spray

**CAV:** Vehicle Accelerated Corrosion

## 4.GENERAL REQUIREMENTS

Not applicable.

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## 5. PARTS AFFECTED BY THE PROCESS – PROHIBITION AND USE LIMITS

- Electrolytic zinc coating is a coating with the unique function of protecting parts in ferrous materials against corrosion up to a maximum peak temperature of around 200 °C (for Zinc Nickel 12 to 15 %).

Electrolytic zinc coating must not be specified for the coating of parts :

- which are not in ferrous material,
- exposed to temperatures above 200°C,
- with a geometry incompatible with electro-deposition : for example, electrolytic zinc coating must not be specified where it is impossible or difficult to observe the thicknesses stated in § 8.2. or on drawings (electro-deposition is impossible in box sections).

On the other hand, Zinc Nickel coating 12 to 15% may be used for the protection of parts rubbing against each other; a functional validation must however be carried out systematically.

Furthermore, acid pickling, electrolytic degreasing and actual electrolytic zinc coating operations have a tendency to lead to **embrittlement (hydrogen embrittlement)** of steel with high mechanical characteristics, **which may cause delayed fractures on coated parts**. This is the reason why :

- Electrolytic zinc coating is prohibited :
  - for any part with a tensile strength load  $R_m > \text{or} = 1200 \text{ Mpa}$ , or with a Vickers hardness  $> \text{or} = 372 \text{ Hv}$ .
  - for safety parts with a tensile strength load  $R_m > \text{or} = 1000 \text{ Mpa}$ .
  - for screws, pillar screws and studs of Quality Class  $> \text{or} = 12.9$ .
  - for safety fasteners of Quality Class  $> \text{or} = 10.9$  (screws, pillar screws, studs).
  - for safety nuts of Quality Class  $> \text{or} = 12$ .

**Note :** *In the case of screws or nuts with incorporated washer, the prohibition for zinc coating is based on the component with the highest hardness or  $R_m$ .*

- A stress relieving operation (see paragraph 6.3.) is mandatory:
  - for parts with a tensile strength load  $R_m > \text{or} = 1000 \text{ Mpa}$  or with a Vickers hardness  $> \text{or} = 310 \text{ Hv}$ .
  - for safety parts with  $R_m > \text{or} = 800 \text{ Mpa}$ .
  - for metallic clips and clamps
  - for thread forming screws, tapping screws and screws for soft materials
  - for nuts of Quality Class 12
  - for fasteners of Quality Class 10.9 (screws, pillar screws, studs...)
  - for safety fasteners of Quality Class 8.8 (screws, pillar screws, studs).

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## 6. DESCRIPTION OF THE PROCESS

To obtain an electrolytic zinc coating conforming to this norme, the next main steps must be observed.

### 6.1. DEGREASING AND PICKLING

Several chemical and/or electrolytic degreasing and pickling operations separated by water rinses must be carried out before zinc plating.

**Warning** : These operations embrittle the steel to a more or less degree (Hydrogen embrittlement) and are therefore prohibited or require a stress relieving operation : see paragraph 5.

**Note** : *Mechanical pickling (micro ball indentation for example) may also be carried out, in particular on parts which have been subjected to a thermal treatment.*

### 6.2. ELECTROLYTIC ZINC COATING (symbol ZNI)

The electrolytic zinc plating must be produced from a mandatory Zinc and Nickel bath, in an alkaline medium without cyanide. This operation and the coating obtained are represented in this norme by letters **ZNI**.

The Zinc Nickel thickness and the Ni content of the coating must conform with the requirements in paragraph 8.

**Warning** : The zinc plating operation embrittles the steel to a more or less degree (see paragraph 5). For certain steel classes, zinc coating is prohibited; for others, a stress relieving operation is required.

### 6.3. STRESS RELIEVING (symbol D)

This operation which carries the symbol represented by letter **D** in this norme **must mandatorily be carried out 4 hours maximum after removing the parts from the zinc plating bath**. It may be carried out before or after the passivation stage and before finishing.

Parts must be subjected to a temperature level of at least 200°C (temperature of the parts) **for a minimum duration of 4 hours in a ventilated oven**.

