

Group standard

TL 52038

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Descriptors: adhesive film, adhesive label, adhesive layer, adhesive tape, label, self-adhesive, sticker

Adhesive Labels

Materials Requirements

4 Types: Without Index, A, B, C

Previous issues

TL 52038: 1978-10, 1990-02, 1999-11, 2004-12, 2005-11, 2009-07, 2019-07, 2019-10, 2019-12

Changes

The following changes have been made to TL 52038: 2019-12:

- a) Section 4.4 „Requirements on the lightfastness“: Differentiation of the requirements for labels that are attached in production and for labels that are delivered as part marking.

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1 Scope

This standard defines the requirements for all self-adhesive labels located on the vehicle. This also includes labels that are used by suppliers for marking components.

2 Types

This standard applies to the following types:

- Without index: Adhesive labels in the vehicle interior and on the vehicle exterior
- A: Adhesive labels in the vehicle interior and on the vehicle exterior having the character of a certificate¹⁾
- B: Adhesive labels in the engine compartment
- C: Adhesive labels in the engine compartment having the character of a certificate¹⁾

3 Designation

The Technical Supply Specification (TL) designation is recorded in the drawing together with the type.

Example for the designation of an adhesive label in the engine compartment:

Adhesive label as per TL 52038-B

The adhesion substrate must be specified in the drawing. If painted sheet metal is not used as the adhesion substrate, the adhesion values must be specified in the drawing.

4 Requirements

4.1 General requirements

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

Avoidance of hazardous substances as per VW 91101

Standard atmosphere VW 50554 – 23/50-2, in the following „SA“

For adhesive labels in the vehicle interior: Emission behavior as per VW 50180

The test results must be included in the initial sample documents as proof that the supplier has met the legal requirements.

4.2 Requirements for the structure and the properties and condition

Film structure as per drawing and release

¹⁾ Transfer of data to another vehicle or data falsification is ruled out.

The adhesive coating must be produced using adhesives based on acrylic ester.

The adhesive labels must have a flawless surface, i.e., there must be no flaws, e.g., bubbles or inclusions.

Bubbles or stains are not permissible – even after subsequent laser labeling.

For the case that the carrier material has kiss cuts²⁾ (see table 1, no. 5), this cutting must have a uniform structure over the entire surface area or over the extent of the label.

The back of the label must be evenly coated with adhesive.

The adhesive labels must be applied to the surface shown in the drawing and must stick to the surface in accordance with the peel forces (see table 1, test no. 1).

The following is not permitted:

- Wrinkling,
- Rolling,
- Tearing,
- Peeling

of the label.

The back-side adhesive coating must be covered with a protective film that can be peeled off.

The protective film must protect the adhesive against soiling and unintentional bonding and must be easily removable from the adhesive label, without a pretreatment being necessary. It must be possible to smoothly fasten the labels.

The protective film is part of the sample inspection.

4.3 Functional Requirements

The requirements in table 1 apply.

Table 1 – Functional requirements on adhesive labels

No.	Property	Requirement			
		Type ^{a)}			
		Without suffix	A	B	C
1	Adhesive behavior see section 5.1	After tests no. 1.1 to no. 1.8, there must be no changes to the surface (e.g., detachment or cracks), the color, or the dimensions. Peel force in N/1 cm specimen width; no individual measurement value must be below the required value.			
1.1	In as-received condition	≥ 3,5	Destructive removal only	≥ 3,5	Destructive removal only
1.2	After heat aging				
1.2.1	(300 ±10) h at 90 °C re-circulated air	≥ 3,5	Destructive removal only	–	–

²⁾ i.e., short cuts or notches starting from the edge of the label (for removal of the label from the carrier material)

Table 1 (continued)

