DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory

k3works GmbH
Industriestraße 5, 91757 Treuchtlingen

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

mechanical and technological tests, environmental simulation tests and permeation (SHED) at technical products of plastic and metal

The accreditation certificate shall only apply in connection with the notice of accreditation of 30.09.2016 with the accreditation number D-PL-17435-01 and is valid until 08.12.2018. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 7 pages.

Registration number of the certificate: **D-PL-17435-01-00**

Berlin, 30.09.2016	Ralf Egner Head of Division	Translation issued: 17.10.2016	Head of Division

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

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Office Frankfurt am Main
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Office Braunschweig
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The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-17435-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 30.09.2016 to 08.12.2018 Date of issue: 30.09.2016

Holder of certificate:

k3works GmbH
Industriestraße 5, 91757 Treuchtlingen

Tests in the fields:

mechanical and technological tests, environmental simulation tests and permeation (SHED) at technical products of plastic and metal

Abbreviations used: see last page

The laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use standard test methods listed here with different issue dates or revision status updates. The listed test methods are exemplary.
The laboratory maintains a current list of all test methods in a flexible scope of accreditation.

Characteristical test methods

Refueling test

PVk3_01 2012-01	Refueling with and without temperature
EH 2.1.2. 1999-02	BMW Testing manual refueling
EP 21 100.14 2005-11	VW Specification refueling

EP 21 100.22 2009-06	VW Specification refueling
PV KI 02.05.02.14 25.07.2012	Porsche Specification - Zero-emissions refueling (ORVR-gasoline)
40 CFR 86.150-98 ff 2013	Code of federal regulations - §86.150-98 Refueling test procedure (ORVR)

Hot gasoline measurement

PVk3_02 2013-09	Hot gasoline measurement (Fuel supply units)
AK-LH-15 2011-11	Electronic fuel pump Working group Specification sheet 15 - Electronic fuel pump for petrol fuels
AK-LH-16 2010-04	Electronic fuel pump Working group Specification sheet 16 - Electronic fuel pump for diesel fuels
EP 21 000.30 1997-12	VW/Audi Development and inspection catalogue Fuel tank
EH 2.3.5 1997-05	BMW Testing manual Hot petrol transport
EH 2.3.6 1998-01	BMW Testing manual Hot petrol transport - Cooler test rig

Temperature cycling

PVk3_03 2011-11	Temperature cycling also with Ex protection
PVk3_03_1 2013-03	Temperature cycling (Treuchtlingen)
PVk3_03_2 2013-03	Temperature cycling (Kerpen)
DIN EN 60068-2-14 2010-04	Environmental testing - Part 2-14: Tests - Test N: Change of temperature

Pump test

PVk3_04 2013-09	Pump test (Electronic fuel pump)

Roll-over test

PVk3_05 2013-07	Roll-over-Test
FMVSS 571.301 2004-10	NHTSA Federal Motor Vehicle Safety Standards - Fuel system integrity
2000/8/EG 2000-03	Liquid fuel tanks and rear underrun protection of motor vehicles and their trailers - 6.2 Tilting test
EH 2.2.1 2003-08	BMW Testing Manual Roll-Over-Test
ECE R 34 2011-04	Regulation of the Economic Commission for Europe of the United Nations (UN/ECE) - Uniform provisions concerning the approval of vehicles with regard to the prevention of fire risks - 6.2 Tilting test

Skew heating test

PVk3_06 2013-07	Skew heating
EH 2.4.1 2007-12	BMW Testing Manual - § 2.2 Skew heating

SHED-Tests

PVk3_07 2013-07	Mini-SHED-Measurements (Fuel and Non-Fuel)
PVk3_07_1 2010-03	ORVR Refueling (On Board Fuel Recovery Refueling)
PVk3_08 2013-07	Micro-SHED-Measurements (Fuel)

VDI 3481 Blatt 3 1995-10	Gaseous emission measurement - Determination of volatile organic compounds, especially solvents, flame ionization detector (FID)
40 CFR § 86.114-94 2013-07	Code of federal regulations - Analytical gases
40 CFR § 86.117-96 2013-07	Code of federal regulations - Evaporative emission enclosure calibrations
40 CFR § 86.133-96 2013-07	Code of federal regulations - Diurnal emission test
40 CFR § 86.138-96 2013-07	Code of federal regulations - Hot soak test
SAE J1769 2002	SAE Information Report - Protocol for Evaluation of Long Term Permeation - Barrier Durability on Non-Metallic Fuel Tanks
EP 21 100.06 1996-09	VW Specification - Permeation
PV 52023 2005-05	VW Specification - Permeation
PF 9682 2004-01	DaimlerChrysler Specification - 4.8 HC Permeation Emissions
PF 10437 2004-03	DaimlerChrysler Specification - 4.7 Permeation loss
GS 97014-1 2009-07	BMW Specification - Permeation
7-A8421 2006-03	Fiat Specification - Permeation
CETP 10.00-E-400 2006-05	Ford Specification - Permeation
CETP 10.00-E-401 2006-05	Ford Specification - Permeation