Stress relieving is mandatory when letter **D** is shown in the symbol of the coating stated on the drawings and for steel classes stated in paragraph 5.

**Note** : *Lamellar zinc (Normes B15 3320) does not require a stress relieving operation as it does not embrittle the steel providing that mechanical pickling is carried out with the exclusion of any other chemical pickling operations.*

### 6.4. PASSIVATION (SYMBOL 3)

This operation strengthens the resistance to corrosion of the coating by delaying the corrosion of the Zinc Nickel layer and colours or participates in the colouring of the coating.

This passivation must be carried out with products containing Chrome 3 (trivalent) when the figure **3** is shown in the coating symbol; refer to the list of PSA product approval in the Appendix. In this case, the colour of the coating must be a mandatory Silver (**Symbol A**) or exceptionally Black for Styling purposes (**Symbol N**).

The use of products containing Chrome 6 (hexavalent) is from now on prohibited : See norme B20 0250.

**Note 1** : *The European Directive 2000/53/EC of 21/10/2000 concerning End of Life vehicles (E.L.V..) prohibits from 01/07/2007 Cr6 on all component or unit of a vehicle marketed in EUROPE (except on the chassis fixing parts : prohibition from 1/07/2008). From 1/07/2003, Cr6 in anticorrosion coatings was permitted as an exemption on vehicles marketed in EUROPE.*

**Note 2** : *Black passivations are at present more difficult to produce, more expensive and less performing from the point of view of resistance to corrosion than the Silver passivations. This is the reason why they must be specified only in exceptional circumstances.*

**Note 3** : *The deletion of the passivation operation is being studied and has not yet been validated.*

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## 6.5.FINISH (symbol P, I, R OR L)

This operation consists of depositing an organic, mineral or organo mineral coating of a thickness in the order of the micron, in order to obtain a uniform colour or reinforce the colour of the coating, strengthen the anticorrosion protection and/or confer a defined friction coefficient to the coating.

There are four possibilities

### 1. The application of a finish is Prohibited : Symbol P

A finish coating may be prohibited (after agreement from PSA corrosion Experts) in the following cases :

- Rubber/metal parts armatures.
- Parts which provide an electrical function (a finish always weakens the part electrically)
- Parts which provide a sealing function to fluids or which are in permanent contact with fluids (oil, anti-freeze, brake fluid, power steering fluid, refrigerating fluid...).

**Example :** *dish plugs, female union nuts etc.*

### 2. The application of a finish is unnecessary but not prohibited : Symbol I

This is the case of parts fitted in the passenger compartment or under the bonnet and with very little exposure to corrosion (housing protection for example) with the exception of multi-use parts (fasteners for example). It is the responsibility of the PSA Corrosion Experts to decide whether the application of a finish is necessary or not.

### 3. The application of a Reinforced finish for anticorrosion is necessary : Symbol R

This is the case of visible parts, excluding fasteners fitted outside the passenger compartment.

### 4. The application of a Lubricated finish is necessary : Symbol L

The aim is to confer a given friction coefficient to the coating. This lubricated finish shall be applied to all threaded parts. Unless otherwise specified on the drawing or on a standard document, threaded fasteners must have a friction coefficient equal to  $0.15 \pm 0.03$  (this friction coefficient is measured according to norme C10 0054).

**Note :** *Certain commercial products are formulated to reinforce protection against corrosion and also to confer to the coating a friction coefficient equal to  $0.15 \pm 0.03$ ; see list of approved products in the Appendix.*

## 7.SYMBOLS

The designation on a drawing or on a standard document of an electrolytic zinc coating conforming to this norme carries a symbol made of characters which specify the process to be used and the requirements to be observed.

The symbols shall include in the following **mandatory order** :

- Letters **ZNI** (which require a Zinc and Nickel electrolytic coating (12 to 15% Ni) in alkaline bath without cyanide).
- Letter **D** (which requires a mandatory stress relieving operation described in § 6.3. for steel classes stated in paragraph 5). Where no letter D is mentioned, the stress relieving operation is not required.
- One of the letters **A** or **N** (which indicates the colour of the coating required by PSA).

