
Group standard**VW 50105**

Issue 2022-04

Class. No.: 55536

Descriptors: backrest trim cover, cover material, covering, flock, lamination, raschel knit fabric, seat trim cover, textiles, trim cover material, warp-knit fabric, woven fabric

Trim Cover Materials

Requirements and Tests

2 types: A, B

Previous issues

VW 50105: 1985-06, 1996-12, 2000-08, 2002-07, 2003-11, 2006-09, 2010-06, 2018-03, 2020-06

Changes

The following changes have been made to VW 50105: 2020-06:

- a) Standard divided into 2 types;
- b) Section 4 „Basic requirements“: VW 52000 added;
- c) Section 6 „Additional equipment“: Section renamed and requirements regarding finish removed
- d) Table 2 „Cleaning behavior“: „Grease-free dirt“ eliminated;
- e) Table 3 „Materials requirements“: Column „Raschel knit fabric“ removed and additional columns renamed;
- f) Table 3 „Materials requirements“: „Schopper test“ item removed
- g) Table 3 „Materials requirements“: No. 5.1.1: Number of abrasion cycles increased;
- h) Table 3 „Materials requirements“: No. 5.1.2: Grade for contrast changed;
- i) Table 3 „Materials requirements“: No. 5.1.3: Requirement on pilling added;
- j) Table 3 „Materials requirements“: „Moisture absorption“ item removed;
- k) Table 3 „Materials requirements“: Footnotes updated;
- l) Table 4 „Standard values for static elongation“: Type of weave „Epinglé“ removed;
- m) Section 11.4 „Seam strength“: Number of sewing thread variants reduced;
- n) Section „Moisture absorption“ removed.

1 Scope

The standard defines the requirements for trim cover materials.

The cover materials are woven, knit, warp-knit, and raschel knit fabrics for the seat trim covers, backrest trim covers, center armrest trim covers, and head restraint trim covers, and other coverings and laminations.

2 Types

This standard applies to the following types:

- | | |
|---------|---|
| Type A: | Standard wear requirements |
| Type B: | Stricter wear requirements for higher loads |

3 Designation

The Technical Supply Specification (TL) designation is noted in the drawing together with the type of cover materials.

Example of the designation of a trim cover material made of woven fabric with stricter wear requirements as per VW 50105:

VW 50105-B - Woven fabric

4 Basic requirements

Approval of first deliveries and changes as per VW 01155

The material analysis is performed as per Volkswagen standard VW 52000.

The trim cover material must comply with the requirements as per VW 91101 with regard to the fiber components as well as the additives, e.g., dyes, contained.

The trim cover material must meet the requirements regarding flammability (see table 3).

At least 2 m² roll goods or parts with the same total area is required for complete laboratory testing.

Requirements for the individual fabric qualities are specified in separate Group Standards. These may contain type-specific deviations from material characteristics which are valid for production delivery.

All tests must be performed on specimens in a laminated state.

The required numerical values apply to each individual measurement.

5 Properties

The trim cover material must be clean and free of mineral oil. With the exception of fabrics with flock yarn, a washing procedure must be performed. Chemical cleaning must not take place.

The fabric must be free of weaving faults and knit faults and must be free of distortions when laid out.

The fabric must not be streaky.

Skew and bow over the entire fabric width must be $\leq 1,5\%$ for woven fabrics or warp-knit fabrics, or $\leq 2\%$ for circular-knit fabrics.

Skew must be measured over the entire fabric width of the roll goods, whereas the degree of bow must be measured at the highest point of the bow (at right angles to the direction of knit, see figure 1).

The measurement must be performed on roll goods that has not yet been processed.

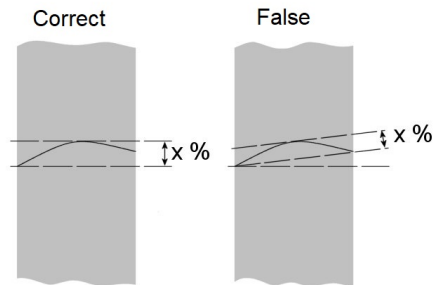


Figure 1 – Bow

In the edge areas of the roll goods and for cut pieces, the skew and bow must be $\leq 2\%$ for woven fabrics or warp-knit fabrics, and must be $\leq 2,5\%$ for circular-knit fabrics. At least 250 mm of the width must be used for the measurement. Fabrics with a „solid single-color appearance“ are excluded from the test.

