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IMPORTANT NOTE

The coatings with passivation including hexavalent chrome salts **MUST NO LONGER BE USED** after 01.07.2007, for the vehicles included in the EC Directive 2000/53/CE and later amendment of 27.06.2002.

Concerning the standard parts used on IVECO vehicles of all ranges, it is mandatory to use hexavalent chrome free coatings (**Table III**).

1 PURPOSE

This Procurement Specification covers the non electrolytic anticorrosion chemical coatings, whose composition is:

- water dispersion of spathic zinc, aluminum, chromates, organic substances (with hexavalent chrome);
- dispersion in water or organic solvent of spathic zinc, aluminum, chromates, organic substances (hexavalent chrome free).

To be applied on iron parts and later baking. Baking temperatures range from 180–200 °C for organic systems with solvent base up to 300–320 °C for water base organic systems. Additional finishing treatments (topcoat) can be applied on base coatings to enhance the resistance to corrosion, to apply specific colors and/or to change friction coefficient with the addition, in that case, of specific additives.

2 USABLE COATINGS

Containing hexavalent chrome, see **Table II**.

Chrome free, see **Table III**.

3 CLASSIFICATION, DESIGNATION, INDICATION ON DRAWING AND USE

See **Tables II** and **III**.

NOTE : See **Table I** for the correspondence between new and old designations.

TABLE I

Type of material	New designation	Old designation
DACROMET 320	DAC 320-5	DAC 5
	DAC 320-8	DAC 8

Edition	Date	Description of modifications	Group
1	01.03.1984	New.	CMD
9	23.02.2007	Fully revised.	
10	30.07.2007	Added Manager. Edited Table II "Coatings containing hexavalent chromium" and Table III "Coating not containing chromium".	
11	17.09.2008	Manager updated. Table III changed.	

TABLE II – COATINGS WITH HEXAVALENT CHROME

Coating type	Coating min. thickness	Friction coefficient	Resistance to salty mist	Indication on drawing	Coating code	Denomination of approved coatings ¹	Specifications	
DACROMET 320	5 µm	0,10 – 0,30	300 hours	DAC 320–5 I.S. 18-1101	753	DACROMET 320	Base coating for protection of metallic parts, bolts and threaded parts.	
	8 µm		800 hours	DAC 320–8 I.S. 18-1101	243			
DACROMET 320 Black ²	5 µm		300 hours	DAC 320–5–Black Dacrokote 450 I.S. 18-1101	A10	DACROMET 320 Black + Dacrokote 450		Base coating for protection of metallic parts, bolts and threaded parts. Black finishing for aesthetic purposes.
	8 µm		800 hours	DAC 320–8–Black Dacrokote 450 I.S. 18-1101	A11			
DACROMET 500	5 µm	0,12 – 0,18	300 hours	DAC 500–5 I.S. 18-1101	A02	DACROMET 500	Suitable for bolts and threaded parts. The dry lubricating additional treatments (organic or mineral finishing) PL and PM, applicable on all Geomet coatings, enable reduction and check of friction coefficient and increase the resistance to corrosion.	
	8 µm		800 hours	DAC 500–8 I.S. 18-1101	A03			
DACROMET 500 Black ²	5 µm		300 hours	DAC 500–5–Black Dacrokote 450 I.S. 18-1101	A14	DACROMET 500 + Dacrokote 450		
	8 µm		800 hours	DAC 500–8–Black Dacrokote 450 I.S. 18-1101	A15			
DACROMET 500 PLUS L	5 µm		0,08–0,14	500 hours	DAC 500–5–PL I.S. 18-1101	A04		DACROMET 500 PLUS L
	8 µm			1000 hours	DAC 500–8–PL I.S. 18-1101	A05		
DACROMET 500 PLUS L Black ²	5 µm	500 hours		DAC 500–5–PL–Black Dacrokote 450 I.S. 18-1101	A16	DACROMET 500 PLUS L + Dacrokote 450		
	8 µm	1000 hours		DAC 500–8–PL–Black Dacrokote 450 I.S. 18-1101	A17			
DACROMET 500 LC	5 µm	0,12–0,18	300 hours	DAC 500–5–LC I.S. 18-1101	A06	DACROMET 500 LC	Low chrome content version (LC) of the DAC500 to be used only in case of specific environmental requirements. It can be requested with additional finishing PLUS L to reduce and check the friction coefficient and increase the resistance to corrosion. The black finishing Dacrokote 450 is applied essentially for aesthetic purposes.	
	8 µm		800 hours	DAC 500–8–LC I.S. 18-1101	A07			
DACROMET 500 LC Black ²	5 µm		300 hours	DAC 500–5–LC–Black Dacrokote 450 I.S. 18-1101	A18	DACROMET 500 LC + Dacrokote 450		
	8 µm		800 hours	DAC 500–8–LC–Black Dacrokote 450 I.S. 18-1101	A19			
DACROMET 500 LC+ PLUS L	5 µm		0,08–0,14	500 hours	DAC 500–5–LC–PL I.S. 18-1101	A08		DACROMET 500 LC+ PLUS L
	8 µm			1000 hours	DAC 500–8–LC–PL I.S. 18-1101	A09		
DACROMET 500 LC+ PLUS L Black ²	5 µm	500 hours		DAC 500–5–LC–PL–Black Dacrokote 450 I.S. 18-1101	A20	DACROMET 500 LC+ PLUS L + Dacrokote 450		
	8 µm	1000 hours		DAC 500–8–LC–PL Black Dacrokote 450 I.S. 18-1101	A21			