**A** = Silver (**A**rgent)

**N** = Black (**N**oir) colour

**Warning :** Colour N (black) must only be specified in exceptional circumstances and only for Styling requirements (see Note 2 in § 6.4.).

- Figures 3 (indicates the required type of passivation stipulated by PSA : see § 6.4.)

**3** = chrome **3** (trivalent) passivation

**Note :** *this norme bans all Chromium 6 (hexavalent) passivation in future.*



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- One of the letters **P**, **I**, **R** or **L** (indicates whether a finish coating is prohibited, unnecessary or required and the type of coating) :

**P** = Prohibited finish (see § 6.5.1.)

**I** = Unnecessary (Inutile) finish but not prohibited (see § 6.5.2.)

**R** = Reinforced finish for an improved anticorrosion protection (see § 6.5.3.)

**L** = Lubricated finish for threaded parts (screws, nuts....) : see § 6.5.4. If the friction coefficient required varies from  $0.15 \pm 0.03$ , this must be specified on the drawing or on the standard document.

### Examples of symbols :

ZNI A3L, norme B15 4102 means a **Zinc Nickel** electrolytic coating (with 12 to 15% Ni) in alkaline bath without cyanide, no stress relieving operation, Silver (**Argent**), with trivalent chromium (**3**) passivation and **Lubricated** finish for a friction coefficient equal to  $0.15 \pm 0.03$ .

ZNIDA3R, norme B15 4102 means a **Zinc Nickel** electrolytic coating (with 12 to 15% Ni) in alkaline bath without cyanide, with a mandatory stress relieving operation of 4 hours at 200°C minimum, Silver (**Argent**) colour, with trivalent chromium (**3**) passivation and **Reinforced** finish for anticorrosion.

## SPECIFIC CASES

### 1. Temporary protection or storage protection

When this type of protection is provided by electrolytic zinc coating, this coating is represented by the symbol **ZS5**.

#### Requirements :

- Type of coating : Pure Zinc or Zinc alloyed to Iron, Cobalt or Nickel.
- Zinc coating thickness :  $\geq 5 \mu\text{m}$  (by X-ray fluorescence method, according to ISO 3497).
- Grip and resistance to thermal shock: mode of operation and requirements of the § 8.4, except temperature of the drying oven: 200° C instead of 300° C.
- Passivation and Finish are not required unless otherwise stated on the drawing. All passivation using Chromium 6 (hexavalent) is from now on banned.
- Resistance to salt spray (D17 1058) : after 48 hours exposure, no red rust.

**Note** : *This coating provides only a poor anticorrosion protection and must only be used for specific cases of temporary or storage protection. It must not be carried out on steel parts which would require a stress relieving operation (see paragraph 5).*

### 2. Electrolytic zinc plating followed by a paint application

In this case, the electrolytic zinc coating is represented by the symbol **Z 10**.

#### Requirements :

- Type of coating : Pure zinc or zinc alloyed to Iron or Cobalt.
- Zinc coating thickness :  $\geq 10 \mu\text{m}$  (by X-ray fluorescence method, according to ISO 3497). A maximum thickness can be specified with drawing in the case of galvanized parts which are soldered by electric spot weld after zinc-coating
- Grip and resistance to thermal shock: mode of operation and requirements of the § 8.4, except temperature of the drying oven: 200°C instead of 300° C
- A slight passivation (white/blue-tinged) to chromium 3 is tolerated.
- Any finish is prohibited.

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### 3. Non-threaded parts fitted inside the passenger compartment

Rather than using nickel alloy zinc coatings (ZNI A3I or ZNI N3I with or without stress relief), these parts (with the exception of Multi-use parts) may be coated, after agreement by PSA Corrosion Experts, and for economical reason, by an electrolytic zinc plating represented by the symbol Z 10 FB or Z 10 FN or Z 10 DFB or Z 10 DFN.

