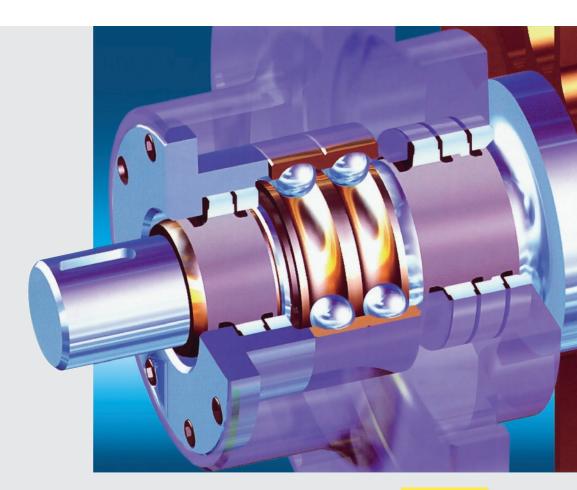
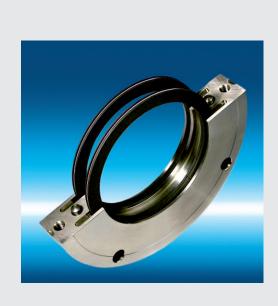


Technical Seals







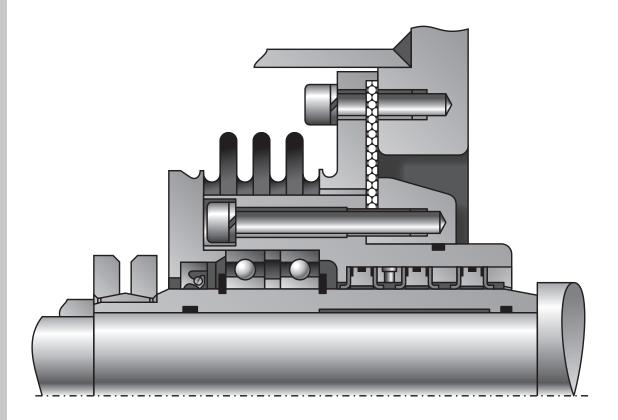
Solutions for complex shaft seals



TEDIMA: better than industrially produced serial seals

Sealing problems do often only become apparent when machines have already been put into operation.

High loaded shaft seals in stirring units, screw conveyors, dryers etc. are often problematic to be realised in an optimal way when using industrially produced serial seals. Apart from expensive machine shutdowns nowadays the environmental protection plays a mayor role.



For more than 25 years now TEDIMA sealing systems have been the solution for complex shaft seals.

Without having to change the available installation spaces TEDIMA seals do stand for long lasting and fast solutions.

TEDIMA re-fittings are not only 'replacement' or 'repair' — TEDIMA enhances the economy. Machine shutdowns are considerably reduced. In addition, the environmental safety is upgraded as a result of remarkably reduced emissions.



Our scope of supply and services

TEDIMA offers individual and stable solutions, explicitly made up to the application and its specific requirements. Development, construction, production, advice and service from one source!

Advantages for TEDIMA customers:

- the broadly based experience in the chemical industry, environmental technology, mechanical engineering, mining industry
- the reliability and security of high quality materials (stainless steel, worldwide approved sealing materials)
- the precision in production and assembly
- the personal and continuous advice and supervision

You should benefit from our experience

- when shutdowns with industrially manufactured serial seals constrain your production
- when the environmental obligations (Clean Air Guidelines) are difficult to fulfil
- when toxic media or
- · when dead spots create problems or
- when shaft deflexions do ask for special solutions...

... a discussion with TEDIMA will be in your favour!



The data and recommendations of this brochure represent our up-to-date knowledge and experience. Since there is a wide variety of possible applications, these data can merely be considered as a guidance. Warranty claims cannot be deduced thereof.





TEDIMA MultiSeal

The High-Performance Shaft Seal



The thermoelastic high-performance seal Multi-Seal is an alternative for mechanical seals and braided packings.