If required, the trim cover material must be high-frequency weldable (HF weldable) with a suitable foam pad insert. Substances or foreign matter that have an adverse effect on HF weldability and weld stability are not permissible.

Changes may be made following written approval and must be recorded in the technical documents.

For velour material, the pile must be uniformly compacted. For flock fabrics, there must be no formation of shiny areas.

Only moisture resistant-grade or highly moisture resistant-grade material may be used as spun rayon. For wool, only pure new wool (not recycled wool) may be used.

The backing fabric must be laminated with low tension.

6 Additional equipment

Organic or inorganic substances that negatively affect the lightfastness, durability, tactile properties, or emission behavior must not be added to the face fabric. This includes, e.g., phosphoric acid derivatives often used as flame retardants.

Additional equipment must be specified in the test report.

7 Marking

The back of the roll goods must be visibly marked for traceability purposes (manufacturer, batch number, etc.). The marking must not have a negative effect on the face fabric.

The batch marking must be agreed accordingly with the departments.

The distance between the marking imprints must be ≤ 350 mm.

8 Material characteristics

8.1 Materials

The following requirements apply to materials:

- Overall structure as per Technical Supply Specification (TL), drawing, or release
- Face fabric as per TL, drawing, or release
- Foam: Ether PUR foam or open-cell ester PUR foam, subject to the following requirements:
 - Gross density (40 ± 5) kg/m³, deviations only permitted after consultation with the appropriate departments;
 - Flame laminatable;
 - HF weldable (if required);
 - Hydrolysis resistance (see section 11.2);
 - as per the specifications in the drawing or release.

When indicating the materials, the requirements as per German Association of the Automotive Industry VDA 260 apply.

The type and color of the foam to be used must be agreed upon with the respective test laboratory and the appropriate departments. The foam supplier, foam type, and total weight of the foam must be indicated at the time of sample inspection.

Alternatively, fleece lamination can also be used in agreement with the department.

8.2 Mass per unit area

See section 11.6

The mass per unit area for face fabric and for backing fabric as well as the total mass per unit area must be specified with tolerances.

8.3 Yarn characteristics

The following requirements apply to the yarn characteristics:

- Specifications of yarn characteristics as per DIN 60900-2 and DIN 60900-4;
- Face and backing fabrics, separated according to length and width¹⁾;
- Thread count, stitch count, type of fiber, yarn usage, yarn size: As per TL or drawing or as per release by the Materials Engineering department or a similarly released sample.

9 Quality characteristics

9.1 Behavior upon treatment with cleaning agents

The trim cover material must be cleanable with an aqueous wetting agent solution and with conventional organic solvents, e.g., cleaner's naphtha, without the formation of stains along the edges.

¹⁾ Woven fabric: Length is warp direction; width is weft direction
Raschel knit fabric: Length is pillar stitch; width is weft direction
Warp-knit and circular-knit fabrics: Length is wales, width is course

After the special boiling point spirit²⁾ has evaporated from the wetted fabric surface of approximately 50 cm², there must be no ring formation on the face fabric.

There must be no color changes and no cloth staining during cleaning tests with a white, spirit-soaked cloth on unused fabric.

9.2 Behavior upon soiling and cleaning

9.2.1 General requirements

Very light colors are not suitable for seat cushion pads and backrests (seat bolsters and inserts) due to their soiling behavior.

A limit of L (brightness) ≤ 65 applies to D65 daylight for inserts and seat bolsters in series production vehicles. Other areas (e.g., fabrics in the anti-squeak coating area) and fabrics for customized vehicles (e.g., fabrics for Audi Sport GmbH) are excluded from the specification.

Colorimetry as per VW 50190

Test as per PV 3356

9.2.2 Soiling behavior

Gray scale for the evaluation of the color change as per DIN EN ISO 105-A03 (see table 1)

Table 1 – Soiling behavior

Lightness value L > 50 (light colors)	Lightness value L 50 to 35 (medium colors)	Lightness value L < 35 (dark colors)
Gray-scale grade 1-2	Gray-scale grade 2	Test not required

9.2.3 Cleaning behavior

Gray scale for assessing change in color as per DIN EN 20105-A02 (see table 2)

Table 2 – Cleaning behavior

Lightness value L > 50 (light colors)	Lightness value L 50 to 35 (medium colors)	Lightness value L < 35 (dark colors)
Gray-scale grade 2-3 or color difference $\Delta E \leq 5,5$	Gray-scale grade 3-4 or color difference $\Delta E \leq 3$	Test not required

If agreed upon with the department, the testing of the cleaning behavior can be omitted.

