VOLKSWAGEN

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Group standard **TL 260**

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Paintwork of Metal Surfaces

Surface Protection Requirements

Previous issues

TL 260: 1975-08, 1980-06, 1985-05, 1986-12, 1994-02, 1995-09, 2004-05, 2015-03, 2018-07

Changes

The following changes have been made to TL 260: 2018-07:

– Section 3.1 "Surface protection (Ofl) types": Characteristics regarding zinc phosphating adapted for Ofl-x634
– Table 3, consec. no. 2 "Resistance to chemicals": Replacement test rephrased to be brand-independent
– Editorial changes

Contents

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The English translation is believed to be accurate. In case of discrepancies, the German version controls.

Technical responsibility			The Standards department	
GQL-M/1	Dr. Olaf Claus	Tel.: +49 5361 91 94081		
GQL-M/1	Tobias Schilling	Tel.: +49 5361 9 37641	K-ILI/5 Ute Hager-Suess	K-ILI
GQL-M	Dr. Frank Röper		Tel.: +49 5361 9 49035	Uwe Wiesner

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1 Scope

This standard defines the requirements for corrosion protection of black paintwork on metal surfaces (code letter x in Volkswagen standard VW 13750). It does not apply to paintwork on zinc-coated metal surfaces (see Technical Supply Specification TL 227) or to decorative protective paintwork (see TL 218 and TL 52451).

The corrosion tests of this standard (see table 3, consec. no. 1) apply to ferrous materials. For aluminum materials, other corrosion cycle tests, in agreement with the Materials Engineering department of the pertinent brand, are permissible (e.g., VDA 233-102; see table 3, consec. no. 1.2).

2 Designation

As per VW 13750, section 2, "Designation."

3 Requirements

3.1 Surface protection (Ofl) types

The surface protection types listed in table 1 apply.

Table 1

Surface protection type	Characteristics
Ofl-x010	Standard paintwork, permissible only after agreement with the Materials Engineering department of the pertinent brand and the appropriate Design Engineering department; No requirements for corrosion protection.
Ofl-x100, Ofl-x300, Ofl-x600	Pretreatment not specified (not possible due to manufacturing reasons); Single-layer liquid paint by any method, alternatively with cathodic electrocoat (KTL).
Ofl-x330	Alternative pretreatment (conversion coating based on zirconium, titanium, or silane compounds), zinc-phosphated, iron-phosphated, or manganese-phosphated, or with tricationic phosphating; Single-layer liquid paint by any method, alternatively KTL (e.g., for propeller shafts).
Ofl-x630	Zinc-phosphated or with tricationic phosphating, KTL
Ofl-x631	Zinc-phosphated or with tricationic phosphating, double-layer paint (dip + spray paint)
Ofl-x634	With tricationic phosphating, cathodic electrocoating (thick-layer cathodic electrocoating), (e.g. chassis parts, trailer hitch); deviating zinc phosphating is only permissible in agreement with the Materials Engineering department of the pertinent brand.

3.2 Basic requirements

Approval of first supply and changes as per Volkswagen standard VW 01155.

Avoidance of hazardous substances as per VW 91101.

The cutting burr on components must correspond at least to the manufacturing precision "medium" as per VW 01088.

Eight parts or part sections are required for complete testing.

The coating must have the specified surface protection, with the specified properties, over the entire surface.

The coatings must be free of pores, cracks, paint runs, foreign matter inclusions, damage, and other flaws that impair the corrosion protection and/or the specified appearance.

The paintwork must adhere firmly to the base material when the parts are used as intended.

The production process and its control must not impair the use properties of the finished part.

Proper installation of parts must not result in damage that impairs the part's function and/or decreases the specified corrosion protection.

The coatings used must be free of compounds containing hexavalent chromium [Cr(VI)] or lead.

3.3 Base material

Material as per drawing

3.4 Surface protection types/appearance

See table 1. The color of the paintwork is always black unless specified otherwise in the drawing.

3.5 Conditioning

If air-drying coating systems are used and/or no paint system baking process at elevated temperature (> 60 °C) is carried out, the components must be conditioned for 24 h at 60 °C before the tests, then the devices under test must be cooled to room temperature VW 50554 – 2.

3.6 Coating thickness

See table 2. Coating thickness may be limited for joining and contact surfaces; this must be specified in the drawing.

Table 2

Surface protection type	Coating thickness in µm
Ofl-x100, Ofl-x300, Ofl-x330, Ofl-x600	15 to 100 (for liquid paintwork) for parts from rolled products
	30 to 150 (for liquid paintwork) for castings and forgings
	> 12 (for KTL)
Ofl-x630	15 to 30, in cavities ≥ 12
Ofl-x631	40 to 60
Ofl-x634	30 to 60, in cavities ≥ 20

3.7 Adhesion and brittleness

Cross-cut test as per DIN EN ISO 2409.

The test must be performed using adhesive tape with a bond strength of (10 ±1) N per 25 mm width. The adhesive tape must be firmly pressed onto the surface by hand with the cross cut applied, and then pulled off with an abrupt movement perpendicularly to the surface.

