

MATERIAL DATA SHEET

Max H-Pur

GENERAL INFORMATION

Max H-Pur is a specially developed polyurethane system, scientifically formulated from a selection of high-quality chemical components to meet the increasing technical demands in the sealing industry.

It has been optimised in terms of its mechanical and tribological properties, resistance to chemicals and hydrolysis and high temperature stability (+ 150°C). It has high tensile strength, very high wear resistance, low hysteresis, good flexibility at low temperatures (-25 °C) and a low compression-set.

Special polymeric lubricants added to the formula ensure superior sliding properties (self-lubrication), significantly reduce friction ($\mu < 0.2$) and prevent the stick-slip effect, thereby exceeding the performance of polyurethanes filled with solid lubricants (MoS₂).

Max H-Pur shows excellent performance in oil hydraulic applications, in sub-sea and natural water applications at elevated temperatures, in cleaning processes in the food/beverage industry, in sour oils and gases in O&G industry, in flame retardant hydraulic fluids (HFA- HFB fluids in mining cylinders and hydr. presses), as well as in biological degradable fluids (vegetable oils and synthetic esters).

It is made available in different colors - red, green, blue, turquoise, natural and dark grey – commonly used in the lathe-cut sealing industry.

Max H-Pur in red, blue and natural colour comply with the FDA CFR 177.2600 food standard.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Hardness at 20°:	DIN 53505	Shore A	95 +/-3
Hardness at 20°:	DIN 53505	Shore D	45 +/-3
Density:	DIN ISO 1183-1	g/cm ³	1.21
100% Modulus:	DIN 53504	N/mm ²	> 11.5
300% Modulus:	DIN 53504	N/mm ²	> 28.5
Tensile strength:	DIN 53504	N/mm ²	> 45
Elongation at break:	DIN 53504	%	> 370
Rebound resilience:	DIN 53512	%	> 28
Tear strength:	DIN ISO 34-1	N/mm ²	> 100
Abrasion:	DIN 53516	mm ³	< 16
Coefficient of friction (dyn.):	ASTM D1894	μ	< 0.2
Compression set:*	DIN ISO 815-1	%	< 17
Compression set:**	DIN 53517	%	< 21
Compression set:***	DIN 53517	%	< 84
Min. service temperature:		°C	- 25
Max. service temperature (short term):		°C	+ 150 (+ 165)
Tg Glass Transition Temp.:		°C	- 24

* Compression set @ 70°C, 24 hours, 10% deflexion

** Compression set @ 100°C, 24 hours, 10% deflexion

*** Compression set @ 150°C, 24 hours, 10% deflexion

REMARK

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MATERIAL DATA SHEET

Max XH-Pur

GENERAL INFORMATION

Max XH-Pur is a specially developed polyurethane system, scientifically formulated from a selection of high-quality chemical components to meet the increasing technical demands in the sealing industry.

It has been optimised in terms of its mechanical and tribological properties, resistance to chemicals and hydrolysis and high temperature stability (+ 150°C). It has high tensile strength, very high wear resistance, low hysteresis, good flexibility at low temperatures (-25 °C) and a low compression-set.

Special polymeric lubricants added to the formula ensure superior sliding properties (self-lubrication), significantly reduce friction ($\mu < 0.2$) and prevent the stick-slip effect, thereby exceeding the performance of polyurethanes filled with solid lubricants (MoS₂).

Max XH-Pur shows excellent performance in oil hydraulic applications, in sub-sea and natural water applications at elevated temperatures, in cleaning processes in the food/beverage industry, in sour oils and gases in O&G industry, in flame retardant hydraulic fluids (HFA- HFB fluids in mining cylinders and hydr. presses), as well as in biological degradable fluids (vegetable oils and synthetic esters).

It is made available in different colors - yellow and dark grey – commonly used in the lathe-cut sealing industry.

