

# **Contents of CAMPUS<sup>â</sup>**

## **4 Properties not Covered by ISO 10350 and ISO 11403**




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### 4.1 Chemical Resistance

The chemical resistance data are not presented in the single-point datasheets, because the International Standard for the Acquisition and Presentation of comparable multipoint data, ISO 11403-3, has not been widely used up to now and no truly comparable data are available. Thus information about the chemical resistance, based on existing data, is displayed in the text window of CAMPUS.

The list of chemicals (see table 15) for which the chemical resistance can be described is following ISO 175.

Because the description of the chemical resistance of a polymer is generally more complicated than is possible in a simple ranking of yes or no CAMPUS gives the possibility to add more information in internal or external links. The ranking follows the following system:

	Symbol	Description	Comments
a)		possible	Defined as: Supplier has sufficient indication that contact with chemical can be potentially accepted under the intended use conditions and expected service life. Criteria for assessment have to be indicated (e.g. surface aspect, volume change, property change).
b)		not recommended	Defined as: Not recommended for use under any condition.
c)		not recommended – see explanation	Defined as: Not recommended for general use. But short-term exposure under certain restricted conditions could be acceptable – examples to be provided (e.g. fast cleaning with thorough rinsing, spills, wiping, vapor exposure).

Searchable classifications are a) and c) only

Further information can be given for a) and c) in internal or external links.

Media Name	short name
<b>Acids</b>	
Acetic Acid (5% by mass) at 23°C	5% $C_2H_4O_2$
Citric Acid solution (10% by mass) at 23°C	10%cit
Lactic Acid (10% by mass) at 23°C	10%lact
Hydrochloric Acid (36% by mass) at 23°C	36%HCl
Nitric Acid (40% by mass) at 23°C	40% $HNO_3$
Sulfuric Acid (38% by mass) at 23°C	38% $H_2SO_4$
Sulfuric Acid (5% by mass) at 23°C	5% $H_2SO_4$
Chromic Acid solution (40% by mass) at 23°C	40% $CrO_3$
<b>Bases</b>	
Sodium Hydroxide solution (35% by mass) at 23°C	35%NaOH
Sodium Hydroxide solution (1% by mass) at 23°C	1%NaOH
Ammonium Hydroxide solution (10% by mass) at 23°C	10% $NH_4OH$
<b>Alcohols</b>	
Isopropyl alcohol at 23°C	$C_3H_7OH$
Methanol at 23°C	$CH_3OH$
Ethanol at 23°C	$C_2H_5OH$
<b>Hydrocarbons</b>	
n-Hexane at 23°C	$C_6H_{14}$
Toluene at 23°C	$C_6H_5CH_3$
iso-Octane at 23°C	$iC_8H_{18}$
<b>Ketones</b>	
Acetone at 23°C	$CH_3COCH_3$
<b>Ethers</b>	
Diethyl ether at 23°C	$(C_2H_5)_2O$
<b>Mineral oils</b>	
SAE 10W40 multigrade motor oil at 23°C	m.oil
SAE 10W40 multigrade motor oil at 130°C	130°moil
SAE 80/90 hypoid-gear oil at 130°C	130°gear
Insulating Oil at 23°C	ins.oil
<b>Standard Fuels <sup>1)</sup></b>	
ISO 1817 Liquid 1 at 60°C	60°fuel1
ISO 1817 Liquid 2 at 60°C	60°fuel2
ISO 1817 Liquid 3 at 60°C	60°fuel3
ISO 1817 Liquid 4 at 60°C	60°fuel4
Standard fuel without alcohol (preferably ISO 1817 Liquid C) at 23°C	fuelC
Standard fuel with alcohol (preferably ISO 1817 Liquid 4) at 23°C	fuel+alc
Diesel fuel (preferably ISO 1817 Liquid F) at 23°C	Disl
Diesel fuel (preferably ISO 1817 Liquid F) at 90°C	90°Disl
Diesel fuel (preferably ISO 1817 Liquid F) above 90°C	90+°Disl

Media Name	short name
<b>Salt solutions</b>	
Sodium Chloride solution (10% by mass) at 23°C	10%NaCl
Sodium Hypochlorite solution (10% by mass) at 23°C	10%NaClO
Sodium Carbonate solution (20% by mass) at 23°C	20%NaCO <sub>3</sub>
Sodium Carbonate solution (2% by mass) at 23°C	2%NaCO <sub>3</sub>
Zinc Chloride solution (50% by mass) at 23°C	50%ZnCl <sub>2</sub>
<b>Other</b>	
Ethyl Acetate at 23°C	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>
Hydrogen peroxide at 23°C	H <sub>2</sub> O <sub>2</sub>
DOT No. 4 Brake fluid at 130°C	130°br.f
Ethylene Glycol (50% by mass) in water at 108°C	108°Cool
1% solution of nonylphenoxy-polyethyleneoxy ethanol in distilled water at 23°C	1%deterg
50% Oleic acid + 50% Olive Oil at 23°C	Oil
Water at 23°C	H <sub>2</sub> O
Deionized water at 90°C	90°H <sub>2</sub> O
Phenol solution (5% by mass) at 23°C	5%C <sub>6</sub> H <sub>5</sub> OH

Table 12: List of chemicals

<sup>1)</sup>: See table 16

Liquid	Constituents	Content / % (V/V)
1	2,2,4-trimethylpentane toluene di-isobutylene ethanol	30 50 15 5
2	2,2,4-trimethylpentane toluene di-isobutylene ethanol methanol water	25.35 42.25 12.68 4.22 15.00 0.50
		} equivalent to 84.5% (V/V) of liquid 1
3	2,2,4-trimethylpentane toluene ethanol methanol	45 45 7 3
4	2,2,4-trimethylpentane toluene methanol	42.5 42.5 15

Table 13: Standard fuels according ISO 1817

#### 4.1.1 VDA Chemical Resistance

The following additional properties are described in VDA 232-201. The Chemical Resistance is recorded at temperatures typical for automotive applications as given in the following table:

Media Name	Abbreviation	Temperature	Group
Motor fuel FAM-B	fuelFAMB	85	Standard Fuels
Diesel EN 590	DislEN590	85	Standard Fuels
Coolant Glysantin G48, 1:1 in water	130°Cool	130	Other
DOT No. 4 Brake fluid	120°DOT4	120	Other
Motor oil OS206 304 Ref.Eng.Oil, ISP	OS206304	140	Mineral oils
Automatic hypoid-gear oil Shell Donax TX	140°gear	140	Mineral oils
Hydraulic oil Pentosin CHF 202	CHF202	125	Mineral oils

#### 4.2 Properties for Rheological Calculations

The properties for rheological calculation are not defined in ISO 10350. The conditions for testing are not standardized thus the data are not comparable and displayed in the text window of CAMPUS.

Property	Unit
Density of melt	kg/m <sup>3</sup>
Thermal conductivity of melt	W/(m K)
Specific heat capacity of melt	J/(kg K)
Effective thermal diffusivity	m <sup>2</sup> /s
Ejection temperature	°C

#### 4.3 Linear Thermal Expansion - Temperature

The following properties are not described in ISO 10350 or ISO 11403 but instead in VDA 232-201. The data shall be recorded in the temperature range -40 .. 100 °C.

Property	Symbol	Unit
Coefficient of linear thermal expansion		
parallel (p)	$\alpha_{p-40}$	10 <sup>-6</sup> /K
normal (n)	$\alpha_{n-40}$	10 <sup>-6</sup> /K