9.3 Fuzzing characteristics

The following requirements apply:

Testing for velour, roughened surfaces and flock material as per PV 3360

Fiber adhesion before cleaning: Grade for rating ≤ 2

Fiber adhesion after cleaning: Grade for rating 1

Number of cleaning tests: 8

²⁾ Type 2 special boiling point spirit as per DIN 51631 [1]

9.4 Resistance to spotting by water

There must be no water spotting (see [section 11.7](#)).

9.5 Emission behavior

Requirements as per [VW 50180](#).

Sampling is done over the entire length of the fabric, at least 10 cm from the edge of the fabric.

9.6 Materials requirements

The materials requirements are defined in [table 3](#).

For materials with color gradient, pattern, or embossing course, the sampling areas must be agreed upon with the releasing department before the test.

Table 3 – Materials requirements

No.	Property	Unit	Requirement		
			Woven fabric	Warp-knit fabric	Knitted fabric
1	Maximum tensile strength ^{a)} , based on a specimen width of 50 mm				
1.1	Initial state as per DIN EN ISO 13934-1, DIN EN 12127, and section 11.3				
1.1.1	Length	N	≥ 600	≥ 500 ^{b)}	≥ 350
1.1.2	Width				
1.2	After water immersion aging ^{c)}				
1.2.1	Length	N	≥ 400	–	
1.2.2	Width				
1.3	After high-temperature light exposure ^{d)} as per PV 1303 (3 cycles)				
1.3.1	Length	N	≥ 500	≥ 350	
1.3.2	Width				
2	Seam behavior, based on a specimen width of 50 mm; specimen preparation as per section 11.4				
2.1	Seam strength Test as per DIN EN ISO 13935-1 Length or width	N	≥ 400 For anti-squeak materials: ≥ 350	≥ 300	
2.2	Seam slippage resistance (for woven fabric only) as per PV 3955				
2.2.1	Seam opening under 400 N load ^{e)}	mm	≤ 6,0	–	
2.2.2	Seam opening under 10 N load		Target value: ≤ 1,0	–	
2.2.3	Seam opening after unloading		No permanent woven fabric change, no piercing yarns	–	
3	Separating force as per DIN EN ISO 2411 and section 11.5, based on a specimen width of 50 mm				
3.1	Foam and face fabric				
3.1.1	Length	N		10 ±4 for flame lamination ≥ 6 for fleece lamination (e.g., multiknit)	
3.1.2	Width				
3.2	Foam and backing fabric				

Table 3 (continued)

No.	Property	Unit	Requirement		
			Woven fabric	Warp-knit fabric	Knitted fabric
3.2.1	Length	N	10 ±4 for flame lamination The backing fabric is removed for fleece lamination		
3.2.2	Width				
4	Elongation of the overall structure, based on a specimen width of 50 mm Testing as per PV 3909, Suspended load	N	125	25	
4.1	Static elongation ^{f)}				
4.1.1	Length	%	See section 10	9 ±3	
4.1.2	Width				
4.2	Permanent elongation				
4.2.1	Length	%	≤ 2		
4.2.2	Width				
4.3	Snag test as per PV 3949	Grade for rating	≥ 4	—	
5	Wear behavior				
5.1	Martindale abrasion test ^{g)} as per DIN EN ISO 12947-1 ^{h),i),g)}				
5.1.1	Wear pattern ^{j)}	Insert	Type A: No flaws up to 35 000 abrasion cycles ^{k)} Type B: No flaws up to 50 000 abrasion cycles ^{k)}		
		Seat bolster	Type A: No flaws up to 50 000 abrasion cycles ^{k)} Type B: No flaws up to 70 000 abrasion cycles ^{k)}		
		Head restraint, armrest, door trim panel, anti-squeak material	No flaws up to 25 000 abrasion cycles ^{k)}		

Table 3 (continued)

