Semi-finished Products

The development, production and marketing of high quality semi-finished products in form of bars and tubes for the machining of sealing elements is an integral part of the core competence of Seal Maker Produktions-u. Vertriebs GmbH. Due to our most modern manufacturing technology we are able to cover the whole spectrum of seal applications. Our semi-finished billets, each of which is controlled several times before dispatch, are one of the most important components for our customers, contributing to their competitiveness by offering high quality at a reasonable price. Besides the wide range of standard dimensions which are carried on stock, special dimensions are also available within short delivery times in all materials and FDA-qualities.

***PU | NBR | EPDM | FPM | **AFLAS® | SILICONE | POM | PA | PTFE | and many more**

Polyurethanes

Polyurethanes have gained a substantial importance in modern seal technology. They hold a dominant market share in the sector of rod seals and piston seals. Seal Maker‘s Polyurethane semi-finished products stand out due to their highest material quality. In many applications seals made of Seal Maker Polyurethane outperform the service life of seals made out of competitive manufacturers’ materials. The reason for this can be attributed on the one hand to the careful selection of raw materials, and on the other hand to the “direct” manufacturing technology. Unlike the thermoplastic processed products, the cast semi-finished products of Polyurethane billets made by Seal Maker have the greatest degree of freedom to develop their physical properties during polymerization. Any kind of negative influence during the polymerization process by heating up and plastic deformation is avoided with our technology.
Besides the standard materials we also produce materials with an optimized coefficient of friction, and materials for direct contact with foodstuffs.
A further important fact is that Seal Maker semi-finished products made of Polyurethane, up to a hardness of 95 Shore A, come with a clamping ring. This makes the use in lathe machines a lot easier, and also independent from the type of the production machine.

***PU**

Elastomers

Elastomers, often referred to as rubber materials, are a reasonable completion of the product range. Although they got widely pushed out of many applications by the modern Polyurethanes, the elastomer products remain important in seal technology due to their wide spectrum of thermal and chemical resistance. Seal Maker works exclusively with rubber compounds made by internationally highly recognized batch manufacturers. This, in conjunction with Seal Maker‘s modern processing technology, is the guarantee for well approved material compounds and an economical shaping. The resulting benefit for our customers is an excellent price-quality ratio, and also prompt availability of both standard and special dimensions and materials. All Seal Maker semi-finished products made of elastomer materials come in a hard shell, which makes them easy machinable in CNC lathes, despite the low hardness and high elasticity.

NBR | EPDM | FPM | **AFLAS® | SILICONE

*PU
The full range of U203 materials is a hydrolysis resistant Polyurethane (also called H-PU).

**AFLAS®
is a registered trade mark of the Asahi Glass Company

Chemical Resistance

	PU-U203	NBR-N107	H-NBR-HN112	EPDM-E131	AFLAS-AF101	FPM-F109	Silicone-S102	POM-P101	PA-A112	PTFE-PT101 + compounds
Air up to 100° C	R	R	R	R	R	R	R	R	R	R
Air up to 200° C	U	U	U	U	U	R	R	U	U	R
Biodegradable	R	S	S	U	-	R	U	R	R	R
Braking fluids	U	U	U	R	R	U	U	U	U	R
Diesel	R	R	R	U	R	R	U	R	R	R
Fuels	S	S	S	U	-	R	U	R	R	R
Mineral oils	R	R	R	U	R	R	S	R	R	R
Ozone, oxygen	R	U	R	R	R	R	R	U	U	R
Steam up to 150° C	U	U	U	R	R	U	U	U	U	R
Vegetable oils	R	R	R	U	R	R	R	R	R	R
Water up to 40°C	R	R	R	R	R	R	R	R	S	R
Water up to 90°C	R	S	R	R	R	S	R	R	S	R

R = resistant I S = suitable I U = unsuitable

Plastics

Hard plastics and fluorinated thermoplastics, as used for back up rings and guide rings, as well as for special and pre-loaded seals, complete the product range of Seal Maker semi-finished products. Seal Maker takes care that the suppliers of these products fulfill the high quality requirements as set by ourselves and by our customers. The excellent business connection we maintain with our suppliers, a broad product line, in combination with efficient warehouse management, guarantee prompt availability. Not only the dimensional range of semi-finished products is well adapted to the requirements of machining, it is also the wide variety of different material compounds which covers all the requirements of seal application.