 For note ¹ and ² see following page.

TABLE III – CHROME FREE COATINGS

Coating type	Coating thickness	Friction coefficient	Resistance to salty mist	Indication on drawing	Coating code	Denomination of approved coatings ¹	Specifications	
Geo 321	5–8 µm	0,10 – 0,30	300 hours	GEO 321 – 5 I.S. 18-1101	A22	a) Geomet 321 b) Zintek 200 c) Delta Protekt KL 100 d) Magni Flake B46	Base coating for protection of metallic parts, bolts and threaded parts.	
	8–10 µm		800 hours	GEO 321 – 8 I.S. 18-1101	A23			
Geo 500	5–8 µm	0,12 – 0,18	300 hours	GEO 500 – 5 I.S. 18-1101	A34	a) Geomet 500 b) Delta Protekt KL 105		
	8–10 µm		800 hours	GEO 500 – 8 I.S. 18-1101	A35			
Geo 321 PM	6,5–12 µm		500 hours	GEO 321 – 5 – PM I.S. 18-1101	A26	a) Geomet 321 PLUS M b) Zintek 200 + Top LF c) Delta Protekt KL 100 + Delta Protekt VH315GZ d) Magni Flake B46 + Magni top coat B18	Suitable for bolts and threaded parts. The dry lubricating additional treatments (organic or mineral finishing) enable reduction and check of friction coefficient and increase the resistance to corrosion.	
	9,5–15 µm		1000 hours	GEO 321 – 8 – PM I.S. 18-1101	A27			
Geo 321 PL	6,5–12 µm	0,08–0,14	500 hours	GEO 321 – 5 – PL I.S. 18-1101	A28			a) Geomet 321 PLUS L b) Delta Protekt KL 100 + VH 301 GZ
	9,5–15 µm		1000 hours	GEO 321 – 8 – PL I.S. 18-1101	A29			
Geo 500 PL ³	6,5–12 µm		500 hours	GEO 500 – 5 – PL I.S. 18-1101	A36	a) Geomet 500 PLUS L b) Delta Protekt KL 105 + VH 301 GZ		
	9,5–15 µm		1000 hours	GEO 500 – 8 – PL I.S. 18-1101	A37			
Geo 321 PM Black ²	6,5–12 µm	0,12–0,18	500 hours	GEO 321 – 5 – PM Black I.S. 18-1101	A38	Zintek 200 + Techseal BlackWF b) Magni base D21 + Magni top coat B37	Suitable for bolts and threaded parts. Black lubricating finishing applicable for aesthetical purposes, with function of reduction and check of friction coefficient.	
	9,5–15 µm		1000 hours	GEO 321 – 8 – PM Black I.S. 18-1101	A39			
Geo 321 PML Black ²	6,5–12 µm	0,10–0,16	500 hours	GEO 321 – 5 – PML Black I.S. 18-1101	A30	a) Geomet 321 PLUS ML Black b) Delta Protekt KL 100 + Delta Seal GZ Black c) Zintek 200 + Techseal BlackWL 14		
	9,5–15 µm		1000 hours	GEO 321 – 8 – PML Black I.S. 18-1101	A33			

¹ The above coatings are produced by:
 – DACROMET and GEOMET (all versions) firm DACRAL S.A.;
 – ZINTEK (all versions) firm SIDASA – UCG;
 – DELTA PROTEKT (all versions) firm DOERKEN – MKS;
 – MAGNI (all versions) firm MAGNI.

