

Group standard

TL 215

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Descriptors: corrosion protection, surface protection, chromium, piston rod, axle shock absorber, spring shock absorber, steering damper, suspension struts

Electroplated Chromium Coatings for Piston Rods Surface Protection Requirements

3 Types: A, B, C

Previous issues

TL 215: 1975-08, 1976-11, 1977-10, 1994-04, 1996-05, 2004-10, 2009-03

Changes

The following changes have been made to TL 215: 2009-03:

- Title changed
- Section 1 Type "F" deleted
- Section 2 Description example changed
- Section 3.1 and Section 3.2 expanded
- Section 3.3, Table 1 expanded and corrected

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The English translation is believed to be accurate. In case of discrepancies, the German version is alone authoritative and controlling.

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1 Scope

This standard specifies requirements for electrolytically deposited chromium coatings on piston rods of axle shock absorbers, spring shock absorbers, and steering dampers as well as suspension struts.

The following types are distinguished:

TL 215-A	Type A: Preferred for piston rods of axle shock absorbers, spring shock absorbers, and steering dampers
TL 215-B	Type B: Preferred for piston rods of suspension struts
TL 215-C	Type C: Preferred for piston rods of suspension struts (always for Volkswagen-internal production)

2 Description

Description example for a chromium coating on piston rods:

Surface protection as per TL 215-B

3 Requirements

3.1 Basic requirements

Approval of first supply and changes as per [VW 01155](#).

Avoidance of hazardous substances as per [VW 91101](#).

Approximately 10 parts (depending on size) are required for a complete examination.

The coatings used must not contain any Cr(VI) compounds.

The coating supplier and the facility that is used must be documented in the initial sample inspection report.

3.2 Surface finish

The piston rods must exhibit the specified surface protection, with the specified properties, over their entire surface. Piston rod sections for which these requirements do not apply must be identified appropriately in the drawing (see [VW 13750](#), section "Specifications in drawings").

The appearance, function, and corrosion resistance of the piston rods and the adhesion of the electroplated coatings must not be impaired by score marks, pores, coarse cracks, or other flaws. The electroplated and machined piston rods must be free of spots and other discolorations.

The production process and its control must not impair the functional characteristics of the piston rods or the function of the damper systems.

Proper assembly and suitable transport conditions are required to ensure that the electroplated coatings are not damaged and/or do not loosen from the base material. Slight damage during assembly may only be disregarded if it does not impair the properties or function.

3.3 Further properties

See table 1.

Table 1

No.	Property	Requirements		
		TL 215-A	TL 215-B	TL 215-C
1	Base material	as per drawing		
2	Coating structure	Chromium coating with micro-cracks		Chromium coating with few cracks
		As part of release tests or initial sample inspections, the supplier must provide images of etched, metallographic transverse microsections of the coating to show the formation of cracks. The images must be magnified 200 and 500 times.		
3	Coating thickness ^{a)}	(18 ± 8) µm	(17 ± 5) µm	
4	Roughness depth Rz as per VW 13705	<1 µm		
5	Number of cracks (chromium crack density) on the piston rod surface after etching as per PV 1058 (etching duration 1 h to max. 9 h, electrolyte etching not permissible)	≥400 cracks/cm ^{b)}		≤200 cracks/cm
6	Microhardness (chromium layer) HV 0.05	≥900		≥800
7	Corrosion resistance			
7.1	Behavior during salt spray test, test method NSS as per DIN EN ISO 9227, test duration: 48 h ^{c)}	No base metal corrosion and/or corrosion cracks ^{d)}		

- a) Testing as per DIN EN ISO 1463 (arbitration process) or DIN EN ISO 2177 and DIN EN ISO 3497. Measuring points in areas on the upper, center and lower part of the piston rod as well as 4 measuring points all around must be considered and evaluated.
- b) The crack formation in the chrome coating must be evaluated in at least 3 areas all around. The number of cracks in the chrome coating is determined as the average of the number of cracks in axial (horizontal) and vertical direction measured under a microscope. If the road test and functional tests produce positive results, smaller numbers of cracks may also be defined in the respective part drawing.
- c) Before testing, the piston rods are cleaned using isopropanol.
At least 5 specimens with coating thicknesses from the lower tolerance range must be tested. The specimens are suspended or placed perpendicular in the salt spray fog chamber. Prior to the evaluation, the specimens can be cleaned using Vienna lime. This is done to remove adherent foreign rust (abrasion) in order to distinguish the rust from possible damage to the surface. Both types of corrosion are not permissible.
- d) Red rust on the surface, blisters within the electroplated coating, or pitting are not permissible.
The component surface must be inspected visually. Only in case of doubt an evaluation under the microscope is to be performed.

4 Applicable documents

The following documents cited in this standard are necessary to its application.

Some of the cited documents are translations from the German original. The translations of German terms in such documents may differ from those used in this standard, resulting in terminological inconsistency.

Standards whose titles are given in German may be available only in German. Editions in other languages may be available from the institution issuing the standard.

PV 1058	Chrome-Plated Surfaces; Determination of the Microcracked Chrome Deposit
VW 01155	Vehicle Parts; Approval of First Supply and Changes
VW 13705	Specification of Surface Texture; Geometrical Product Specifications - Engineering Drawings
VW 13750	Surface Protection for Metal Parts; Surface Protection Types, Codes
VW 91101	Environmental Standard for Vehicles; Vehicle Parts, Materials, Operating Fluids; Avoidance of Hazardous Substances
DIN EN ISO 1463	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method
DIN EN ISO 2177	Metallic coatings - Measurement of coating thickness - Coulometric method by anodic dissolution
DIN EN ISO 3497	Metallic coatings - Measurement of coating thickness - X-ray spectrometric methods
DIN EN ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests