

# Deutsche Akkreditierungsstelle GmbH

## Annex to the Accreditation Certificate D-PL-17435-01-00 according to DIN EN ISO/IEC 17025:2018

**Valid from: 01.11.2018**

Date of issue: 12.12.2018

Holder of certificate:

**k3works GmbH**

at the locations:

**Industriestraße 5, 91757 Treuchtlingen**  
**Richard-Stücklen-Str. 3, 91781 Weißenburg i. Bay.**

Tests in the fields:

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

**Within the testing laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, the free choice of standard or equivalent testing methods. The listed testing methods are exemplary. The testing laboratory maintains a current list of all testing methods within the flexible scope of accreditation.**

All test procedures are carried out at the location Treuchtlingen.

At the location Weißenburg only the in-house procedures PVk3\_03 and PVk3\_15 are carried out.

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

Abbreviations used: see last page

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.  
<https://www.dakks.de/en/content/accredited-bodies-dakks>*

**Annex to the accreditation certificate D-PL-17435-01-00**

**Characteristical test methods**

**Refueling test**

|                                 |  |
|---------------------------------|--|
| PVk3_01<br>2016-06              | Refueling with and without temperature   |
| PVk3_14<br>2017-02              | Height-Volume-Resistance-Curve   |
| EH 2.1.2<br>2017-05             | BMW Test handbook - Fuel supply system - Refueling   |
| EP 21 100.22<br>2013-05         | VW Specification - Refueling   |
| LP.7A010<br>2014-06             | FCA Specification - Fuel System Refueling Bench or Vehicle Level Test  |
| FU 1059<br>2012-07              | Ford Specification - Requirements for liquid fuel refueling performance  |
| EP 21 100.13<br>2014-11         | VW Specification - Height-Volume-Curve, Resistance-Volume-Curve  |
| PF.90083<br>2016-08             | FCA Specification - Fuel Tank Assembly - Plastic § 7.14 Fuel Measurement   |
| PV KI 02.05.02.14<br>25.07.2012 | Porsche Specification - Zero-emissions refueling (ORVR-gasoline)   |
| 40 CFR 86.150-98 ff<br>2013     | Code of federal regulations - §86.150-98 Refueling test procedure (Onboard-Refueling-Vapor-Recovery - ORVR / Benzin) |

**-Translation-**

**Hot gasoline measurement**

|                         |  |
|-------------------------|--|
| PVk3_02<br>2013-09      | Hot gasoline measurement (Fuel supply units)   |
| AK-LH-15<br>2011-11     | Electronic fuel pump Working group Specification sheet 15 -<br>Electronic fuel pump for petrol fuels |
| AK-LH-16<br>2010-04     | Electronic fuel pump Working group Specification sheet 16 -<br>Electronic fuel pump for diesel fuels |
| EP 21 000.30<br>1997-12 | VW/Audi Development and inspection catalogue Fuel tank   |
| EH 2.3.5<br>2016-07     | BMW Test handbook - Fuel supply system - Hot gas supply (summer<br>testing)                          |
| EH 2.3.6<br>2016-07     | BMW Test handbook - Fuel supply system - Hot gas supply (radiator<br>test bench)                     |

**Temperature cycling**

|                              |   |
|------------------------------|---|
| PVk3_03<br>2017-08           | Temperature cycling   |
| DIN EN 60068-2-14<br>2010-04 | Environmental testing - Part 2-14: Tests - Test N: Change of<br>temperature |

**Pump test**

|                    |                                  |
|--------------------|----------------------------------|
| PVk3_04<br>2015-01 | Pump test (Electronic fuel pump) |
|--------------------|----------------------------------|

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**Roll-over test**

|                          |   |
|--------------------------|---|
| PVk3_05<br>2013-07       | Roll-over test  |
| FMVSS 571.301<br>2004-10 | NHTSA Federal Motor Vehicle Safety Standards - Fuel system integrity  |
| 2000/8/EG<br>2000-03     | Liquid fuel tanks and rear underrun protection of motor vehicles and their trailers - 6.2 Tilting test  |
| EH 2.2.1<br>2003-08      | BMW Test handbook - Fuel supply system - Manual Roll-over test  |
| ECE R 34<br>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<br>2013-07  | Static venting - Skew heating                               |
| EH 2.4.1<br>2007-12 | BMW Test handbook - Fuel supply system - § 2.2 Skew heating |