² Black coatings must not be used for application on flat washers ≤ 2 mm because the viscosity of the colouring treatment may cause packing.

³ GEO 500 PL is suitable for threaded elements which may be subject to frequent fastening and loosening.

For a quick comparative individuation between **coatings containing hexavalent chrome salts and chrome free coatings** (compliance with EEC Directive ELV'S) see **Table IV**.

TABLE IV

Coatings with hexavalent chrome	Coating code	Chrome free coatings	Coating code	Friction coefficient	Resistance to corrosion (hrs of exposition to salty mist)
DAC 320-5	753	GEO 321-5	A22	0.10-0.30	300 hours
DAC 320-5 Black	A10	To be defined ^[4]	—		
DAC 320-8	243	GEO 321-8	A23	0.10-0.30	800 hours
DAC 320-8 Black	A11	To be defined ^[4]	—		
DAC 500-5	A02	GEO 500-5	A34	0.12-0.18	300 hours
DAC 500-5-LC	A06				
DAC 500-5 black	A14				
DAC 500-5-LC black	A18	GEO 321-5 PM Black	A38		
DAC 500-8	A03				
DAC 500-8-LC	A07	GEO 500-8	A35		
DAC 500-8 black	A15				
DAC 500-8-LC black	A19				
—	—	GEO 321-5 PM	A26		500 hours
—	—	GEO 321-8 PM	A27		1000 hours
DAC 500-5-PL	A04	GEO 321-5 PL	A28	0.08-0.14	500 hours
DAC 500-5-LC-PL	A08	GEO 500-5 PL ^[5]	A36		
DAC 500-5-PL black	A16	To be defined	—		
DAC 500-5-LC-PL black	A20	To be defined	—		
DAC 500-8-PL	A05	GEO 321-8 PL	A29		1000 hours
DAC 500-8-LC-PL	A09	GEO 500-8 PL ^[5]	A37		
DAC 500-8-PL black	A17	To be defined	—		
DAC 500-8-LC-PL black	A21	To be defined	—		
—	—	GEO 321-5 PML black	A30	0.10-0.16	500 hours
—	—	GEO 321-8 PML black	A33		1000 hours

^[2] Pending the definition of a specific product, as an alternative it is possible to use the products GEO 321-5 PM Black and GEO 321-8 PM Black.

^[5] GEO 500 PL is suitable for threaded elements which may be subject to frequent fastening and loosening.

4 APPLICATION

4.1 Non electrolytic coatings based on zinc and aluminum slats, depending on the type of part to be treated, can be applied with the following methods:

- **bolts**

- mass treatment and centrifugation with diameter ≤ 14 mm and weight ≤ 300 g;
- immersion and centrifugation on frame with diameter > 14 mm and weight > 300 g, which prevents thread damage.

- **parts**

- mass + centrifugation for small sizes;
- immersion + centrifugation on frame for small sizes or complex geometries;
- spraying on frame for simple geometries, or partial protection.

4.2 They must not be used in the following cases:

- parts which are assembled with stainless steels or other metals or alloys (nickel, copper, brass) able to create a galvanic battery with the zinc (electrochemical corrosion);
- self locking nuts with polyamide insert;
- parts for which a good electric conductivity is required (e.g. mass connections);
- only for coatings obtained from water dispersions, for parts made of materials for which temperatures of ~ 300 °C can cause mechanic specification decay.

4.3 They are not recommended for:

- internal and external threadings $< M6$;
- parts for which welding operations are foreseen after the application of the coating.

5 DIMENSIONS AND TOLERANCES OF THE COATED PART

The dimensions and tolerances indicated on the drawing are meant as inclusive of coating.

6 SPECIFICATIONS AND CHECKS

The above specifications refer to the significant surface.

Significant surface means the part of the surface which is essential for the appearance or use of the treated part. It can be indicated on drawing or agreed when ordering; otherwise, the whole surface of the part is to be considered significant.