POM | PA | PTFE | diverse Compounds

The chart above gives an overlook over the most common pressure fluids and seal materials, and of their applicability. Please bear in mind that several working conditions, like e. g. the temperature, may influence the usability of different materials in the hydraulic fluids. For further and more detailed information you call on us, or you look them up in our media resistance table. In case of remaining doubt even tests might become necessary, which we are prepared to carry out on request of our customers.

Physical Properties

Sealing materials Semi-finished products	DIN/ASTM Standard	Units	PU U203	PU U203-MoS2	PU U203-D57	NBR N107	H-NBR HN112
Color							
Density	DIN 53479	g/cm^3	1,1	1,15	1,13	1,32	1,23
Hardness	DIN 53505	Shore A	95 +/- 2	95 +/- 2	57 +/- 2	85	85
Hardness	DIN 53505	Shore D					
Moisture absorbance	20°/65% rel. M.						
100% modulus	DIN 53504	N/mm^2	> 12	> 11	> 18	10,2	
Tear strength	DIN 53504 / ASTM D4894	N/mm^2	38	> 35	> 35	> 30	> 17
Elongation at break	DIN 53504 / 53455	%	520	560	330	> 155	> 200
Coefficient of friction	ASTM D1894						
Compression Set 22h/70°	DIN 53517	%	31	26	32	7	
Compression Set 22h/100°	DIN 53485					9	20
Compression Set 22h/150°	DIN 53517A						22
Compression Set 22h/175°	DIN 53517A						
Compression Set 24h/175°	DIN 53517						
Compression Set 72h/RT	DIN 53517						
Minimum service temperature		°C	-30	-30	-30	-25	-25
Maximum service temperature		°C	105	105	90	100	150

Materials conform with FDA		
PU	U203-B95	
PU	U203-FDA95	
NBR	N111–W85	
EPDM	E132-W85	
FPM	F110-BR85	
Silicone	S102-R85	
Silicone	S103-BL85	
POM	P101-WE	
Polyamide	PA6- A112-WC	
PTFE	T101-W	