**SHED-Tests**

|                                |  |
|--------------------------------|--|
| PVk3_07<br>2018-02             | Mini-SHED-Measurements (Fuel and Non-Fuel)   |
| PVk3_07_1<br>2010-03           | ORVR Refueling (On Board Fuel Recovery Refueling)  |
| PVk3_08<br>2013-07             | Micro-SHED-Measurements (Fuel)   |
| VDI 3481<br>Paper 3<br>1995-10 | Gaseous emission measurement - Determination of volatile organic compounds, especially solvents, flame ionization detector (FID) |

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|                             |  |
|-----------------------------|--|
| 40 CFR § 86.114-94<br>2016  | Code of federal regulations - Analytical gases   |
| 40 CFR § 86.117-96<br>2016  | Code of federal regulations - Evaporative emission enclosure calibrations  |
| 40 CFR § 86.133-96<br>2016  | Code of federal regulations - Diurnal emission test  |
| 40 CFR § 86.138-96<br>2016  | Code of federal regulations - Hot soak test  |
| SAE J1769<br>2002           | SAE Information Report - Protocol for Evaluation of Long Term Permeation - Barrier Durability on Non-Metallic Fuel Tanks |
| EP 21 100.06<br>1996-09     | VW-Specification - Permeation  |
| PV 52023<br>2005-05         | VW-Specification - Permeation  |
| PF 9682<br>2004-01          | DaimlerChrysler Specification - 4.8 HC Permeation Emissions  |
| GS 97014-1<br>2009-07       | BMW-Specification - Permeation   |
| 7-A8421<br>2006-03          | Fiat-Specification - Permeation  |
| CETP 10.00-E-400<br>2006-05 | Ford-Specification - Permeation  |
| CETP 10.00-E-401<br>2006-05 | Ford-Specification - Permeation  |
| C-ENQD-001<br>2003-06       | Inergy-Specification - 3.2 Permeation testing  |
| CARB<br>2012-12             | California Evaporative Emission Standard   |

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**Activated carbon filter tests**

PVk3\_15  
2018-04                      Carbon Canister Working Capacity test

**Pressure cycling test**

PVk3\_09  
2014-12                      Pressure-Vacuum test

9.02159/01  
2006-03                      Fiat-Specification - Pressure-Vacuum test

CETP 10.01-E-301  
2004-04                      Ford-Specification - Pressure-Vacuum test

**Vapor pressure measurements**

PVK3\_10  
2017-05                      Vapor pressure measurement

ASTM D 5191  
2015                          Standard Test Method for Vapor Pressure of Petroleum Products  
(Mini Method)

ASTM D 6378-10  
2016                          Standard Test Method for Determination of Vapor Pressure (VPX)  
of Petroleum Products, Hydrocarbons, and Hydrocarbon-Oxygenate  
Mixtures (Triple Expansion Method)

**Vibration tests**

PVK3\_12  
2016-06                      Vibration test

ISO 16750-3  
2012-12                      Road vehicles - Environmental conditions and testing for electrical and  
electronic equipment - Part 3: Mechanical loads

DIN EN 60068-2-64  
2009-04                      Environmental testing - Part 2-64: Tests - Test Fh: Vibration,  
broadband random and guidance

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**Contamination analysis**

|                        |   |
|------------------------|---|
| PVK3_13<br>2018-03     | Contamination analysis  |
| ISO 16232-3<br>2007-06 | Road vehicles - Cleanliness of components of fluid circuits - Part 3:<br>Method of extraction of contaminants by pressure rinsing                               |
| ISO 16232-5<br>2007-06 | Road vehicles - Cleanliness of components of fluid circuits - Part 5:<br>Method of extraction of contaminants on functional test bench                          |
| ISO 16232-6<br>2007-06 | Road vehicles - Cleanliness of components of fluid circuits - Part 6:<br>Particle mass determination by gravimetric analysis                                    |
| ISO 16232-7<br>2007-06 | Road vehicles - Cleanliness of components of fluid circuits - Part 7:<br>Particle sizing and counting by microscopic analysis                                   |
| ISO 18413<br>2015-03   | Hydraulic fluid power - Cleanliness of components - Inspection<br>document and principles related to contaminant extraction and<br>analysis, and data reporting |
| VDA Band 19<br>2015    | Prüfung der Technischen Sauberkeit - Partikelverunreinigung<br>funktionsrelevanter Automobilteile   |