6.1 Appearance

The surface of the part must be free of defects such as: porosity, inclusions, etc. Unless otherwise specified on drawing, the appearance of the coating must be uniform semi opaque silver grey, non greasy or sticky and it must withstand the standard handling, storage and installation operations, without flaking or losing adhesion.

It is possible to request a different color (e.g. black), usually obtained applying one or two additional layers which may increase coating thickness, creating a potential issue for short pitch metric threading.

The bolts must not show product accumulations on threading and handling slots that may interfere with tightening operations. **No thread dent is allowed.**

6.2 Qualitative search of the additional treatment (dry lubricant)

6.2.1 Operative method

Put a drop of 10% hydrochloric acid on a surface, ideally flat, of the part examined.

6.2.2 Result

The possible outcomes are:

- an immediate reaction with release of small bubbles within 5 seconds; in this case **the additional layer is not present.**
- no immediate reaction, yet small bubbles are released within 30 seconds; in this case **the additional layer is present.**

6.3 Check for no hexavalent chrome compounds in the GEO 321 coatings indicated in Table III

Perform the check in compliance with standard FIAT 7.M5000.

6.4 Coating thickness

Local minimum thickness of coatings, measured in areas of the significant surface with one of the following methods, must be as indicated in **Tables II** and **III**.

a) Magnetic method

According to IVECO STD. [15-0757](#), using the equipment Magne – Gage, Microtest or equivalent which enable an accuracy of at least $\pm 10\%$.

b) Micrographic method

According to IVECO STD. [15-0758](#).

To be used in case of contentions or when it is not possible to use the previous method.

6.4.1 Thickness of the chemical coating for bolts

The dimensions resulting after the application of chemical coatings, must be within the tolerances required on drawing.

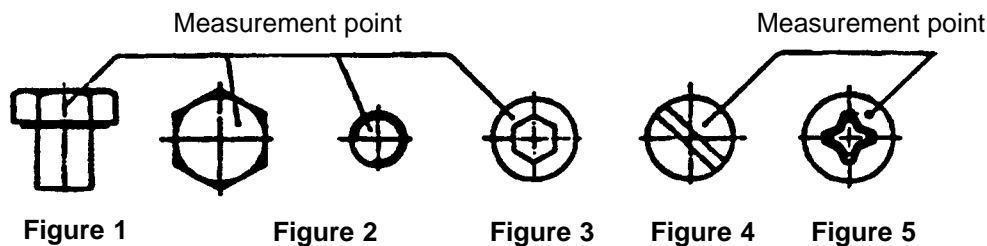
When dimensioning the threaded parts, it is necessary to take into account the thickness of the coating to be applied.

6.4.2 Areas for the measurement of the coating for bolts and threaded parts

Being the chemical coating uniform on the whole surface of the threaded part, in this case, the areas for thickness measurement must be determined only depending on the measurement method used. For practical reasons, we recommend to use the following areas:

- in case of screws, the point is located about at the center of the surface of the head or at the center of the end (see **Figure 1** and **2**).
- In case of cylindrical screws with countersunk hexagonal head and of screws with cross cut, the measuring point lies on the flat surface of the head, between edge and countersunk hexagon, between edge and cross cut, or on the side of the head (see **Figure 3**, **4** and **5**).

Countersunk and cut surfaces are excluded from the measuring points.



6.5 Adhesion

6.5.1 Unless otherwise agreed between Buyer and Supplier, and depending on the specifications of the parts undergoing the test, the following method must be adopted. "THERMAL SHOCK test" to be carried out according to IVECO STD. [15-0765](#).

6.5.2 At the end of the tests, the coating must show no sign of detachment from the base metal or blistering, flaking, etc.

6.6 Resistance to corrosion

6.6.1 Pick up, after at least 24 h from the end of the coating baking, a number of parts so that the sum of areas of the significant surfaces is $\geq 2 \text{ dm}^2$.

6.6.2 Perform the salt spray test according to IVECO STD. [16-0135](#) Method A1, for the required time depending on the type of coating (see **Tables II** and **III**).

6.6.3 The outcome is successful if at the end of the exposure period, the number of iron corrosion hotbeds, visible with naked eye at standard reading distance, is $\leq 1/\text{dm}^2$.

