

## Group standard

**TL 256**

Issue 2016-11

Class. No.: 50204

Descriptors: powder coating, surface protection, corrosion protection, paint, paintwork, metal surface, surface, corrosion, OfI-x340, OfI-x650, OfI-x651

## Powder Coating on Metal Surfaces

### Surface Protection Requirements

#### Previous issues

TL 256: 1974-10, 1993-09, 1999-06, 2004-08, 2010-12

#### Changes

The following changes have been made to TL 256: 2010-12:

- Section 3.2 "Basic requirements" updated
- "Weak points" section deleted
- Table 2 revised
- Additional content-related and editorial revisions

## 1 Scope

This Technical Supply Specification (TL) specifies the requirements for powder coatings on pre-treated components.

It does not apply to decorative surfaces (see TL 52451 <sup>1)</sup>) or aluminum wheels (see TL 239 <sup>2)</sup>).

## 2 Designation

As per Volkswagen standard VW 13750, section "Designation"

1) TL 52451 – Paintwork of Metallic Decorative Add-On Parts for the Exterior; Requirements

2) TL 239 – Surface Protection for Alloy Wheels; Requirements

Always use the latest version of this standard.

This electronically generated standard is authentic and valid without signature.

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

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### 3 Requirements

#### 3.1 Surface protection (OfI) types

The surface protection types listed in table 1 apply.

Table 1

Surface protection type	Type
OfI-x340	Medium protection with any pretreatment (for interior parts in non-visible areas)
OfI-x650	Heavy protection with film- or layer-forming pretreatment
OfI-x651	Especially heavy protection with film- or layer-forming pretreatment and primer coat (application in the visible area, for example)

#### 3.2 Basic requirements

Approval of first supply and changes as per VW 01155

Avoidance of hazardous substances as per VW 91101.

For complete testing, 10 parts must be delivered, including the following information:

- Type of pretreatment (product designation and company name)
- Coating designation and binder type, coating manufacturer

#### 3.3 Appearance

The parts must have a uniform appearance on their entire surface, in accordance with the drawing and released sample. Pores, coarse cracks, and other flaws or damage that adversely affect the specified appearance are not permissible. The coating must adhere firmly to the base material.

### 3.4 Further properties

See table 2.

Table 2

No.	Property	Requirement		
		Ofi-x340	Ofi-x650	Ofi-x651
1	Base material	See drawing		
2	IR spectrum of the powder coating	As per sample		
3	Gloss level	Gloss level as per the original sample or drawing specification		
4	Pretreatment and primer coat			
4.1	Steel	Any	Zinc-phosphated	Zinc-phosphated and primed
4.2	Zinc	Any	Passivated	Passivated and primed
4.3	Aluminum	Any	Passivated	Passivated and primed
4.4	Copper	-		Primed
5	Coating thickness			
5.1	Primer coat	-		25 µm ±5 µm
5.2	Powder coating	≥ 60 µm		
6	Coating adhesion (cross-cut test) as per DIN EN ISO 2409; Tesa-band 4657 <sup>a)</sup> must be used as the adhesive tape.	Characteristic value ≤ 1		
7	Stone-chip resistance as per DIN EN ISO 20567-1, method B; Tesaband 4657 <sup>a)</sup> must be used as the adhesive tape.	Characteristic value ≤ 1.5		
8	Corrosion properties			
8.1	Corrosion cycle test as per Test Specification PV 1210 with scribing line as per DIN EN ISO 17872			
	15 cycles	No blisters, no edge and base metal corrosion <sup>b)</sup>	-	
	60 cycles Evaluation of the scribe corrosion creepage as per DIN EN ISO 4628-8	-	No blisters, no edge and base metal corrosion <sup>b)</sup> ; loss of adhesion d ≤ 2.5 mm	
8.2	Testing in the condensation atmosphere with constant humidity, test atmosphere CH as per DIN EN ISO 6270-2; test duration: 240 h; the specimens are then acclimatized for at least 30 min at 18 °C to 28 °C.	No blisters, no base metal corrosion; no cracks, no changes having adverse effects; see table 2, consec. no. 6: coating adhesion (cross-cut test) as per DIN EN ISO 2409: characteristic value ≤ 1		