Due to its excellent extrusion resistance, allowing larger sealing gaps at higher application temperatures, superior sliding properties and reduced stick-slip it is mainly used for elastomer energized composite seals.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Hardness at 20°:	DIN 53505	Shore A	/
Hardness at 20°:	DIN 53505	Shore D	56 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.21
100% Modulus:	DIN 53504	N/mm ²	> 16
300% Modulus:	DIN 53504	N/mm ²	> 33
Tensile strength:	DIN 53504	N/mm ²	> 41
Elongation at break:	DIN 53504	%	> 320
Rebound resilience:	DIN 53512	%	> /
Tear strength:	DIN ISO 34-1	N/mm ²	> 170
Abrasion:	DIN 53516	mm ³	< 18
Compression set:*	DIN ISO 815-1 %		< /
Compression set:**	DIN 53517	%	< 25
Compression set:***	DIN 53517	%	< 30
Min. service temperature:		°C	- 25
Max. service temperature (short term):		°C	+ 150 (+ 165)
Tg Glass Transition Temp.:		°C	- 24

* Compression set @ 70°C, 24 hours, 10% deflexion

** Compression set @ 100°C, 24 hours, 10% deflexion

*** Compression set @ 150°C, 24 hours, 10% deflexion

REMARK

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MATERIAL DATA SHEET

XSH-Pur

GENERAL INFORMATION

XSH-Pur is a hard grade casted polyurethane system (CPU), made of a selection of top-grade chemical components which have been scientifically blended for the use in the sealing industry.

XSH-Pur has been optimized regarding its hydrolysis stability, high temp. stability, mechanical properties and friction and wear by adding solid lubricants (MoS₂).

Besides an outstanding stability in oil hydraulic applications XSH-Pur is highly recommended to be used in high temp. natural and/or sea-water applications, in sour oils and gases, for the use in flame retardant hydraulic fluids (HFA- HFB fluids in mining cylinders and hydr. presses), as well as in biological degradable fluids (vegetable oils and synthetic esters).

Due to its excellent extrusion resistance, allowing larger sealing gaps at higher application temperatures, improved sliding properties and reduced stick-slip effect it is mainly used for composite seals.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			dark grey
Hardness at 20°:	DIN 53505	Shore A	/
Hardness at 20°:	DIN 53505	Shore D	56 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.22
100% Modulus:	DIN 53504	N/mm ²	> 17
300% Modulus:	DIN 53504	N/mm ²	> 33
Tensile strength:	DIN 53504	N/mm ²	> 45
Elongation at break:	DIN 53504	%	> 370
Rebound resilience:	DIN 53512	%	> /
Tear strength:	DIN ISO 34-1	N/mm ²	> 170
Abrasion:	DIN 53516	mm ³	< 25
Compression set:*	DIN ISO 815-1 %		< /
Compression set:**	DIN 53517	%	< 29
Compression set:***	DIN 53517	%	< 33
Compression set:****	DIN 53517	%	< /
Min. service temperature:		°C	- 20
Max. service temperature (short term):		°C	+ 140 (+ 155)
Tg Glass Transition Temp.:		°C	/

* Compression set @ 70°C, 24 hours, 10% deflexion

** Compression set @ 100°C, 24 hours, 10% deflexion

*** Compression set @ 150°C, 24 hours, 10% deflexion

**** Compression set @ -40°C, 70 hours, 10% deflexion

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MATERIAL DATA SHEET

NBR

GENERAL INFORMATION

NBR is an acrylonitrile-butadiene rubber commonly known as Nitrile or BUNA. It has good mechanical properties and chemical resistance to mineral oils and greases, HFA, HFB and HFC fire retardant pressure fluids.

NBR is one of the most used elastomers in the sealing industry.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			black
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.32
100% Modulus:	DIN 53504	N/mm ²	> 10
300% Modulus:	DIN 53504	N/mm ²	/
Tensile strength:	DIN 53504	N/mm ²	> 16
Elongation at break:	DIN 53504	%	> 200
Rebound resilience:	DIN 53512	%	> 25
Tear strength:	DIN ISO 34-1	N/mm ²	> 6
Abrasion:	DIN 53516	mm ³	< 90
Compression set:*	DIN ISO 815-1	%	< 10
Compression set:**	DIN ISO 815-1	%	< 10
Compression set:***	DIN ISO 815-1	%	< 15
Min. service temperature:		°C	- 30
Max. service temperature (short term):		°C	+ 100 (+120)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

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MATERIAL DATA SHEET

FKM | FDA

GENERAL INFORMATION

FKM | FDA is an elastomer based on fluoro-rubber and commonly known as FPM, VITON®.