Advantages of MultiSeal:

- applicable with pressure and vacuum
- suitable for high peripheral speed
- temperature resistant up to 260°C
- excellent resistance with chemical media
- applicable in the sensitive food and pharmaceutical industries
- wear-resistance and low friction
- · outstanding behaviour under dry running conditions

Some typical applications:

- centrifuges
- rotary valves
- mixing machines
- · rotary feedthroughs
- compressors
- screw-conveyors
- agitators
- Joiew conveyo
- pumps
- separators

TEDIMA type range

- MultiSeal Standard
- MultiSeal Standard with double lip
- · MultiSeal Set of lips
- MultiSeal Special
- · MultiSeal Floating seal

The thermoelastic high-performance seal TEDIMA MultiSeal operates with a seal lip of a modified PTFE material with stopped cold flow. This material is produced in a special process under the brand name 'TEDEX'. Seal lips made of TEDEX have a considerable memory effect, high elasticity, low friction, high wearing quality and do not need a metallic spring element.

TEDIMA high-performance MultiSeals are especially produced to ensure a reliable seal for rotating shafts with high pressure, high peripheral speed, high temperature, aggressive media, poor lubrication or dry running. With these applications, conventional radial shaft seal rings are not an ideal option because of the Elastomer material of their seal lips.

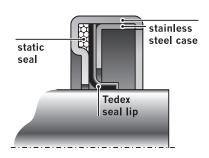
With the wide variety of requirements, the thermoelastic MultiSeal offers various economic solutions. That is why TEDIMA provides five different product versions – starting from the standard seal rings which are available ex stock up to the special constructions made up to the customer's requirements.

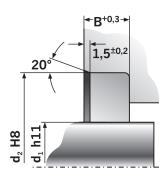


TEDIMA MultiSeal Standard

The MultiSeal Standard is a high-performance radial shaft seal with a case made of stainless steel (1.4571) and a seal lip made of various Tedex qualities as well as a static Elastomer Viton®.

MultiSeal Standard is available with single lip, single lip with dust lip, double lip (back-to-back, tandem). The dimensions marked with '*' in the below list are standard dimensions being available ex stock.





Dimensions

d1	d2	В
8	18	5
10	25	7
12	25	7
12	28	8
14	30	7
*15	30	8
16	30	7
*17	28	8
*17	35	8
18	35	7
*20	35	8
*22	40	8
*25	35	8
*25	42	8
25	47	7
*28	47	10
*30	47	10

d1	d2	В	
32	47	10	
*35	47	8	
*35	50	10	
38	55	7	
*40	55	10	
*40	60	10	
*40	62	10	
*42	60	10	
*42	62	8	
*45	62	10	
*45	65	10	
48	62	8	
*48	65	10	
*50	65	10	
*50	70	10	
*50	72	10	
*55	72	10	

d1	d2	В
55	80	8
*60	75	8
*60	80	10
*62	80	10
*65	85	10
*70	90	10
*70	90	15
70	95	10
*73	100	10
75	95	13
*75	100	10
*80	100	10
80	110	10
85	110	12
*90	110	10
90	120	12

d1	d2	В
95	120	12
*100	120	12
*100	125	10
*100	125	15
*100	125	20
*100	130	13
105	130	12
110	130	12
*110	140	13
115	140	12
120	150	12
125	150	12
130	160	12
135	170	12
*140	165	10
*140	165	13

Application in the food and pharmaceutical industry

Both the MultiSeal Standard single and double lip are appropriate for the above sensitive application fields.

The seal lip is made of TEDEX-W, a material with FDA approval. Those seal rings are produced in the standard

sizes according to the table MultiSeal Standard and are available ex stock.

Seal rings of the categories MultiSeal set of seal lips and MultiSeal special can as well be equipped with seal lips of TEDEX-W, thus are applicable for above.

Single lip



Double lip, back-to-back



Double lip, tandem

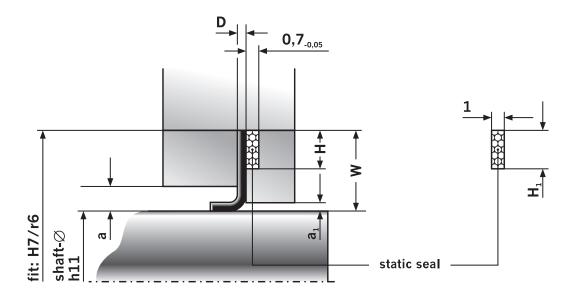




TEDIMA MultiSeal Set of Lips

MultiSeal seal lips are applicable where ready-to-instal MultiSeal Standard cannot be used due to installation conditions or constructional reasons. The ready-to-install set of lips consists of a thermoelastic TEDEX

seal lip and the appropriate static seal. Standard installation dimensions are shown in the below table, however, special dimensions are as well available on short notice.