No.	Property	Unit	Requirement		
			Woven fabric	Warp-knit fabric	Knitted fabric
5.1.2	Contrast Test as per DIN EN 20105-A02	Grade for rating	≥2		
5.1.3	Pilling		No pilling after 10 000 abrasion cycles (interim evaluation)		
5.2	Hook-and-loop fastener test as per PV 3961 ^{1),I)}				
	Seat bolster, insert, armrest	Grade for rating	≥ 4		
	Head restraint, door trim panel	Grade for rating	≥ 3		
6	Xenon arc light behavior test: 3 cycles as per PV 1303	Gray scale	≥ 4 ≥ 3 for anti-squeak materials No color shift		
7	Color fastness as per DIN EN ISO 105-X12, gray scale as per DIN EN ISO 105-A03				
7.1	Wet	Grade for rating	≥ 4-5		
7.2	Dry				
8	Air permeability ^{m),I)} Test as per DIN EN ISO 9237 Test surface area 20 cm² Differential pressure: 200 Pa	$\frac{1}{\text{min } 100 \text{ cm}^2}$	≥ 50	≥ 75	
9	Flammability as per TL 1010				
a) In the case of laminated trim cover materials: Face fabric and overall structure					
b) Depending on usage: ≥ 350 N permissible, to be specified by the releasing appropriate department					
c) Only applies to trim cover materials containing spun rayon					
d) For laminated trim cover materials: Light exposure of trim cover material only with foam or backing fabric.					
e) Load for anti-squeak materials: 350 N					
f) Static elongation is used as a standard value for development of trim cover materials and is determined for each trim cover material in collaboration with the appropriate departments and the processor. Processability must also be ensured on critical components. The static elongation is established as a nominal dimension with tolerance for series production (e.g., in the build sample approval or in the drawing). Process capability must be demonstrated for the production release. This specification is also valid for second suppliers.					
g) Load weight (auxiliary weight and specimen holder): (795 ±7) g					

Table 3 (continued)

h)	At an overall thickness of the material structure of $\geq 4,5$ mm, the backing material must be detached. The overall thickness after detaching must be $(3,5 \pm 0,5)$ mm.
i)	Alternatively to the specimen carrier with threaded stud as per DIN EN ISO 12947-1, a specimen carrier with tension spring can be used.
j)	For evaluation of the wear behavior after testing with the Martindale abrasion tester, the following flaws are not acceptable within the specified number of abrasion cycles: broken threads, pilling, heavy fluffing or roughening, stripping of flock material cores, abrasion revealing white color
k)	In addition to the Martindale abrasion test, the component testing (e.g., as per Performance Specification) must be completed with positive results.
l)	This test is not required for anti-squeak materials.
m)	Deviating requirements are possible in special cases (climate-controlled seat, embossed fabric) following written approval.

10 Static elongation of woven fabric

The values for static elongation are established by the Development and Quality Assurance departments. The type of weave must be specified in the test report.

The standard values for static elongation are defined in table 4.

Table 4 – Standard values for static elongation

Type of weave	Length (warp) in %	Width (weft) in %
Seat bolster fabrics for Volkswagen passenger cars and Volkswagen commercial vehicles	9 ±3	9 ±3
Flock fabric	7 ±3	6 ±3
Plain weave, satin weave, Jacquard, Panama	7 ±3	7 ±3
Twill	8 ±3	8 ±3
Warp ribs	7 ±3	6 ±3
Weft ribs	6 ±3	7 ±3
Woven velour	10 ±3	10 ±3
Double weave	Proportional weave with least elongation minus 1%	

11 Notes on testing

11.1 Specimen preparation and performance of the testing

Before testing, the specimens must be conditioned in a standard atmosphere as per VW 50554 – 23/50-2 (SA) for at least 24 h.

The tests must be carried out in the standard atmosphere.

11.2 Hydrolysis resistance

The test is carried out as per PV 3959 with the following deviations:

1. Aging: 120 h at (90 ±2) °C and (95 ±2)% relative humidity,
2. Evaluation of the test:
 - visible foam compression set must not occur,
 - there must be no changes to the foam seal,
 - the decorative material and foam must not be separated,
 - there must be no cohesive failure of the foam,
 - Complete recovery of laminated foam must take place within 5 s after removing applied pressure (thumb test) compared to as-received condition.

11.3 Maximum tensile strength

The measurements must take place with a specimen width of 5 cm in each case.

The maximum tensile strength is determined in the strip tensile test as per DIN EN ISO 13934-1 at a feed rate of 100 mm/min and a free clamping length (gage length) of 100 mm.

11.4 Seam strength

In deviation from DIN EN ISO 13935-1 the free clamping length is 100 mm.