No.	Property	Requirement			
		Without suffix	Type ^{a)}		
			A	B	C
1.2.2	(72 ±2) h at 130 °C re-circulated air	–	–		
1.3	After low-temperature aging (22 ±2) h at -40 °C	≥ 3,5	Destructive removal only	≥ 3,5	Destructive removal only
1.4	After aging in constant condensation-water atmosphere (300 ±10) h as per DIN EN ISO 6270-2 – CH ^{b)}				
1.5	Environmental cycle test 30 cycles as per Test Specification PV 1200				
1.6	Pressure water jet test (see section 5.2) as per DIN EN ISO 16925, but without cross-cut test (St. Andrew's cross) ^{c)}				
1.7	Fuel immersion aging (see section 5.3) 30 min at (23 ±2) °C	As per drawing			
1.8	Condensation atmosphere cycle aging only for labels on the vehicle exterior 4 cycles as per DIN 50018 – AHT 2,0 S	As per drawing			
1.9	Dimensional change Shrinkage after 48 h of reconditioning, see section 5.4	≤ 1,0%			
2	Resistance to media (see section 5.5)				

Table 1 (continued)

No.	Property	Requirement			
		Type ^{a)}			
		Without suffix	A	B	C
2.1	Premium unleaded gasoline as per TL 52138	There must not be any change in lettering (print) after aging. The following are not permissible: – Color change, – Size change, – Waviness. Deviation as per drawing			
2.2	Diesel fuel as per TL 788				
2.3	Biodiesel (RME) as per DIN EN 14214				
2.4	Commercially available methylated spirit				
2.5	Engine oil as per TL 52185				
2.6	Brake fluid as per TL 766			There must not be any change in lettering (print) after aging. The following are not permissible: – Color change, – Size change, – Waviness. Deviation as per drawing	
2.7	Coolant as per TL 774	–	–	There must not be any change in lettering (print) after aging. The following are not permissible: – Color change, – Size change, – Waviness. Deviation as per drawing	
2.8	FAM test fluid DIN 51604-B as per DIN 51604-2	There must not be any change in lettering (print) after aging ^{d)} . The following are not permissible: – Color change, – Size change, – Waviness. Deviation as per drawing			
2.9	Urea solution as per ISO 22241-1 (AdBlue®)				
2.10	Ethanol fuel E85 as per DIN 51625				
3	Resistance of lettering (print) to mechanical influences				
3.1	Resistance to abrasion see section 5.6	It must not be possible to detect signs of abrasion with the naked eye. Discoloration on the cotton rubbing cloth is permissible.			
3.2	Scratch resistance see section 5.7	There must be no surface damage visible to the naked eye. A trace of indentation is permissible.			
4	Flammability ^{e)}	as per TL 1010			
5	Requirement on tear-off behavior (applies to types A and C only)	It must only be possible to remove the adhesive labels of – type A at temperatures from -40 °C to 90 °C, – type C at temperatures from -40 °C to 130 °C, and as per the tests no. 1.1 to no. 1.8 if they are completely destroyed by the removal process ^{f)} .			
^{a)} Requirements for tests on painted sheet test panels as per section 4.2 and section 5.1. ^{b)} A slight bleaching relative to the as-received condition is permissible.					

Table 1 (continued)

- c) For labels in the vehicle interior and in the luggage compartment: Testing is performed only if required in the drawing.
- d) For the type „without index“ and „type A“, the requirement applies only to labels that can come into contact with fuels in the course of normal operation and maintenance (e.g., on the fuel filler door).
- e) This requirement applies only to labels in the vehicle interior.
- f) Complete destruction: Fragmentation or internal delamination of the structure with destruction of the lettering (print). The delamination must also destroy lettering on fragments that have been removed.

4.4 Requirements on the lightfastness

4.4.1 Requirements for applications in the vehicle interior

Lightfastness as per PV 1303

For labels that are attached during vehicle manufacture, the following applies:

Number of exposure periods according to the label's point of application (see PV 1303, appendix A.1)

For labels that are already applied with an adhesive bond for part marking upon delivery:

Light exposure duration must correspond to the requirement for the surface with the adhesive bond.

Requirement: As per gray scale DIN EN 20105-A02, grade > 4

4.4.2 Requirements for applications in the vehicle exterior

4.4.2.1 Weathering in a dry, hot climate

As per PV 3929:

For labels that are attached during vehicle manufacture, the following applies:

1-year cycle: For parts under continuous, direct irradiation

½-year cycle: For parts in shaded areas (e.g., in the door cutout)

For labels that are already applied with an adhesive bond for part marking upon delivery:

Light exposure duration must correspond to the requirement for the surface with the adhesive bond.