Example for shaft-Ø 80: lip Ø 80 x 100 x 1, static seal Ø 93 x 100 x 1

Shaft-∅	W	D	Н	H1	а	5 bar a ₁	10 bar a ₁	25 bar a ₁
up to 19	6,0	0,8	2,5	2,0	2,0	2,0	0,5	0,2
20 - 49	7,5	0,8	3,5	2,5	2,5	2,5	0,5	0,2
50 - 149	10,0	1,0	4,5	3,5	3,0	3,0	0,5	0,2
150 - 299	12,5	1,0	6,0	4,5	3,0	3,0	0,5	0,2
300 - 500	15,0	1,0	8,0	6,0	3,0	3,0	0,5	0,2

MultiSeal set of lips with bearing





TEDIMA MultiSeal Special

Where MultiSeal Standard or the MultiSeal set of lips are not first choice because of special installation reasons, TEDIMA offers still further solutions. The configuration of single and double-lip are dimensionally standardized and represent an economic seal for special solutions.

MultiSeal Special is available in several other materials than the standard ones.

Shaft-∅	Н	H ₁	В	5 bar	10 bar	25 bar
				a_1	\mathbf{a}_1	a_1
up to 19	8,0	10,0	8	2,2	0,5	0,2
20 - 64	11,0	12,5	10	2,5	0,5	0,2
65 - 119	14,0	15,0	10	3,0	0,5	0,2
120 - 199	15,0	17,0	12	3,0	0,5	0,2
200 - 299	17,5	20,0	15	3,0	0,5	0,2
300 - 450	20,0	25,0	20	3,0	0,5	0,2

Order example for shaft-Ø 80; 10 bar:

TEDIMA MultiSeal Special $80 \times 108 \times 10$, 10 bar,

Order example with O-ring

TEDIMA MultiSeal Special 80 \times 110 \times 10, 10 bar with 0-ring

Shaft-Ø	Н	В	B ₁	5 bar	10 bar	25 bar
			-	a_1	a_1	\mathbf{a}_1
up to 19	10,0	14	16	2,2	0,5	0,2
20 - 64	12,5	17	19	2,5	0,5	0,2
65 - 119	15,0	18	20	3,0	0,5	0,2
120 - 199	17,0	20	24	3,0	0,5	0,2
200 - 299	20,0	23	26	3,0	0,5	0,2
300 - 450	25,0	25	30	3,0	0,5	0,2

Order example for shaft-Ø 80; 10 bar:

TEDIMA MultiSeal Special, double lip tandem

 $80\times110\times20,\,10$ bar with 0-ring

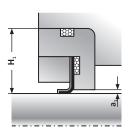
Shaft-⊘	OH	В	5 bar	10 bar	25 bar
			a_1	a_1	\mathbf{a}_1
uo to 19	10,0	12	2,2	0,5	0,2
20 - 64	12,5	15	2,5	0,5	0,2
65 - 119	15,0	17	3,0	0,5	0,2
120 - 199	17,0	20	3,0	0,5	0,2
200 - 299	20,0	24	3,0	0,5	0,2
300 - 450	25.0	25	3.0	0.5	0.2

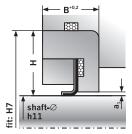
Order example for shaft-Ø 80; 10 bar:

TEDIMA MultiSeal Special, double lip p-v 80 \times 110 \times 17,

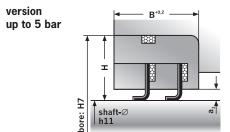
10 bar with O-ring

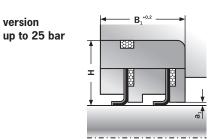
MultiSeal Special, single lip



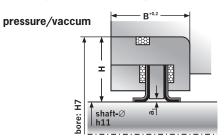


MultiSeal Spezial, double lip





MultiSeal Special, double lip





Technical Data

Materials

The seal lip material TEDEX – an especially modified PTFE-material – is the most important basis for the

successful application in MultiSeal high-performance seals.