#### Requirements :

- Type of coating : Pure Zinc or Zinc alloyed to Iron or Cobalt.
- Zinc coating thickness :  $\geq 10 \mu\text{m}$  (by X-ray fluorescence method, according to ISO 3497).
- Grip and resistance to thermal shock: mode of operation and requirements of the § 8.4, except temperature of the drying oven: 200°C instead of 300°C.
- Stress relieving operation (for Z 10 DFB and Z 10 DFN designations – see paragraph 5) **of a minimum duration of 4 hours at a minimum temperature of 200°C produced after zinc plating (within a minimum time of 4 hours) and before passivation.**
- Chromium 3 passivation is mandatory, of a white colour for Z 10 FB and Z 10 DFB designations or of a black colour for Z 10 FN and Z 10 DFN designations.
- Finish unnecessary
- Resistance to salt spray (D17 1058) : after 300 hours exposure, no red rust must appear.

### 4. Threaded parts fitted inside the passenger compartment

Rather than using nickel alloy zinc coatings (ZNI A3L or ZNI N3L with or without stress relief), these parts (with the exception of Multi-use parts) may be coated, after agreement by PSA Corrosion Experts, and for economical reason, by an electrolytic zinc plating represented by the symbol Z 10 FBL or Z 10 FNL or Z 10 DFBL or Z 10 DFNL.

#### Requirements :

- Type of coating : Pure Zinc or Zinc alloyed to Iron or Cobalt.
- Zinc coating thickness :  $\geq 10 \mu\text{m}$  (except on threads  $> \text{ or } = 8 \mu\text{m}$ ) (by X-ray fluorescence method, according to ISO 3497).
- Grip and resistance to thermal shock: mode of operation and requirements of the § 8.4, except temperature of the drying oven: 200°C instead of 300°C.
- Stress relieving operation (for Z 10 DFBL and Z 10 DFNL designations – see paragraph 5) **of a minimum duration of 4 hours at a minimum temperature of 200°C produced after zinc plating (within a minimum time of 4 hours) and before passivation.**
- Chromium 3 passivation is mandatory, of a white colour for Z 10 FBL and Z 10 DFBL designations or of a black colour for Z 10 FNL and Z 10 DFNL designations.
- Lubricated finish mandatory providing (unless otherwise specified) a friction coefficient equal to 0.15 + or – 0.03 (measured according to norme C10 0054). Use preferably the commercial products listed in appendix 1.
- Resistance to salt spray (according to D17 1058) : after 300 hours exposure, no red rust must appear.

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## 8.COATING CHARACTERISTICS AND REQUIREMENTS

### 8.1.COATING COMPOSITION

The coatings (Zinc Nickel deposit, passivation and finish) must be carried out with commercial products which have previously been approved by PSA as a result of various validation tests (corrosion tests in laboratory, on C.A.V. (Accelerated Corrosion) vehicles, on natural corrosion sites). The list of approved products is shown in the Appendix.

Ni content : the Nickel content of the Zinc Nickel coating **must be between 12 and 15% in weight** (test carried out by X-ray fluorescence, according to the ISO method 3497).

Chromium 3 passivations (Symbol 3) : **check that there is no Cr 6** in extraction products after immersion of zinc coated parts in boiling water according to ISO method 3613 – 2000 ; possible traces of Cr6 must be below the threshold indicated in norme B20 0250.

**Passivation and finish products must not contain Lead or Cadmium or Mercury in order to be in conformity with norme B20 0250; possible traces of these heavy metals must be below the threshold indicated in norme B10 0250.**

### 8.2.ZINC NICKEL COATING THICKNESS

Thickness is measured by X-ray fluorescence (ISO method 3497).

In litigation cases between PSA and the supplier, the thickness shall be measured by microstructural section (ISO method 1463).

Coating thickness excluding thread :  $\geq 8 \mu\text{m}$

Coating thickness on thread :  $\geq 5 \mu\text{m}$

**Note 1 :** *Where the measuring apparatus by X-ray fluorescence is not available, the coating thickness may be measured approximately and in certain conditions with a magnetic inductance apparatus (Test method D26 5316), but this technique does not provide the measurement for Ni content.*

**Note 2 :** *Unless otherwise stated on the drawing, all areas on a part must have a mandatory coating with the thicknesses required above.*

*The drawing must indicate the areas exempt of coating and those where the coating thickness is special.*

**Note 3 :** *Coated threaded parts must also meet the various "ring gauge" inspection : consult the specific normes relating to each family of threaded parts.*

### 8.3.COLOUR AND APPEARANCE

The colour of the coating must correspond to that required on the drawing or on the standard document.