6.7 Resistance to temperature

6.7.1 Expose the parts being tested in ventilated thermostatic cell for 3 h at the temperature of 150 ± 3 °C (temperature measured on the part) and then perform salty mist test according to IVECO STD. [16-0135](#) Method A 1 for the time required depending on the type of coating (see **Tables II** and **III**).

6.7.2 Corrosion resistance specification must be the same as the parts exposed to salty mist without thermal conditioning (see para. 6.6).

6.8 Cathodic protection of the coating

- 6.8.1 Cut until you reach the base metal with a spike suitable to trace the coating of the part being tested. Cut width must not exceed 0.5 mm.
- 6.8.2 Expose the part to salty mist for 96 h according to IVECO STD. [16-0135](#) Method A1.
- 6.8.3 At test end, no iron rust is allowed in the area of the cut.

6.9 Baking check

- 6.9.1 Perform the test according to IVECO STD. [15-0473](#) Method B using a solution with 70% of Isooctane and 30% of Toluene.
- 6.9.2 No surface defect (spot, blistering, detachment, etc.) different from the unexposed area is allowed.

6.10 Friction coefficient

The check of the correct application of friction coefficients must be performed by measuring friction coefficients according to IVECO STD. [16-3100](#).

7 PRODUCTION CYCLE REQUIREMENTS

NOTE : *The material and the coating process used for the Supplies must be the same as those adopted during the qualification process.*

The coating process must be periodically certified and verified by the manufacturer of the coating, which must notify IVECO – QUALITÀ FORNITORI.

Changes to the specifications of the coating material and/or process may be introduced only if authorized by IVECO – SURFACE PROTECTION LAB.

For the preparation of surfaces of high hardness steel parts, acid pickling and cathode degreasing must not be used.

The coating must be applied with at least two layers of protective film in case of mass treatment to avoid lack of protection in contact areas of the parts randomly positioned in the basket. Before using the parts, we recommend to wait for at least 48 h from the application of the treatment. The Supplier must file the documents concerning the titre of Zinc, Aluminum and Chrome in the bath, available for examination by IVECO, for a period of 12 months.

The application process must be adapted to the geometry and specifications of the part to be protected to ensure compliance with functional requirements. The Supplier of the part must ensure that the protective coating is applied with suitable processes.

8 ENGINEERING RELEASE

The Supplier must submit as sample for engineering release the quantity of product required in the purchase order on which the checks of the specifications required by this Procurement Specification will be performed.

The sample must be provided with the "Product Identification Sheet" (see IVECO STD. [18-0015](#)) and the "Product Quality Certification Documents" (see IVECO STD. [18-0013](#)) filled in by the Supplier with reference to the requirements of this Procurement Specification.

With the sample, the Supplier must submit a report about all the tests and checks performed. No "non compliance" is allowed.

9 QUALITY OF THE SUPPLIES

The supply must be carried out according to the specifications of the IVECO STD. 18-0001-A003 "Quality of Supplies".

10 SPECIFICATION CLASSIFICATION TABLE

NAME	CLASS OF IMPORTANCE (according to I.S. 18-0011)	TYPE OF TEST (1)
Appearance	-	NM
Qualitative search of the additional treatment (dry lubricant)	+	M
Check for no hexavalent chrome compounds in the GEO 321 coatings	-	M
Coating thickness	-	NM
Adhesion	-	M
Resistance to corrosion	+	M
Resistance to temperature	-	M
Cathodic protection of the coating	-	M
Baking check	-	M
Friction coefficient	+	M

(1) M = Destructive NM = Non destructive

NOTE : During both product qualification and supply control, checks can be carried out on parts which underwent non destructive (NM) tests; if the component underwent destructive (M) tests, it cannot be used for other tests or checks, unless otherwise specified.

REFERENCED STANDARDS

IVECO STD.: 15-0473, 15-0757, 15-0758, 15-0765, 16-0135, 16-3100, 18-0001-A003, 18-0011, 18-0013, 18-0015.

FIAT ★: 7.M5000.

★ The progressive transformation of the referenced FIAT standards into corresponding IVECO Standards is foreseen.
Consequently, the users of this document must check on the TAS system for new IVECO STANDARDS, which include the reference to the original FIAT standard and any change/integration.