Requirement: No visible color changes or gloss level changes

4.4.2.2 Weathering in a humid, hot climate

As per PV 3930:

For labels that are attached during vehicle manufacture, the following applies:

1-year cycle: For parts under continuous, direct irradiation

½-year cycle: For parts in shaded areas (e.g., in the door cutout)

For labels that are already applied with an adhesive bond for part marking upon delivery:

Light exposure duration must correspond to the requirement for the surface with the adhesive bond.

Requirement: No visible color changes or gloss level changes

4.5 Resistance to weathering

Resistance to open-air weathering as per [VW 50185](#)

Requirement: No complaints, deviations as per drawing

5 Notes on testing

5.1 Testing of the adhesive behavior

5.1.1 Specimen

Cut the adhesive labels to a size of 100 mm in length and 20 mm in width if the labels exceed these dimensions in the as-received condition.

5.1.2 Test preparation

The following requirements apply:

Type without index, type B:

Peel the protective film off of two-thirds of the specimen length and cut it off, so that one-third of the adhesive label is still covered.

Types A and C:

Bond the label over its entire surface area. On one corner, place a protective film under the label on a surface of approx. 0,5 cm².

Adhere the specimens in the center of painted sheet test panels or, for tests as per [section 4.2](#), in the center on the adhesion substrate specified in the drawing (original component off production tool).

5.1.3 Sheet test panel

Recommendation for the dimensions of the sheet test panel: 200 mm x 100 mm

Deviating dimensions are permissible.

Prepare the sheets as per [Quality Specification QP F082, section 3.4](#) (baking temperature (average value of overbaking and underbaking) ± 5 K).

The sheet surfaces must be free of flaws and soiling. Therefore, moisten a lint-free paper towel with an isopropanol/water mixture (volume content_{isopropanol} = 75%, volume content_{demineralized water} = 25%) and wipe the surface clean with a single, light wiping motion.

A fluid film that remains on the surface being cleaned after it is wiped indicates that the paper towel is adequately moistened. The remaining fluid film must be absorbed by a dry part of the paper towel when wiped a second time. The surface being cleaned is wiped dry as a result.

5.1.4 Test procedure

Adhere the label by strongly and continuously pressing on it starting from the narrow side with the aid of a felt pad (thickness: 1,0 mm $\pm 0,2$ mm).

Use each sheet test panel only one time.

Before carrying out tests without aging or before aging in test agents and standard atmospheres, condition the specimens prepared as mentioned above for at least 72 h in SA.

After removing the specimens from the individual test agents and standard climates, recondition them once again for 24 h, or 48 h in the case of condensed water loading, in SA.

After reconditioning, test the adhesion.

Also test the tear-off behavior immediately after removal at 90 °C, 130 °C, or -40 °C.

Depending on the type, the following specifications apply:

Type without index and type B:

Testing must be conducted as a peel test with a tensile test machine, with the use of a roller support (see figure 1).

Traverse speed: 50 mm/min, peeling angle: 90°, peeling distance: approx. 15 mm

5 specimens must be tested for each case.