**-Translation-**

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

| Testing field / Type of testing | Measurand / Test parameter  | Test and measurement range | Unit              |
|---------------------------------|-----------------------------|----------------------------|-------------------|
| <b>Refueling test</b>           | pressure                    | -250 to 250                | hPa               |
|                                 | temperature                 | 20 to 70                   | °C                |
|                                 | flow rate (liquid)          | 15 to 55                   | L/min             |
|                                 | resistance                  | 100 to 5000                | Ω                 |
|                                 | length                      | 10 to 1500                 | mm                |
|                                 | density                     | 0,7 to 0,85                | g/cm <sup>3</sup> |
|                                 | volume                      | 1 to 100                   | L                 |
|                                 | mass                        | 0,620 to 300               | kg                |
| <b>Hot gasoline measurement</b> | pressure in hydraulic pipes | 0 to 1600                  | kPa               |
|                                 | pressure in test container  | -250 to 250                | hPa               |
|                                 | temperature                 | 20 to 70                   | °C                |
|                                 | flow rate (liquid)          | 0,05 to 6                  | L/min             |
|                                 | electric current            | 1 to 50                    | A                 |
|                                 | electric pressure           | 1 to 30                    | V                 |
|                                 | revolutions per minute      | 2000 to 11000              | rpm               |
| <b>Temperature cycling</b>      | temperature                 | -40 to 150                 | °C                |
| <b>Pump test</b>                | pressure in hydraulic pipes | 0 to 1600                  | kPa               |
|                                 | pressure in test container  | -250 to 250                | hPa               |
|                                 | flow rate (liquid)          | 0,05 to 6                  | L/min             |
|                                 | electric current            | 1 to 50                    | A                 |
|                                 | electric pressure           | 1 to 30                    | V                 |
|                                 | revolutions per minute      | 2000 to 11000              | rpm               |
| <b>Roll-over test</b>           | mass                        | 0,620 to 300               | kg                |
|                                 | density                     | 0,7 to 0,85                | g/cm <sup>3</sup> |
|                                 | angle (slope)               | -90 to 90                  | °                 |
|                                 | volume                      | 1 to 100                   | L                 |
| <b>Skew heating test</b>        | angle (slope)               | -90 to 90                  | °                 |
|                                 | mass                        | 0,620 to 300               | kg                |
|                                 | density                     | 0,7 to 0,85                | g/cm <sup>3</sup> |
|                                 | volume                      | 1 to 100                   | L                 |
|                                 | flow rate (gas)             | 1 to 60                    | L/min             |
| <b>Pressure cycling test</b>    | pressure                    | -500 to 500                | hPa               |

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|                                      |                  |                      |                      |
|--------------------------------------|------------------|----------------------|----------------------|
| <b>Vibration tests</b>               | temperature      | -40 to 150           | °C                   |
|                                      | acceleration     | ± 500                | <i>g</i>             |
| <b>Contamination analysis</b>        | mass             | 0,002 to 10          | <i>g</i>             |
|                                      | length           | 20 to 44.000         | µm                   |
| <b>SHED-Tests</b>                    | HC-concentration | 0 to 30              | ppm                  |
|                                      |                  | 30 to 100            |                      |
|                                      |                  | 100 to 1000          |                      |
|                                      | pressure         | -900 to 1000         | hPa                  |
|                                      | temperature      | 20 to 70             | °C                   |
|                                      | mass             | 0 to 200             | <i>g</i>             |
|                                      |                  | 0 to 600             |                      |
|                                      |                  | 0 to 4000            |                      |
|                                      |                  | 0 to 6000            |                      |
|                                      | mass             | 0 to 30              | kg                   |
| flow rate (gas)                      | 100 to 500       | cm <sup>3</sup> /min |                      |
| <b>Activated carbon filter tests</b> | flow rate (gas)  | 100 to 500           | cm <sup>3</sup> /min |
|                                      |                  | 100 to 2000          |                      |
|                                      | temperature      | 20 to 40             | °C                   |
|                                      | mass             | 0 to 6000            | <i>g</i>             |

**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 the k3works GmbH                    |
| SAE     | Society (Standard) of Automotive Engineers             |
| VDA     | German Association of the Automotive Industry          |
| VDI     | Association of German Engineers                        |
| EH      | BMW Testing manual                                     |
| EP      | VW/Audi Development and inspection catalogue           |
| LP      | internal abbreviation of OEM - no explanation given    |
| FU      | Fuel   |
| PF      | internal abbreviation of OEM - no explanation given    |
| FCA     | Fiat Chrysler Automobiles                              |
| PV KI   | PV Body integration                                    |
| CFR     | Code of federal regulations                            |
| AK-LH   | Electronic fuel pump Working group Specification sheet |
| ECE     | Economic Commission for Europe                         |
| GS      | Group Standard   |
| CETP    | Corporate Engineering Test Procedure                   |
| CARB    | California Air Resources Board                         |

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