It has outstanding properties in resistance to high temperature, weathering, ozone and many chemicals. FKM | FDA has good chemical resistance to mineral oils and greases containing sulphur, HFD fluids, crude oil and sour gas but is not resistant to anhydrous ammonia, amines, ketones, esters, hot water and low-molecular organic acids.

FKM | FDA corresponds to foodgrade standards.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			brown
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	2.51
100% Modulus:	DIN 53504	N/mm ²	> 6.5
300% Modulus:	DIN 53504	N/mm ²	> /
Tensile strength:	DIN 53504	N/mm ²	> 9.2
Elongation at break:	DIN 53504	%	> 180
Rebound resilience:	DIN 53512	%	> 6
Tear strength:	DIN ISO 34-1	N/mm ²	> 5
Abrasion:	DIN 53516	mm ³	< 230
Compression set:*	DIN ISO 815-1	%	< /
Compression set:**	DIN ISO 815-1	%	< /
Compression set:***	DIN ISO 815-1	%	< /
Compression set:****	DIN ISO 815-1	%	< 8
Min. service temperature:		°C	- 20
Max. service temperature (short term):		°C	+ 200 (+230)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

**** Compression set @ 225°C, 22 hours, 10% deflexion

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MATERIAL DATA SHEET

FKM Black

GENERAL INFORMATION

FKM Black is an elastomer based on fluoro-rubber and commonly known as FPM, VITON®.

It has outstanding properties in resistance to high temperature, weathering, ozone and many chemicals. FKM Black has good chemical resistance to mineral oils and greases containing sulphur, HFD fluids, crude oil and sour gas but is not resistant to anhydrous ammonia, amines, ketones, esters, hot water and low-molecular organic acids.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			black
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.88
100% Modulus:	DIN 53504	N/mm ²	> 7
300% Modulus:	DIN 53504	N/mm ²	> /
Tensile strength:	DIN 53504	N/mm ²	> 12
Elongation at break:	DIN 53504	%	> 180
Rebound resilience:	DIN 53512	%	> 7
Tear strength:	DIN ISO 34-1	N/mm ²	> 21
Abrasion:	DIN 53516	mm ³	< 150
Compression set:*	DIN ISO 815-1	%	< /
Compression set:**	DIN ISO 815-1	%	< 20
Compression set:***	DIN ISO 815-1	%	< /
Compression set:****	DIN ISO 815-1	%	< /
Min. service temperature:		°C	- 25
Max. service temperature (short term):		°C	+ 210 (+230)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

**** Compression set @ 225°C, 22 hours, 10% deflexion

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MATERIAL DATA SHEET

H-NBR

GENERAL INFORMATION

H-NBR is an is a hydrogenated acrylonitrile-butadiene rubber commonly known as H-NBR. It has good mechanical properties and good chemical resistance to mineral oils and greases, propane and butane, sulfonated crude oil, water-glycol mixtures and can be used at elevated temperatures. H-HBR is highly ozone, weathering and aging resistant.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			green
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.23
100% Modulus:	DIN 53504	N/mm ²	> 11
300% Modulus:	DIN 53504	N/mm ²	/
Tensile strength:	DIN 53504	N/mm ²	> 17
Elongation at break:	DIN 53504	%	> 170
Rebound resilience:	DIN 53512	%	> 35
Tear strength:	DIN ISO 34-1	N/mm ²	> 6
Abrasion:	DIN 53516	mm ³	< 115
Compression set:*	DIN ISO 815-1	%	< 24
Compression set:**	DIN ISO 815-1	%	< 26
Compression set:***	DIN ISO 815-1	%	< 40
Min. service temperature:		°C	- 25
Max. service temperature (short term):		°C	+ 150 (+170)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

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MATERIAL DATA SHEET

EPDM | FDA

GENERAL INFORMATION

EPDM | FDA is based on ethylene-propylene rubber and is commonly known as EPDM.