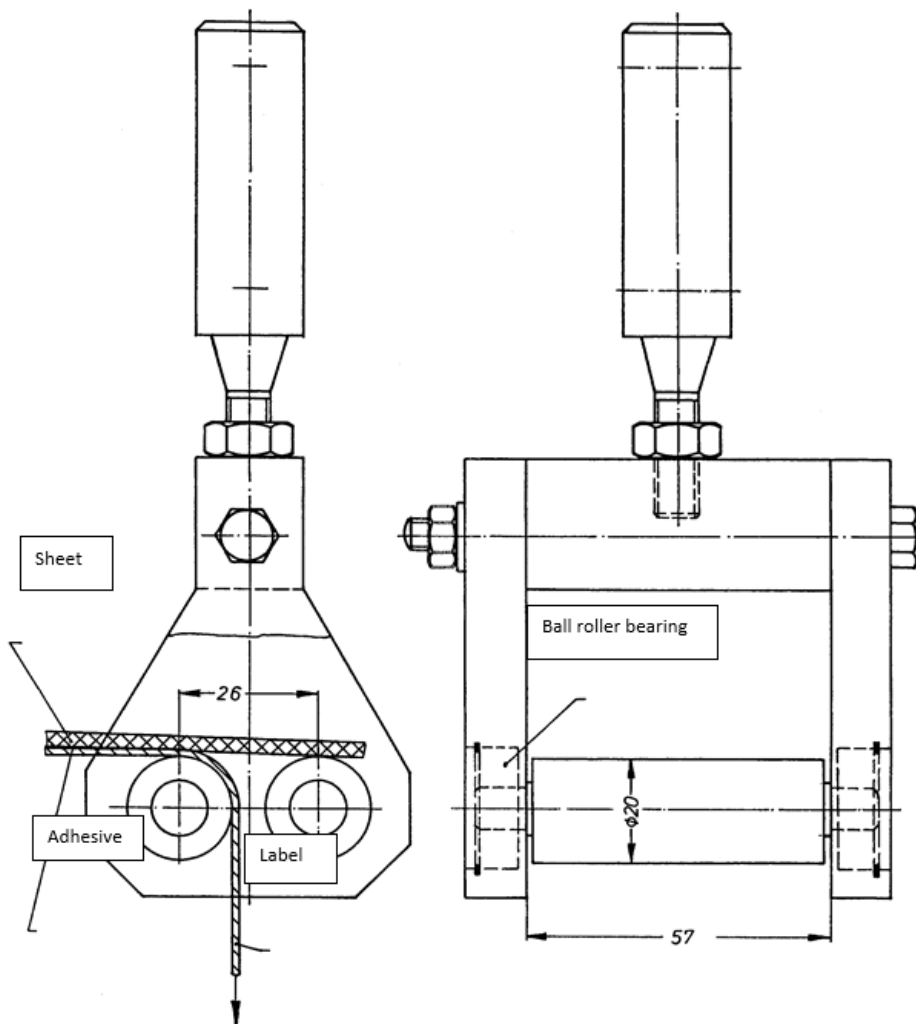


Figure 1 – Roller support

Types A and C:

Grasp the label by hand at the non-adhered corner and slowly subject it to a tensile load.

It is permissible for the peeling angle to vary during the test. Rotations that cause increased loading of one label edge must be avoided.

It must not be possible to remove the label without destroying it (see table 1).

3 specimens must be tested for each case.

5.1.5 Evaluation

Using the obtained load-displacement diagram, evaluate the middle area (approx. 30% to 90% of the tested distance). For this area, determine the mean value of the peel force (see table 1) as a comparison value relative to the specification.

5.2 Testing of the resistance to pressure water

Before the tests, condition the molded parts/shaped parts, onto which the adhesive labels have been adhered, for at least 72 h in SA. Then expose the specimens to the relevant agents (see table 1, no. 2).

After removing the specimens, recondition them for at least 48 h in SA.

Then spray the specimens with a commercially available high-pressure cleaner for 10 min with water under the following conditions:

- At 40 °C,
- Operating pressure: 50 bar,
- Spraying angle: 90° ±45°,
- Distance of nozzle to the object: 0,4 m to 0,6 m.

5.3 Fuel immersion aging

The following test agents must be used:

- Fuel mixture, consisting of the following volume contents:
 - 50% regular gasoline unleaded as per TL 781 (purity > 99%),
 - 30% toluene (purity > 99%),
 - 20% ethanol (purity > 99%);
- Ethanol fuel E85 as per DIN 51625;
- AdBlue® (32,5% aqueous urea solution).

5.4 Testing of dimensional changes (shrinkage test)

Prepare the adhesive labels as per section 5.1.1 and section 5.1.2.

Peel the protective film off of the entire specimen length. Adhere the specimens onto painted sheet test panels (see section 5.1.3) and condition for at least 72 h in SA.

Before and after aging (see table 1, no. 1.1 to no. 1.8), measure the specimens in longitudinal and transverse directions using a caliper.

The shrinkage value is calculated using formula (1):

$$\text{Shrinkage} = \frac{L_0 - L_1}{L_0} \times 100\% \quad (1)$$

Legend

L_0	Original length
L_1	Length after the loading

Repeat the aging with the worst test result on the original substrate.