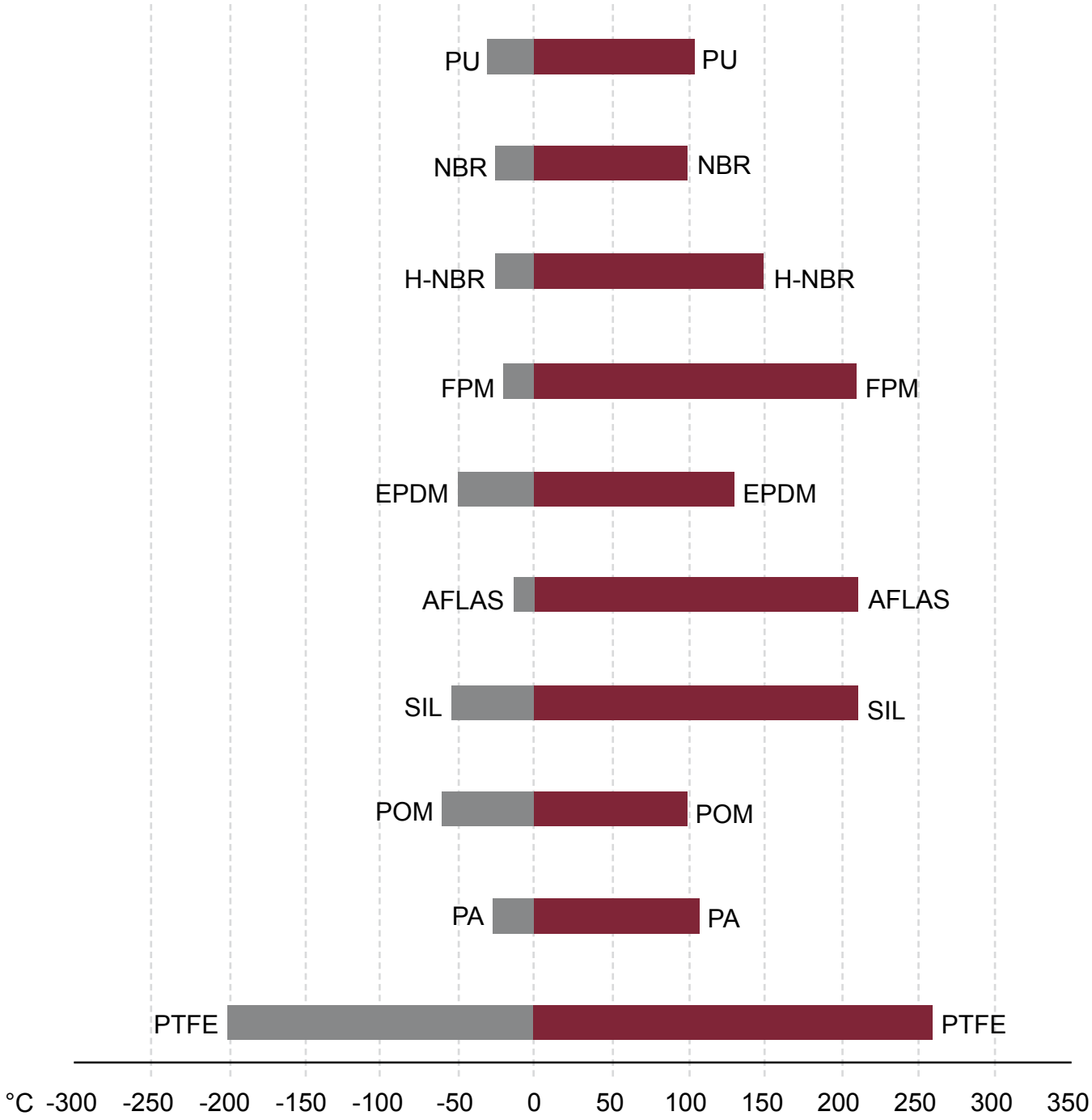
The chart above is only an excerpt of our most important seal materials and their typical properties. The data represent the typical results of tests. It is not recommended to go to the limits of more than one property.

An exhaustive overlook over all Seal Maker materials can be found on pages 10 / 11.

More detailed information can be found in our material data sheets. In case of doubt we suggest to get in contact with our application engineers, or to carry out a test run.

EPDM E131	AFLAS AF101	FPM F109	FPM F111	Silicone S102	POM P101	PA A112	PTFE-PT101	PTFE-FT105	PTFE-BR40 T110
1,23	1,68	2,51	1,878	1,54	1,41	1,15	2,16	2,25	3,09
85	85	85	85	85					
							56	60	63
					0,2	2,2			
	4,2		7,4						
> 14	> 7,2	> 13	> 11,5	> 7	70	85	> 25	> 15	> 23
> 137	> 236	> 200	> 180	> 120	40	25	> 300	> 220	> 200
					< 0,4	< 0,4	0,06	0,08	0,13
16									
13									
		7,7							
			32,8	18,5					
-50	-15	-20	-25	-55	-60	-30	-200	-200	-200
130	210	210	210	210	100	105	260	260	260

Temperature Range



The chart above gives a rough overlook over the application temperature of the most important seal materials. When using a material in contact with a chemically aggressive fluid, these temperature limits can get dramatically reduced.