The colour must be uniform over the whole part.

### 8.4.ADHESION AND RESISTANCE TO THERMAL SHOCK

These two characteristics are checked by placing the coated part in an oven at a temperature of  $300^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .

As soon as the part reaches the temperature of  $300^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , plunge the part immediately in water at a temperature of  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$  for a few seconds.

**Requirement :** No flaking, blistering of the coating visible to the naked eye.

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## 8.5.RESISTANCE TO SALT SPRAY (D17 1058)

The part must be stored for a minimum of 24 hours at the temperature of  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$  before being dried in an oven which must take the part to a temperature level of  $120^{\circ}\text{C} \pm 2^{\circ}\text{C}$  (temperature of the part) for a duration of 1 hour. After returning the part to a temperature of  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , the part is introduced into the salt spray enclosure.

### Requirements :

1. Excluding mechanically crimped areas after zinc plating :

- No white rust before 200 hours of *salt spray*.

**Note :** *At 200 hours salt spray, the following is allowed :*

- *presence of a "white film"*
- *A white rust recovering less than 5% of the surface of the part*
- *it presence of white rust on sharp edges*
- No red rust before 720 hours of salt spray

2. On the mechanically crimped areas after zinc plating :

### **No red rust before 720 hours salt spray**

**Note :** *white rust allowed before 200 hours salt spray*

### Definitions :

- White film : Very slight change in the initial colour of the coating due to white oxides showing on the coating microcracks.
- White rust : Corrosion of the zinc coating which translates by the showing of large white oxides following the disappearance (localised or generalised) of finish and passivation layers. The "white rust" stage has been reached when more than 5% of the surface of the part is oxidised.

## 8.6.FRICTION COEFFICIENT

This requirement concerns only symbol **L** coating.

The measurement of the friction coefficient is carried out according to the method of operation stated in norme C10 0054.

The friction coefficient must be equal to  $0.15 \pm 0.03$  unless a specific friction coefficient is indicated on the drawing or on the standard document relating to the part.

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## 9.CONTROL OF THE ZINC PLATING PROCESS BY THE PLATER

Control of the process by the plater and the use of commercial products quoted in Appendix 1 in this norme cannot be separated in order to meet permanently the requirements of this norme.

Since the supplier of products used in electrolytic zinc coatings is perfectly aware of the parameters and conditions of use of his products, PSA request that he systematically and regularly audits (approximately every 2 years) the zinc plating lines allocated to automotive products and user of his products. Conformity of the coating on the parts for each plater with regard to the requirements of this norme shall also be verified periodically by the supplier of the products.

The plater is the only person responsible for the conformity of the coatings with regard to the requirements of this norme towards his customers. However, the supplier must ensure that the plater is in full control of the process supplied or to be supplied and that the installations of the plater are suitable to the products used. As such, the supplier of the products shall forward, at PSA's request, the reports of audits and the results of the tests on parts concerning the platers supplied by him.

PSA encourages the suppliers of products to deliver Automobile a Qualité label with the applicators which conform to the requirements of the system of coordinates of audit of the supplier of products. When this label exists, the coatings of the parts used by PSA must be only realized by labeled applicators. PSA shall proceed with striking off, in Appendix 1, the supplier's products that have not complied with the various requirements.

The plater is free to change products and suppliers among those stated in Appendix 1, but before carrying out any any modifications, the relevant line shall be audited by the new supplier of products

The file on the plater to be included with the Initial Samples shall contain the detailed range of the electrolytic zinc coating (with the commercial references of products used), as well as the report of tests carried out by the plater proving the conformity of the coating with regard to the requirements of this norme. Any subsequent modification to the range shall be the subject of a new presentation of the Initial Samples.