Requirement: characteristic value ≤ 1

NOTE: For this test, e.g., tesa® 4657 [1)] is suitable.

3.8 Stone-chip resistance

Test as per DIN EN ISO 20567-1, method B with visual examination.

Requirement: characteristic value ≤ 2

3.9 Further properties

See table 3.

1) tesa® 4657 is the manufacturer's product designation. It is produced by tesa SE.
This information is only intended for informational purposes for the users of this in-house standard. This does not signify an endorsement of the mentioned product by the Volkswagen Group. Equivalent products may be used if it can be verified that they lead to the same results.

Table 3

No.	Property	Ofl-x100	Ofl-x300	Ofl-x330	Ofl-x600[a)]	Ofl-x630	Olf-x631	Ofl-x634
1	**Corrosion properties**							
1.1	After the hours of testing in the neutral salt spray test (NSS) as per DIN EN ISO 9227, no scribing line							
1.1.1	48 h	No blisters, no base metal corrosion	-					
1.1.2	96 h	-	No blisters, no base metal corrosion	-				
1.2	After the number of cycles in the corrosion cycle test as per Test Specification PV 1210 [b)], with scribing line [c)]							
1.2.1	5 cycles	-		No surface changes, including cut edges and welds				
1.2.2	15 cycles	-		No surface changes; loss of adhesion d ≤ 2,5 mm (e.g., propeller shaft), isolated base metal corrosion in the area of the cut edges and welds over a width of max. 2,5 mm permissible [d)]	-	No surface changes; including cut edges, isolated base metal corrosion on welds permissible[d)]	-	No surface changes; including cut edges, isolated base metal corrosion on welds permissible[d)]

<table>
<tr><th>No.</th><th>Property</th><th>OfI-x100</th><th>OfI-x300</th><th>OfI-x330</th><th>OfI-x600[a)]</th><th>OfI-x630</th><th>OIf-x631</th><th>OfI-x634</th></tr>
<tr><td>1.2.3</td><td>30 cycles</td><td colspan="3" rowspan="2">-</td><td colspan="4">No surface changes</td></tr>
<tr><td>Loss of adhesion
d ≤ 2,5 mm</td><td>Loss of adhesion
d ≤ 1,5 mm</td><td>Loss of adhesion
d ≤ 2,5 mm</td><td>-</td></tr>
<tr><td>1.2.4</td><td>60 cycles</td><td colspan="5">-</td><td colspan="4">Isolated base metal corrosion in the area of the cut edges and welds over a width of
max. 2,5 mm | max. 1,5 mm | max. 2,5 mm | max. 1,5 mm
permissible[d)]</td></tr>
<tr><td>1.2.4</td><td>60 cycles</td><td colspan="5">-</td><td>No surface changes; loss of adhesion d ≤ 1,5 mm, isolated base metal corrosion in the area of the cut edges and welds over a width of max. 1,5 mm permissible[d)]</td></tr>
<tr><td>1.3</td><td colspan="8">After the hours of testing in condensation water climates (condensation atmosphere with constant humidity CH) as per DIN EN ISO 6270-2</td></tr>
<tr><td>1.3.1</td><td>72 h[e)]</td><td>No blisters, no base metal corrosion; the requirement as per section 3.7 must be fulfilled</td><td colspan="7">-</td></tr>
</table>

No.	Property	Ofl-x100	Ofl-x300	Ofl-x330	Ofl-x600[a)]	Ofl-x630	Olf-x631	Ofl-x634
1.3.2	144 h[e)]	-	No blisters, no base metal corrosion, the requirement as per section 3.7 must be fulfilled -	(for liquid paint finish, however, 240 h for cathodic electrocoating)	-			
1.3.3	240 h[e)]	-			No blisters, no base metal corrosion; the requirement as per section 3.7 must be fulfilled			
2	**Resistance to chemicals**							
2.1	Pertinent chemicals: Following consultation with the appropriate department, the scope may be restricted to chemicals that are pertinent for the application. The agreement must be documented in the drawing or Performance Specification. Replacement test for individual vehicle projects of the superpremium segment: requirements as per table 3, consec. no. 2.10							
2.2	FAM test fuel B as per DIN 51604-1 and DIN EN ISO 2812-4, method A, 10 min at room temperature VW 50554 – 2	Evaluation after 1. 1 h at room temperature VW 50554 – 2; no visible changes; if changes occur, perform no. 2. 2. 2 h, 60 °C reflow aging; no visible changes						
2.3	E10 gasoline as per DIN EN 228 (blend of premium unleaded gasoline as per DIN EN 228 with 10 volume percent ethanol p.a.) and DIN EN ISO 2812-4, method A, 10 min at room temperature VW 50554 – 2							

