VOLKSWAGEN

AKTIENGESELLSCHAFT

Group Standard

TL 82253

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Descriptors: Fuel Line ASSY, line, feed line, connecting element, joining element, breather line

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Fuel Line ASSY

Functional Requirements

5 Types: A to E

Previous issues

TL 82253: 1990-07, 1996-05, 1998-03, 2005-01, 2007-03

Changes

The following changes have been made as compared to TL 82253: 2007-03:

– Common rail diesel incorporated
– Requirements expanded to include VW 60507
– Table values adapted

Contents

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1 Scope

This standard specifies requirements for overpressurized or underpressurized, fuel vapor-carrying or fuel-carrying components. It applies to the entire fuel line system or breather line system of the fuel system.

Fuel systems are differentiated into 5 types. See Table 1.

Table 1 – Types

Type	A	B	C	D	E
Maximum operating pressure in bar (relative)	-0,2 to 0,2	Up to 1,4	Up to 4,5	Up to 7,0	Up to 7,0
Maximum service temperature range in °C	-40 to +100	-40 to +130	-40 to +100	-40 to +100	Feed -40 to +80 Return [a)] -40 to +100
Example of application	Breather line for leak diagnosis, parking heater, and unpressurized hose connections	Fuel line for diesel engine with fuel distributor injection pump and unit-injector system	Fuel line for MPI Otto engines	Fuel line for FSI Otto engines	Fuel line for common rail diesel engines

a) Unpressurized

2 Description

Functional requirements for fuel line ASSYs according to TL 82253.

3 Requirements

3.1 General requirements

Sections marked with a documentation bar are subject to mandatory documentation. The documents shall be kept on file for 15 years.

Approval of first supply and changes according to Volkswagen standard VW 01155.

Environmental requirements according to VW 91100 must be fulfilled.

Technical Supply Specifications are part of the drawing.

Drawing specifications take precedence.

FMVSS 301 – Leak tightness of fuel system

3.2 Operating temperature range

-40 °C to +130 °C

3.3 As-received condition

Free of impurities (internally and externally). Values according to Test Specification PV 3336 or drawing specifications must not be exceeded. The supplier shall guarantee that soiling during transport and storage will be prevented.

At least 5 specimens must be prepared as follows for tests according to Section 4.2.1, Section 4.3, and Section 4.4.1.1:

A fuel pipe approx. 150 mm in length is fitted to both sides of the specimen (plug side and coupling side).

3.4 Material

According to drawing.

3.5 Marking

According to drawing and VDA 260.

3.6 Connections

Location and/or positioning of the connection according to drawing.

3.7 Aging

Prior to testing, the specimens must be aged for at least 48 h in the ISO 554-23/50-2 standard climate.

4 Tests

The tests acc. to Sections 4.1, 4.2 and 4.3 are each to be performed in succession with the parts.

For the test run, see Figure 1.

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Figure 1 – Test run

The following tolerance specifications apply to all tests:

Temperature	Tolerance ± 2 °C
Pressure p = 2,0 bar over-pressure	Tolerance ± 10%
Pressure p > 2,0 bar over-pressure	Tolerance ± 5%

4.1 Leak tightness test in unused condition

See Table 2.

Table 2 – Testing of new parts

Type	A	B	C	D	E
Test pressure in bar over-pressure	0,5	2,0	6,8	12	12
Temperature	(23 ± 2) °C				
Pressure hold time	5 minutes				
Test medium	Air				
Leakage	Not permissible. This is checked in a glycol bath or using leak detection spray.				

4.2 Leak tightness test after pulsating pressure test

4.2.1 Pulsating pressure test

See Table 3.

Table 3 – Pulsating pressure test

Type	A	B	C	D	E
Test pressure in bar over-pressure	0 to 0,5	0 to 2,0	0 to 6,8	0 to 12	0 to 12
Temperature in the specimen and/or medium temperature	+100 °C	+130 °C	+100 °C	+100 °C	+80 °C
Number of load cycles	200 000 load cycles			350 000 load cycles	200 000 load cycles
Test frequency	0,5 $^{+0,3}$ Hz				
Test setup	Testing in air				
Test medium	Air			Air	Air
				for components in the fuel tank, optionally: unleaded gasoline (maximum temperature 65 °C) according to DIN EN 228	for components in the fuel tank, optionally: diesel fuel according to DIN EN 590
Pulsating pressure load: Pressure buildup	Sinusoidal				
Number of specimen parts	5				

Subsequently, testing according to Section 4.2.2 must be performed on the same specimens.

4.2.2 Aging with fuel

The complete specimen shall be filled with test fuel. The inside of the specimen shall always have complete contact with the test fuel at the connection (vertical aging). When using the fuel line ASSY in the fuel tank, the specimen shall also be completely in contact with the test fuel on the outside.

Gasoline engine	FAM B according to DIN 51604-2
Diesel engine	FAME according to DIN EN 14214
Aging temperature	+40 °C
Aging period	168 h

The fuel shall be replaced on the 4th day of aging. No later than 10 min after aging, leak tightness shall be tested acc. to Sections 4.2.3, 4.2.4 and 4.2.5.

4.2.3 Leak tightness test at room temperature

The specimens shall be immersed into the glycol bath in mounted condition. The test is performed immediately after Section 4.2.2 "fuel aging" or the Section 4.3"temperature cycle test". See Table 4.