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*Summary table of the requirements*

Test method	Characteristics	Expression of results	Value	
			minimum	maximum
	Coating composition (§ 8.1)			
ISO 3497	Nickel content	% in weight	12	15
ISO 3613	No chromium 6		No Cr 6 required for coatings with symbol 3 (possible traces of Cr 6 < than threshold shown in B20 0250)	
	Other heavy metals		No Pb, Cd, Hg (possible traces < than threshold shown in B20 0250)	
ISO 3497 (or ISO 1463 if litigation)	Zinc Nickel coating thickness (§ 8.2)			
	Thread excluded	µm	8	
	On thread	µm	5	
Visual examination	Colour and appearance (§ 8.3)			
	Colour		A = Silver N = Black (for Styling)	
	Appearance		Even colour over the whole part	
Refer to procedure in § 8.4	Adhesion and resistance to thermal shock (§ 8.4)	-	No flaking No blistering	
	Resistance to salt spray (§ 8.5)			
D17 1058	Excluding mechanically crimped area after zinc plating (§ 8.5.1)			
Refer to procedure in § 8.5	White rust showing	Hours	200 (1)	
	Red rust showing	Hours	720 (2)	
	On mechanically crimped area after zinc plating (§ 8.5.2)			
	Red rust showing	Hours	720 (2)	
C10 0054	Friction coefficient (§ 8.6)	No unit	0,12	0,18
	(this requirement concerns only coating with symbol L)		Or specific requirement stated on the drawing or standard document	

(1) At 200 hours of salt spray, the following are allowed :

- A «white film» (see definition in § 8.5)
- White rust covering at least 5% of the part surface area
- White rust on edges

(2) No red rust spot is allowed.

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## Appendix 1

### List of suppliers and zinc plating, passivation and finish products approved by PSA – Approval by PSA further to testing on coated parts on industrial lines

Colour	Supplier	Reference of zinc plating products Symbol ZNI	Reference of trivalent passivation products Symbol 3	Reference of reinforced finish products Symbol R	Reference of lubricated finish products Symbol L
A (Silver)	MAC DERMID (1) ZINKLAD 1000 Label ZAP	ENVIRALLOY Ni 12-15	TRIPASS ELV 3000	TNT 15	TNT 15 (2 layers required)
	COVENTYA	PERFORMA 280	FINIDIP 128 (4)	FINIGARD 105 ou FINIGARD 150 (2)	FINIGARD 105 (3) FINIGARD 150 (2)
	ATOTECH Label AAA (5)	PROTEDUR Ni 75 ou ZINNIAL 15 ou REFLECTALLOY ZNA (6)	ECOTRI ou ZINNIFIX 3	CORROSIL PLUS 501 BG ou SEALER 300 WL ou CORROSIL AL 2007	CORROSIL AL 2007
N (Black)	COVENTYA	PERFORMA 280	FINIDIP 728	FOM 302 ou FINIGARD 150 (2) ou FINIGARD 105	FOM 302 ou FINIGARD 150 (2)
	MAC DERMID (1) ZINKLAD 1000 B Label ZAP	ENVIRALLOY Ni 12-15	TRIPASS ELV 5100	TNT 15	TNT 15
	ATOTECH Label AAA (5)	PROTEDUR Ni 75 ou ZINNIAL 15 ou REFLECTALLOY ZNA (6)	CORROTRI NOIR ZnNi	CORROSIL PLUS NOIR 600 BG ou CORROSIL NOIR AL 2007	CORROSIL Noir AL 2007

(1) Only the platers who have received from MAC DERMID the ZAP approval (ZINKLAD APPROVED PLATER) may apply the MAC DERMID products on parts intended for PSA (ZINKLAD is the Quality Assurance system set up by MAC DERMID at world level within the scope of application of the European Directive on ELV).

(2) FINIGARD 150 is the definitive trade name (allocated by the COVENTYA Company) of the finishing product also known under the provisional names "Ex2" or "EX CCA 0509".

(3) FINIGARD 105 must not be used on new threaded parts.

(4) the FINIDIP 128 passivation must not be used for screws and studs of diameter  $\leq$  M7 which are tightened into aluminium or which are in contact under the head with aluminium; in this case it is advisable to use the black passivation FINIDIP 728 (with FINIGARD 150 or FOM 302 finishes).

(5) Only the applicators which received or which are in the course of obtaining, on the part of ATOTECH, of approval AAA (ATOTECH Automotive Applicators) can apply products ATOTECH above, on the parts intended for PSA.

(6) ATOTECH certifies that PROTEDUR Ni 75 and ZINNIAL 15 are two trade descriptions of only one and even produced