It has outstanding resistance to hot water, steam (up to 180 °C), washing agents and polar organic solvents and good resistance to weathering, ozone and ageing. EPDM | FDA is not resistant to mineral, vegetable and animal oils, resistance to gas permeability and radiation is low.

EPDM | FDA can be used in glycol based break fluids, provided previous successful tests passed.

EPDM | FDA corresponds to foodgrade standards.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			black
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.22
100% Modulus:	DIN 53504	N/mm ²	> 10
300% Modulus:	DIN 53504	N/mm ²	
Tensile strength:	DIN 53504	N/mm ²	> 14
Elongation at break:	DIN 53504	%	> 130
Rebound resilience:	DIN 53512	%	> 35
Tear strength:	DIN ISO 34-1	N/mm ²	> 5
Abrasion:	DIN 53516	mm ³	< 120
Compression set:*	DIN ISO 815-1	%	< 12
Compression set:**	DIN ISO 815-1	%	< 17
Compression set:***	DIN ISO 815-1	%	< 14
Min. service temperature:		°C	- 50
Max. service temperature (short term):		°C	+ 150 (+180)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

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MATERIAL DATA SHEET

MVQ | FDA

GENERAL INFORMATION

MVQ | FDA is a methyl vinyl silicone rubber commonly known as Silicone.

It has poor mechanical properties and is therefore mainly used in static applications. It is highly resistant to weathering, ozone and ageing and is used for applications in contact with foodstuff, hot air and mineral oils.

MVQ | FDA has a high gas permeability.

MVQ | FDA corresponds to foodgrade standards.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			rustbrown
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.51
100% Modulus:	DIN 53504	N/mm ²	> 5
300% Modulus:	DIN 53504	N/mm ²	> /
Tensile strength:	DIN 53504	N/mm ²	> 6
Elongation at break:	DIN 53504	%	> 180
Rebound resilience:	DIN 53512	%	> 50
Tear strength:	DIN ISO 34-1	N/mm ²	> 13
Abrasion:	DIN 53516	mm ³	< /
Compression set:*	DIN ISO 815-1	%	< /
Compression set:**	DIN ISO 815-1	%	< /
Compression set:***	DIN ISO 815-1	%	< /
Compression set:****	DIN ISO 815-1	%	< /
Compression set:*****	DIN ISO 815-1	%	< 13
Min. service temperature:		°C	- 60
Max. service temperature (short term):		°C	+ 200 (+230)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

**** Compression set @ 225°C, 22 hours, 10% deflexion

***** Compression set @ 175°C, 22 hours, 10% deflexion

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MATERIAL DATA SHEET

PA6 | FDA

GENERAL INFORMATION

PA6 | FDA is a casted high molecular and high crystalline polyamide, commonly known as Nylon or Polyamide. PA6 | FDA is one of the most important engineering plastics with excellent mechanical properties, low stress, low coefficient of friction and good abrasion resistance. PA6 | FDA is mainly used in mineral oils and is suitable for applications in contact with foodstuff. PA6 | FDA is optimized in regards to moisture absorption (leads to swelling and the loss of physical properties for normal PA), and maintains stable mechanical properties.

PA6 | FDA is approved and corresponds to foodgrade standards.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			off white
Hardness at 20°:	DIN 53505	Shore D	85
Density:	ISO 1183	g/cm ³	1.03
Tensile strength:	EN ISO 527-2	N/mm ²	> 60
Elongation at break:	EN ISO 527-2	%	> 55
Modulus of elasticity:	EN ISO 527-2	N/mm ²	2200
Charpy impact strength:	EN ISO 179	kJ/m ²	> -
Compr. strength at 1% deform.:	ASTM D695	N/mm ²	-
Coefficient of friction (dyn.):	ASTM D1894	μ	< 0.4
Water absorbtion to saturation:	EN ISO 62	%	< 1.2
Moisture absorbtion to saturation:	DIN 53715	%	< 0.9
Dielectric strength:	EN IEC 60243	kV/mm	50
Volume resistivity:	EN IEC 60093	Ω*cm	> 10 ¹⁶
Surface resistivity:	EN IEC 60093	Ω	> 10 ¹³
Coefficient of therm. expansion:		1/K*10 ⁶	10-11
Min. service temperature:		°C	- 60
Max. service temperature (short term):		°C	+ 110 (+150)

REMARK

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MATERIAL DATA SHEET

POM | FDA

GENERAL INFORMATION

POM | FDA is a polyacetal-copolymer, commonly known as POM (Polyoxymethylene) and Acetal. POM | FDA is one of the most important engineering plastics with excellent mechanical strength, high dimensional stability, high wear resistance, low water-absorbition and good chemical resistance.