For the case that all the test results are the same, perform the testing as per the environmental cycle test (table 1, no. 1.5) on the original substrate.

5.5 Testing of the resistance to media

Prepare the adhesive labels as per section 5.1.1 and section 5.1.2.

Peel the protective film off of the entire specimen length. Adhere the specimens onto painted sheet test panels (see section 5.1.3) and condition for at least 72 h in SA.

Wet the surface using a lint-free paper towel that has been previously moistened with the test agent.

Wet the surface by hand by wiping back and forth over the surface (10 times), applying light pressure. Circular motions are not permissible.

A fluid film that remains on the surface being cleaned after it is wiped indicates that the paper towel is adequately moistened.

Wipe the surface clean using a dry and lint-free paper towel 5 seconds after the last wetting process.

The evaluation is performed 15 min after the cleaning.

5.6 Testing of the resistance to abrasion

Perform the test using a crockmeter relative to a cotton rubbing cloth as per DIN EN ISO 105-X12.

The following applies in this case:

- 100 cycles,
- Contact force: $(9 \pm 0,2)$ N,
- Travel: (104 ± 3) mm,
- Cylindrical rubbing tool with diameter $\varnothing = 16$ mm,
- 1 cycle per 3 s.

Adhere the specimens onto a painted body sheet.

For samples with dimensions smaller than the required travel, reduce the travel without changing the speed. The movement of the cylindrical rubbing tool must not exceed the edges of the label.

5.7 Testing of the scratch resistance

Perform the test with an Erichsen hardness test pencil of type 318, engraving tip no. 1 (Bosch, 0,75 mm), load $(5 \pm 0,1)$ N.

Prepare the specimens as per section 5.1.1 and section 5.1.2

6 Applicable documents

The following documents cited in the standard are required for the application of this standard:

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 1200 Vehicle Parts; Testing the Environmental Cycle Resistance
(80 °C/-40 °C)

PV 1303 Non-Metallic Materials; Xenon Arc Light Aging of Vehicle Interior Parts

PV 3929	Non-Metallic Materials; Weathering in Dry, Hot Climate (Exterior)
PV 3930	Non-Metallic Materials; Weathering in Humid, Hot Climate (Exterior)
QP F082	Two-Component Clear Coat; Quality Requirements
TL 1010	Materials for Vehicle Interiors; Burning Behavior; Material Requirements; updated translation: 2018-06
TL 52138	Ottokraftstoff, metallfrei; Kraftstoffanforderungen
TL 52185	Reference Engine Oil SAE 5W-30; Testing of Compatibility with Respect to Elastomer Materials; Lubricant Requirements
TL 766	Bremsflüssigkeit; Werkstoffanforderungen
TL 774	Ethylene-Glycol-Based Coolant Additive; Materials Requirements
TL 781	Regular Unleaded Gasoline; Fuel Requirements
TL 788	Diesel Fuel; Fuel Requirements
VW 01155	Vehicle Parts; Approval of First Supply and Changes
VW 50180	Components, Semi-Finished Products, and Materials in the Vehicle Interior; Emission Behavior
VW 50185	Testing for Resistance to Open-Air Weathering on Whole Vehicles and of Components
VW 50554	Standard Atmospheres and Room Temperatures; Requirements on Standard Atmospheres
VW 91101	Environmental Standard for Articles; Material and Chemical Conformity
DIN 50018	Testing in a saturated atmosphere in the presence of sulfur dioxide
DIN 51604-2	FAM-testing fluid for polymer materials - Composition and requirements - Part 2: Testing Fluid B, containing methanol
DIN 51625	Automotive fuels - Ethanol Fuel - Requirements and test methods
DIN EN 14214	Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods
DIN EN 20105-A02	Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour
DIN EN ISO 105-X12	Textiles - Tests for colour fastness - Part X12: Colour fastness to rubbing
DIN EN ISO 16925	Paints and varnishes - Determination of the resistance of coatings to pressure water-jetting
DIN EN ISO 6270-2	Paints and varnishes - Determination of resistance to humidity - Part 2: Condensation (in-cabinet exposure with heated water reservoir)
ISO 22241-1	Diesel engines - NOx reduction agent AUS 32 - Part 1: Quality requirements