No.	Property	Requirement		
		Ofi-x340	Ofi-x650	Ofi-x651
9	Thermal stability (temperature cycle test)			
9.1	Heat aging 240 h aging in the forced-air oven at (90 ±2) °C; the specimens are then acclimatized for at least 30 min at 18 °C to 28 °C.	Both after heat aging and also after low-temperature aging: no cracks, no changes having adverse effects; see table 2, consec. no. 6: coating adhesion (cross-cut test) as per DIN EN ISO 2409: characteristic value ≤ 1		
9.2	Low-temperature aging after heat aging (see table 2, consec. no. 9.1) with the same specimens for 24 h at (-40 ±3) °C; immediately afterward, these same specimens are tested as per table 2, consec. no. 10.			
10	Impact test at low temperature based on DIN ISO 4532 but with specified testing force of 90 N on rigid support plate; after thermal aging (elevated-temperature and low-temperature phase), see table 2, consec. no. 9.2; paint flaking around the penetration area after low-temperature impacts must be removed completely; the maximum diameter of the flaking must be determined; the layer thickness determined adjacent to the flaking must be documented.	No cracks, penetration down to the base material is permissible; max. flaking 3 mm with layer thickness < 120 µm; max. flaking 4 mm with layer thickness ≥ 120 µm		
11	Resistance to chemicals as per DIN EN ISO 2812-4 Evaluation as per DIN EN ISO 4628-1, table "Characteristic values for evaluating the intensity of changes" After consultation and agreement with the appropriate department, the scope may be reduced to the media relevant to the application.			
11.1	For all parts			
11.1.1	Gasoline E10 as per DIN EN 228 (mixture made from premium unleaded with 10 volume percent ethanol) 1 h at room temperature	-	Evaluation after 1 h at room temperature Max. characteristic value 1	
11.1.2	Diesel fuel as per DIN EN 590 10 min at room temperature			
11.2	Only for parts in the engine compartment			

No.	Property	Requirement		
		Ofi-x340	Ofi-x650	Ofi-x651
11.2.1	Factory-fill engine oil as per TL 52167, 16 h at room temperature	-	Evaluation after 1 h at room temperature Max. characteristic value 1	
11.2.2	Automatic transmission fluid as per TL 52162, 16 h at room temperature			
11.2.3	Central hydraulic fluid as per TL 52146, 16 h at room temperature			
11.2.4	Sulfuric acid (10 mass percent), 1 h at room temperature			
11.2.5	Brake fluid as per TL 766, 1 h at room temperature		Evaluation immediately after the end of loading Max. characteristic value 2, but after 5 h rest time, max. characteristic value 1	
11.2.6	Coolant additive as per TL 774, 1 h at room temperature			

- a) Tesaband 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.
- b) At weak points (e.g., welds, gaps), isolated occurrences of base metal corrosion up to an adjacent zone of  $\leq 1.5$  mm is permissible.

## 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 1210	Body and Add-On Parts/Hang-On Parts; Corrosion Test
TL 52146	Central Hydraulic System Fluid; Lubricant Requirements
TL 52162	Factory-Fill-for-Life Automatic Transmission Fluid (ATF); 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; Materials Requirements
VW 01155	Vehicle Parts; Approval of First Supply and Changes
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 228	Automotive fuels - Unleaded petrol - Requirements and test methods
DIN EN 590	Automotive fuels - Diesel - 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 2812-4	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: Procedure for exposing test specimens in condensation-water atmospheres
DIN ISO 4532	Vitreous and porcelain enamels - Determination of the resistance of enamelled articles to impact - Pistol test