POM | FDA is used in mineral oils and water-based fire-resistant pressure fluids (HFA, HFB, HFC). POM has good recyclability.

POM | FDA is approved and corresponds to foodgrade standards.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			white
Hardness at 20°:	DIN 53505	Shore D	85
Density:	DIN 53479	g/cm ³	1.41
Tensile strength:	EN ISO 527-2	N/mm ²	> 70
Elongation at break:	EN ISO 527-2	%	> 35
Modulus of elasticity:	EN ISO 527-2	N/mm ²	3000
Charpy impact strength:	EN ISO 179	kJ/m ²	> 140
Compr. strength at 1% deform.:	ASTM D695	N/mm ²	100
Coefficient of friction (dyn.):	ASTM D1894	μ	< 0.25
Water absorbtion to saturation:	EN ISO 62	%	< 0.8
Water absorbtion in 23h:	EN ISO 62	%	< 0.2
Dielectric strength:	EN IEC 60243	kV/mm	20
Volume resistivity:	EN IEC 60093	Ω*cm	> 10 ¹⁴
Surface resistivity:	EN IEC 60093	Ω	> 10 ¹³
Coefficient of therm. expansion:		1/K*10 ⁶	120
Min. service temperature:		°C	- 60
Max. service temperature (short term):		°C	+ 100 (+140)

REMARK

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MATERIAL DATA SHEET

TFE/P (AFLAS®)

GENERAL INFORMATION

TFE/P is a tetrafluoroethylene-propylene, commonly known as FEPM or AFLAS®. TFE/P has excellent heat and chemical resistance, incl. resistance to strong acids, bases and steam, high electrical resistivity, and excellent oil resistance.

MECHANICAL | ELECTRICAL | THERMAL PROPERTIES

Colour:			black
Hardness at 20°:	DIN 53505	Shore A	85 +/-2
Density:	DIN ISO 1183-1	g/cm ³	1.73
100% Modulus:	DIN 53504	N/mm ²	> 8
300% Modulus:	DIN 53504	N/mm ²	> /
Tensile strength:	DIN 53504	N/mm ²	> 9
Elongation at break:	DIN 53504	%	> 180
Rebound resilience:	DIN 53512	%	> 10
Tear strength:	DIN ISO 34-1	N/mm ²	> 7
Abrasion:	DIN 53516	mm ³	< 145
Compression set:*	DIN ISO 815-1	%	< /
Compression set:**	DIN ISO 815-1	%	< /
Compression set:***	DIN ISO 815-1	%	< 35
Compression set:****	DIN ISO 815-1	%	< /
Compression set:*****	DIN ISO 815-1	%	< /
Min. service temperature:		°C	- 15
Max. service temperature (short term):		°C	+ 210 (+230)