No.	Property	Ofl-x100	Ofl-x300	Ofl-x330	Ofl-x600[a)]	Ofl-x630	Olf-x631	Ofl-x634
2.4	B7 diesel fuel as per TL 788-B and DIN EN ISO 2812-4, method A, 10 min at room temperature VW 50554- 2	Evaluation after 1. 1 h at room temperature VW 50554 – 2; no visible changes; if changes occur, perform no. 2. 2. 2 h, 60 °C reflow aging; no visible changes						
2.5	Factory-fill engine oil as per TL 52167, 1 h at room temperature VW 50554 – 2 [f)]							
2.6	Central hydraulic system fluid as per TL 52146, 16 h at room temperature VW 50554 – 2							
2.7	10% sulfuric acid (weight percent) as per DIN EN ISO 2812-4 method A, 1 h at room temperature VW 50554 – 2							
2.8	Brake fluid as per TL 766- X, 1 h at room temperature VW 50554 – 2 [g)]							

No.	Property	Ofl-x100	Ofl-x300	Ofl-x330	Ofl-x600[a)]	Ofl-x630	Olf-x631	Ofl-x634
2.9	Coolant as per TL 774, blend J5, 1 h at room temperature VW 50554 – 2	Evaluation after 1. 1 h at room temperature VW 50554 – 2; no visible changes; if changes occur, perform no. 2. 2. 2 h, 60 °C reflow aging; no visible changes						
2.10	The following applies to individual vehicle projects in the superpremium segment: Replacement test for table 3, consec. no. 2.1 to table 3, consec. no. 2.9 Resistance to chemicals: Testing as per DIN EN ISO 2812-3, Test fluids as per VW 50002. The test fluids to be used , must be agreed upon with the Porsche AG Materials Engineering department depending on the area of the part's application. Evaluation as per DIN EN ISO 4628-1	Damage to the anti-corrosion coating, swellings, discoloration, or change in gloss Requirement: characteristic value ≤ 1 The evaluation must be performed immediately after the end of exposure. If the requirements are not fulfilled, further evaluations must be performed after 1 h and after 24 h.						

a) The following applies to individual vehicle projects of the superpremium segment: Requirements for ultraviolet resistance must be noted in the drawing.

b) To be used for ferrous materials; For aluminum materials, other corrosion cycle tests, in agreement with the Materials Engineering department of the pertinent brand, are permissible (e.g., VDA 233-102).

c) Scribing line as per DIN EN ISO 9227, appendix C.4 and DIN EN ISO 4628-8; scribing tools are permissible as per DIN EN ISO 9227, which produce rectangular or trapezoidal scribing line profiles (Sikkens scribing tool), or as per DIN EN ISO 17872, appendix A, which produce U-shaped scribing line profiles (van Laar scribing stylus).

d) Other permissible isolated base metal corrosion on component-specific weak spots (e.g., design-specific gaps or points of contact) must be entered in the drawing in agreement with the Materials Engineering department of the pertinent brand.

e) Then at least 30 min acclimatization at room temperature VW 50554 – 2.

f) Only for parts in the engine compartment

g) Only for parts of the brake system

4 Applicable documents

The following documents cited are necessary to the application of this document:

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 1210	Body and Add-On Parts/Hang-On Parts; Corrosion Test
TL 52146	Hydraulic Oil; Lubricant Requirements
TL 52167	Factory-Fill Engine Oil SAE 5W-40; Lubricant Requirements
TL 766	Brake Fluid; Material Requirements
TL 774	Ethylene Glycol-Based Coolant Additive; Requirements on Materials
TL 788	Diesel Fuel; Fuel Requirements
VW 01088	Workpiece Edges; Definitions, Drawing Specifications
VW 01155	Vehicle Parts; Approval of First Supply and Changes
VW 13750	Surface Protection for Metal Parts; Surface Protection Types, Codes
VW 50002	Whole Vehicle; Test Media; Material Compatibility
VW 50554	Standard Atmospheres and Room Temperatures; Requirements on Standard Atmospheres
VW 91101	Environmental Standard for Vehicles; Vehicle Parts, Materials, Operating Fluids; Avoidance of Hazardous Substances
DIN 51604-1	FAM testing fluid for polymer materials; Composition and requirements
DIN EN 228	Automotive fuels - Unleaded petrol - Requirements and test methods
DIN EN ISO 17872	Paints and varnishes - Guidelines for the introduction of scribe marks through coatings on metallic panels for corrosion testing
DIN EN ISO 20567-1	Paints and varnishes - Determination of stone-chip resistance of coatings - Part 1: Multi-impact testing
DIN EN ISO 2409	Paints and varnishes - Cross-cut test
DIN EN ISO 2812-3	Paints and varnishes - Determination of resistance to liquids - Part 3: Method using an absorbent medium
DIN EN ISO 2812-4	Paints and varnishes - Determination of resistance to liquids - Part 4: Spotting methods
DIN EN ISO 4628-1	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system
DIN EN ISO 4628-8	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect

DIN EN ISO 6270-2	Paints and varnishes - Determination of resistance to humidity - Part 2: Condensation (in-cabinet exposure with heated water reservoir)
DIN EN ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests
VDA 233-102	Cyclic corrosion testing of materials and components in automotive construction