C-ENQD-001 2003-06	Energy Specification - 3.2 Permeation Testing
CARB 2007-10	California Evaporative Emission Standard

Pressure cycling test

PVk3_09 2013-07	Pressure cycling test
9.02159/01 2006-03	Fiat Specification - 2.11.1 Pressure cycling
CETP 10.01-E-301 2004-04	Ford Specification - Pressure cycling

Vapor pressure measurements

PVK3_10 2013-07	Vapor pressure measurement
ASTM D 5191 2012	Standard Test Method for Vapour Pressure of Petroleum Products (Mini Method)

Vibration tests

PVK3_12 2010-01	Vibration test
ISO 16750-3 2007-08-01	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads
DIN EN 60068-2-64 2008	Environmental testing - Part 2-64: Test methods - Test Fh: Vibration, broad-band random (digital control) and guidance

Contamination analysis

PVK3_13 2013-09	Contamination analysis
ISO 16232-3 2007-06	Road vehicles - Cleanliness of components of fluid circuits - Part 3: Method of extraction of contaminants by pressure rinsing
ISO 16232-5 2007-06	Road vehicles - Cleanliness of components of fluid circuits - Part 5: Method of extraction of contaminants on functional test bench
ISO 16232-6 2007-06	Road vehicles - Cleanliness of components of fluid circuits - Part 6: Particle mass determination by gravimetric analysis
ISO 16232-7 2007-06	Road vehicles - Cleanliness of components of fluid circuits - Part 7: Particle sizing and counting by microscopic analysis
ISO 18413 2002-10	Hydraulic fluid power - Cleanliness of parts and components - Inspection document and principles related to contaminant collection, analysis and data reporting
VDA Band 19 2004	Technical cleanliness in assembly - Particulate contamination of functionally relevant automotive parts

The above-mentioned test methods are characterized by the measures set out in the following table:

Measurement	Measurement range	Measurement uncertainty *
Differential pressure	-1.000 to 40.000 hPa	0.45 hPa
Air-pressure	to 1.100 hPa	1.7 hPa
Vapor pressure	0 to 300.0 kPa	0.6 kPa
Flow rate (Liquid)	10 to 660.0 dm³/h 15,0 to 60.0 dm³/min 1 to 30 dm³/min	1.4 dm³/h 0.8 dm³/min 0.2%
Flow rate (Gas)	2,0 to 100.0 cm³/min	0.2 cm³/min
Humidity	12 % r.F. to 75 % r.F.	0.5 % r.F. (25 °C)
Temperature	20 °C to 60 °C -40 °C to 300 °C	0.21 °C 0.03 °C
Pressure	5 mV to 2500 mV 1 V to 1000 V	$76 \cdot 10^{-6}$ mV $75 \cdot 10^{-6}$ V

* smallest attainable expanded uncertainty of measurement (k=2)

Measurement	Measurement range	Measurement uncertainty *
Current	DC Current	
	10 A to 60 A	$46 \cdot 10^{-4}$ A
	100 A to 600 A	$44 \cdot 10^{-3}$ A
	AC Current 50 Hz	
	10 A to 60 A	$55 \cdot 10^{-4}$ A
	100 A to 600 A	$51 \cdot 10^{-3}$ A
	DC Current	
	50 mA to 350 mA	$400 \cdot 10^{-6}$ mA
	1 A to 10A	$800 \cdot 10^{-6}$ A
Compound	0.126 to 300.000 kg	0.0039 kg
	1.23 to 6.200.00 g	0.020 g
	0.,123 to 600.000 g	0.0036 g
	0.0123 to 230.0000 g	0.0021 g
Density	0,7-0,8 g/cm^3	0.0002 g/cm^3
Acceleration	50 g (< 5 kHz)	
	500 g (< 5 kHz)	2 %
	2.000 g (< 5 kHz)	
Length	20 µm to 0.1 m	14 µm
Time	at 0.01 s	0.01 s

* smallest attainable expanded uncertainty of measurement (k=2)

abbreviations used:

ASTM	American Society for Testing and Materials
FMVSS	Federal Motor Vehicle Safety Standards
NHTSA	National Highway Traffic Safety Administration
PVk3_xx	In-house method of k3works GmbH
SAE	Society (Standard) of Automotive Engineers
VDA	Verband der Automobilindustrie (Association of the Automotive Industry)
VDI	Verein Deutscher Ingenieure