* Compression set @ 23°C, 72 hours, 10% deflexion

** Compression set @ 70°C, 24 hours, 20% deflexion

*** Compression set @ 100°C, 24 hours, 20% deflexion

**** Compression set @ 225°C, 22 hours, 10% deflexion

***** Compression set @ 175°C, 22 hours, 10% deflexion

REMARK

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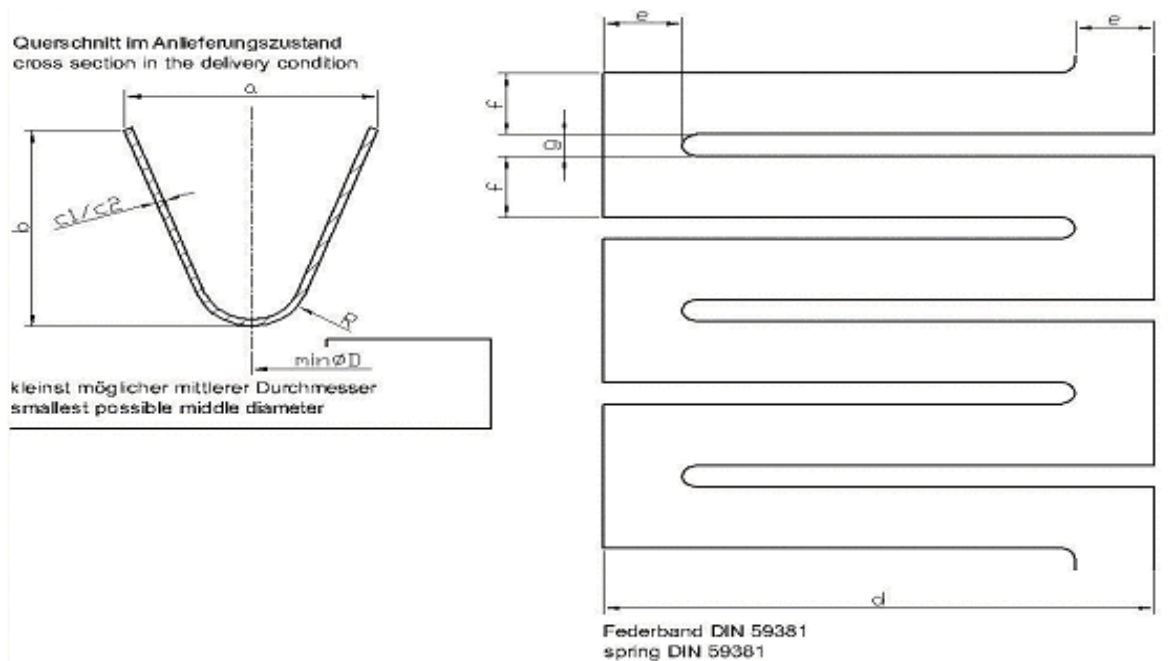
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SPRING DATA SHEET

V-Spring

Material: X12 Cr Ni 17 7

Material number: 1.4310; AISI 301



Standard dimensions [mm]

Partnumber	a	b	c1	d	e	f	g	R
52V1000120008	1.2	1.3	0.08	2.9	0.5	0.5	0.3	0.3
52V1000190010	1.9	2	0.1	4.5	0.6	0.75	0.3	0.4
52V1000200012	2.0	2	0.12	4.5	0.6	0.75	0.3	0.4
52V1000280012	2.8	2.8	0.12	6.35	1.2	1	0.3	0.8
52V1000280015	2.8	2.8	0.15	6.35	1.2	1	0.3	0.8
52V1000450015	4.5	4.5	0.15	9.8	1.4	1.4	0.5	1
52V1000450020	4.5	4.3	0.20	9.8	1.4	1.4	0.5	1.4
52V1000650020	6.5	6	0.2	13.9	2	2	0.5	2
52V1000650025	6.5	6	0.25	13.9	2	2	0.5	2
52V1000808051	8.08	9.14	0.51	20.3	3.8	1.65	0.89	2.25
52V1000900025	9	8.5	0.25	20	2.8	2.5	1	2.5
52V1001250050	12.5	11.5	0.5	27.5	3.3	3	1	2.85

Material data X12 Cr Ni 17 7

General properties

- high tensile strength
- good corrosion resistance
- minor relaxation

Chemical composition [%]

C	Si	Mn	P	S	Cr	Mo	Ni
max. 0.12	max. 1.5	max. 2	max. 0.045	max. 0.015	16 – 18	max. 0.80	6 – 9

Mechanical properties

Tensile modulus E [N/mm ²]	E=190000 N/mm ²
Tensile strength R _m [N/mm ²]	R _m =1600 N/mm ²
Torsion modulus G [N/mm ²]	G=71500 N/mm ²
Permissible torsional strength t _{zul} [N/mm ²]	t _{zul} =720 N/mm ²
Temperature range T [°C]	T= -200 up to +250 °C
Density r [kg/dm ³]	r=7.9 kg/dm ³