The following requirements apply:

PET sewing thread: Nm 30/3;

Needle dimensions: 120 Nm;

Stitch length: $(4,0 \pm 0,5)$ mm;

Seam allowance: Lower tolerance limit;

Example: At (8 ± 2) mm the seam allowance to be tested is 6 mm

11.5 Separating force

The measurements must take place with a specimen width of 5 cm in each case.

The separating force is determined as per DIN EN ISO 2411, Procedure 1 of the specimen preparation.

During the evaluation, the range of variation as well as the peak values of the separating force is recorded.

11.6 Mass per unit area

The test is performed as per DIN EN 12127.

The mass per unit area is determined on at least five round specimens with an area of 100 cm² each. These specimens must be taken from across the full width of the fabric.

11.7 Testing of resistance to spotting by water

11.7.1 Reagents and equipment

- Demineralized water,
- Graduated cylinder for measuring 10 ml water,
- Gray scales as per DIN EN 20105-A02 and DIN EN ISO 105-A03 for evaluating changes in color as well as staining (grades 1 to 5)

NOTE : Grade 5: no change; grade 1: significant change

11.7.2 Manufacture and preparation of specimen

At least one specimen (500 mm x 500 mm) must be taken from the material to be tested.

In the case of multicolor fabrics, enough specimens must be taken so that each color can be tested.

11.7.3 Test procedure

The specimen is placed on a waterproof backing. 10 ml of demineralized water is applied onto the center of the specimen from as low as possible and slowly enough so that the water cannot flow off the upper side of the specimen but instead is absorbed.

The specimens wetted in this way are laid out to dry at room temperature 18 °C to 25 °C.

Complete drying is controlled by determining the weight before and after the treatment. Color change and changes in the color appearance compared to the unwetted surface is evaluated using a gray scale.

For light-colored fabrics, the gray scale as per [DIN EN ISO 105-A03](#) must be used; for darker colors, the gray scale as per [DIN EN 20105-A02](#) must be used.

12 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 1303	Non-Metallic Materials; Xenon Arc Light Aging of Vehicle Interior Parts
PV 3356	Textiles; Testing of the Soiling and Cleaning Behavior
PV 3360	Upholstery Materials; Determination of Fuzzing Behavior
PV 3909	Non-Metallic Planar Materials; Measurement of Static and Permanent Elongation
PV 3949	Upholstery Cover Materials; Snag Test
PV 3955	Trim Cover Material; Determining the Seam Slippage Resistance of Trim Cover Material – Woven Fabrics
PV 3959	Hydrolysis Test on Components with Foam-Laminated Decorative Material in the Vehicle Interior
PV 3961	Trim Cover Material; Hook Fastener Test
TL 1010	Materials for Vehicle Interiors; Burning Behavior; Material Requirements; updated translation: 2018-06
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 50190	Vehicle Interior Equipment Components; Measurement-Based Evaluation of Color and Gloss Level; Visual Evaluation of Chrome Surfaces
VW 50554	Standard Atmospheres and Room Temperatures; Requirements on Standard Atmospheres
VW 52000	Material Quality Verification; Requirements and Documentation
VW 91101	Environmental Standard for Articles; Material and Chemical Conformity

DIN 60900-2	Yarns; terms for the designation of yarn construction in the Tex system
DIN 60900-4	Yarns; designation in the system Nm
DIN EN 12127	Textiles - Fabrics - Determination of mass per unit area using small samples
DIN EN 20105-A02	Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour
DIN EN ISO 105-A03	Textiles - Tests for colour fastness - Part A03: Grey scale for assessing staining
DIN EN ISO 105-X12	Textiles - Tests for colour fastness - Part X12: Colour fastness to rubbing
DIN EN ISO 12947-1	Textiles - Determination of the abrasion resistance of fabrics by the Martindale method - Part 1: Martindale abrasion testing apparatus
DIN EN ISO 13934-1	Textiles - Tensile properties of fabrics - Part 1: Determination of maximum force and elongation at maximum force using the strip method
DIN EN ISO 13935-1	Textiles - Seam tensile properties of fabrics and made-up textile articles - Part 1: Determination of maximum force to seam rupture using the strip method
DIN EN ISO 2411	Rubber- or plastics-coated fabrics - Determination of coating adhesion
DIN EN ISO 9237	Textiles - Determination of permeability of fabrics to air
VDA 260	Components of motor vehicles - Marking of material

13 Bibliography

- [1] DIN 51631 Mineral spirits - Special boiling point spirits - Requirements