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Table 4 – Testing at room temperature

Type	A	B	C	D	E
Test pressure in bar over-pressure	0,5	2,0	6,8	12	12
Temperature requirement	(23 ± 2) °C				
Test medium	Air				
Pressure hold time	5 minutes				
Leakage	Not permissible. This is checked in a glycol bath or using leak detection spray.				

4.2.4 Leak tightness test at low temperature

Same as Section 4.2.3 but with a different temperature range, see Table 5.

Table 5 – Low-temperature testing

Type	A	B	C	D	E
Test pressure in bar over-pressure	0,5	2,0	6,8	12	12
Temperature	-30 °C	-20 °C[a)]	-30 °C	-30 °C	-20 °C
Test medium	Air				
Pressure hold time	5 minutes				
Leakage	Not permissible. This is checked in a glycol bath or using leak detection spray.				

a) Only for diesel and diesel substitutes

4.2.5 Leak tightness test at elevated temperature

Same as Section 4.2.3 but with a different temperature range, see Table 6.

Table 6 – Testing at elevated temperature

Type	A	B	C	D	E
Test pressure in bar over-pressure	0,5	2,0	6,8	12	12
Temperature	+100 °C	+130 °C[a)]	+100 °C	+100 °C	+80 °C
Test medium	Air				
Pressure hold time	5 minutes				
Leakage	Not permissible. This is checked in a glycol bath or using leak detection spray.				

a) Only for diesel and diesel substitutes

4.3 Temperature cycle test with static internal pressure

Specimen surface temperature, see Table 7.

Table 7 – Temperature cycle test

Type	A	B	C	D	E
Test pressure in bar over-pressure	0,5	2,0	6,8	12	12
Specimen surface temperature	-30 °C to +100 °C	-30 °C to +130 °C	-30 °C to +100 °C	-30 °C to +100 °C	-30 °C to +80 °C
Duration of cycle	3 to 4 h				
	All temperature cycles to be conducted with constant temperature gradients.				
Hold time when reaching the specified temperatures	None				
Test setup	Testing in air				
Test medium	Air			Air	Air
				for components in the fuel tank, optionally: unleaded gasoline (maximum temperature 65 °C) according to DIN EN 228	for components in the fuel tank, optionally: diesel fuel according to DIN EN 590
Minimum hold time	35 cycles				

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Type	A	B	C	D	E
Number of specimen parts	5				
Leakage	No leakage permissible.				

4.4 Removal forces

4.4.1 Connections outside the tank

4.4.1.1 Test in as-received condition

Separating force against joining direction	≥ 300 N
Pull-off rate	100 mm/min
Number of specimens	5

4.4.1.2 Testing after pulsating pressure test and temperature cycle

See Section 4.2.1 and Section 4.3.

Separating force against joining direction	≥ 300 N
Pull-apart rate	100 mm/min

4.4.2 For connections inside the fuel tank

Test in as-received condition.

Type, see drawing.

Testing is conducted after aging in FAM B for 48 h at +60 °C without subsequent drying. The specimens are completely immersed during this time.

Acclimatization period	≤ 10 min
Separating force against joining direction	≥ 200 N
Pull-apart rate	100 mm/min

4.5 Static internal pressure test

Static internal pressure test for frictional connections (fitting, sliding agent, hose, clip) for joints with auxiliary mounting means; test in as-received condition.

Test setup:

Secure hose using joining element (e.g., threaded ring, spring clamp, pressure ring) on the fitting as in standard production and according to VW 60507.

Ensure that the fitting is wetted with the approved lubricant before pushing on the hose. See Table 8.

Table 8 – Static internal pressure test

Type	A	B	C	D	E
Test pressure in bar over-pressure	0,5	2,0	6,8	12	12
Temperature	Continuous heating-up of test parts under internal pressure in the oven, starting from room temperature (23 ± 2) °C to +100 °C. The internal pressure must be kept constant.				
Heating rate	(4 + 1) °C/min				
Hold time after reaching +100 °C	t = 30 min				
Number of specimen parts	5				
Requirement	The hose must not shift or slip from the fitting.				
Test setup	Testing in air				
Test medium	Air			Air	Air
				for components in the fuel tank, optionally: unleaded gasoline (maximum temperature 65 °C) according to DIN EN 228	for components in the fuel tank, optionally: diesel fuel according to DIN EN 590

5 Referenced documents

The following documents cited in this standard are necessary for application.

In this Section terminological inconsistencies may occur as the original titles are used.

Standards with the titles given in German are either only available in German or may be procured in other languages from the institution issuing the standard.

PV 3336	Lines; Checking for Impurities
VW 01155	Vehicle Supply Parts; Approval of First Supply and Changes
VW 60507	Fuel Lines; Hoses and Fittings for Spring Clamp with Nominal Ø 14 mm
VW 91100	Environmental Standard for Vehicles; Vehicle Parts, Materials, Operating Fluids; Policy, Specifications
DIN 51604-2	Methanolic FAM testing fluid for polymer materials; composition and requirements
DIN EN 14214	Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods
DIN EN 228	Automotive fuels - Unleaded petrol - Requirements and test methods
DIN EN 590	Automotive fuels - Diesel - Requirements and test methods
ISO 554	Standard atmospheres for conditioning and/or testing; Specifications

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VDA 260 Components of motor vehicles; marking of material