Table of materials

Description		Application temp.	Hardn. at 20°C	Main application
PU red U203-R95		-30 to +105°C	Shore A 95 +/-2	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water Resistant against hydrolysis
PU green U203-G95		-30 to +105°C	Shore A 95 +/-2	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water Resistant against hydrolysis
PU FDA light blue U203-B95		-30 to +105°C	Shore A 95 +/-2	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water Resistant against hydrolysis
PU FDA natural U203-95FDA		-30 to +100°C	Shore A 95 +/-2	U-rings, wiper rings and other seal elements Contact with food Resistant against hydrolysis
PU MoS_2 grey U203-GM95		-30 to +105°C	Shore A 95 +/-2	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water For heavy duty applications, resistant against hydrolysis
PU 57 Shore D dark blue U203-D57		-30 to +90°C	Shore D 57 +/-2	Back-up rings or composite seals with preload element Mineral oil, compressed air, water Resistant against hydrolysis
PU 57 Shore D + MoS_2 grey U203-D57G		-30 to +90°C	Shore D 57 +/-2	Back-up rings or composite seals with preload element Mineral oil, compressed air, water Resistant against hydrolysis
NBR black N107-B85		-25 to +100°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water
NBR 95 black 10N109-B95		-25 to +100°C	Shore A 95 +/-5	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water
NBR FDA white N111-W85		-22 to +100°C	Shore A 85 +/-3	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water
H-NBR black HN112-B85		-25 to +150°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements Mineral oil, compressed air, water
FPM brown F109-BR85		-20 to +210°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements High temperatures and aggressive media
FPM FDA brown F110-BR85		-20 to +210°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements High temperatures and aggressive media
FPM black F111-B85		-25 to +210°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements High temperatures and aggressive media
EPDM black E131-B85		-50 to +130°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements Hot water and steam, diluted acids and alkaline solutions. EPDM is NOT resistant against mineral oil
EPDM FDA white E132-W85		-50 to +100°C	Shore A 85 +/-3	U-rings, wiper rings and other seal elements Hot water and steam, diluted acids and alkaline solutions. EPDM is NOT resistant against mineral oil

Description		Application temp.	Hardn. at 20°C	Main application
Silicone FDA red S102-R85		-55 to +210°C	Shore A 85 +/-5	Flange seals, gaskets and other static seals For dynamic applications not recommended
Silicone FDA blue S103-BL85		-55 to +180°C	Shore A 85 +/-3	Flange seals, gaskets and other static seals For dynamic applications not recommended
AFLAS black AF101-B85		-15 to +210°C	Shore A 85 +/-5	U-rings, wiper rings and other seal elements Sour oil and gas, amines, steam/hot water, brake fluids High electrical insulation properties
POM FDA white P101-WE		-60 to +100°C	-	Back-up and guide rings, machined parts
PA FDA natural A112-WC		-30 to +105°C	-	Back-up and guide rings, machined parts
PTFE-F grey T105-G		-200 to +260°C	Shore D 55 - 64	Composite seals with elastomer preaload elements Spring loaded seals, back-up and guide elements Glass fibre / MoS_2 reinforced
PTFE-P FDA white T101-W		-200 to +260°C	Shore D 51 - 60	Composite seals with elastomer preload elements, spring loaded seals Back-up and guide rings, low friction For food industry, excellent chemical restistance
PTFE-40% Bronze brown T110-BR40		-200 to +260°C	Shore D 62 - 67	Composite seals with elastomer preload elements, spring loaded seals Back-up and guide rings, low friction
PTFE-40% Bronze blue T115-BR40		-200 to +260°C	Shore D 62 - 67	Composite seals with elastomer preload elements, spring loaded seals Back-up and guide rings, low friction
PTFE-60% Bronze brown T120-BR60		-200 to +260°C	Shore D 65 - 70	Composite seals with elastomer preload elements, spring loaded seals Back-up and guide rings, low friction
PTFE-25% Carbon grey T125-C25		-200 to +260°C	Shore D 62 - 67	Composite seals with elastomer preload elements, Spring loaded seals Back-up and guide rings, low friction

Furthermore we deliver parts made of different PTFE compounds, PEEK, different Poly-Amides and Poly-Imides, PETP and other materials.

The indicated minimum application temperatures are thought as a general guideline, because a seal's function at low temperatures is dependent on the kind of the seal, the general application conditions, and on the kind of the surrounding metal parts the seal is in touch with. The indicated upper temperature limits may be exceeded, but this reduces the service life.

In case of doubt you are always welcome to contact our application engineers.