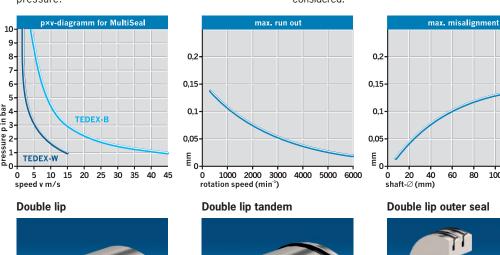
	seal lip)		case	static seal
standard material:	TEDEX	′-В		stainless steel	Viton®
special material:		TEDEX-W with FDA approval for applications in food and pharmaceutical		Hastelloy, ST52, Titan etc, available incl 3.1B-certificate	TEDEX-W for those applications where Viton® is not resistant
	TEDEX-M for minor lubrication and dry running		nor lubrication and		
erse rotation sur	face				
surface finish:	Ra	=0,1	-0,4 μm	The reverse rotation surface mu	ust be plunge grinded so to
	R ₇	=0,65	-2,5 μm	exclude leakage due to transpo	rtation effect of twists.
	R _{max}	-0,4 μm			
surface hardness:	up to	1,5 bar	45 HRC	We recommend a plasma coating with chromium oxide,	
	over	1,5 bar	60 HRC	plunge grinded and sealed with	PTFE.
itations of use					
pressure-vacuum:	MultiSe	al standa	rd	up to max. 10 bar	
	MultiSe	al set of I	ips	up to max. 25 bar	
	MultiSeal special			up to max. 25 bar	
temperature:	-90° C up to +260° C		60° C		pressure and peripheral speed do at g temperature and may make it nece s

Several simultaneous operating parameters such as pressure and peripheral speed make it necessary to check the limitations of use. The below $\mathbf{p} \times \mathbf{v}$ diagram shows these limitations for TEDEX-B and TEDEX-W. The $\mathbf{p} \times \mathbf{v}$ values are based on full lubrication at an operating temperature of approximately 100°C and for all MultiSeal models up to 10 bar pressure.

Depending on the particular conditions, minor lubrication and dry running make it necessary to considerably reduce the mentioned values and need a coated reverse rotation surface. In such cases we strongly recommend to consult our specialists.

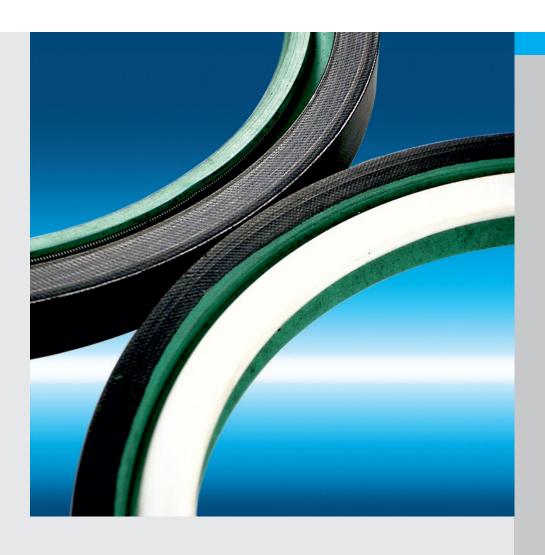
When applying a seal lip, minor friction loss is to be considered.

100 120 140





Universal Shaft Seal



The High-Performance Shaft Seal



Universal Shaft SealThe High-Performance Shaft Seal

Constructional Features

Universal shaft seal rings are produced without metal housing and do basically consist of three elements:

- fabric-reinforced Elastomer to secure the seal rings against the casing bore.
- seal lips made from a homogeneous Elastomermixture with addition of PTFE (minor friction!)
- · stainless steel garter spring

Universal shaft seal rings are available in various types, in split and endless version.

Applications

Universal shaft seal rings are generally used in the engine construction, however, mainly with heavy equipment and shipbuilding (e.g. rolling mill, power transmission, propeller shaft, water turbine etc.).

In addition to the above, they are used where shaft seal rings in a metal housing may not be applied.

Туре	Description	Design	Application	Shaft-∅
T51	split shaft seal ring with retaining ring for axial clamping without fabric-reinforcement in joint line area for better sealing	seal lips with PTFE-share, fabric-reinforced back and stainless steel garter spring	general engine construction, heavy equipment, shipbuilding	up to 1,800 mm
T52	endless shaft seal ring with retaining ring for axial clamping	seal lips with PTFE-share, fabric-reinforced back and stainless steel garter spring	general engine construction, heavy equipment, shipbuilding	up to 1,800 mm
T53	endless shaft seal ring • oversized outer diameter, therefore: • without retaining ring	seal lips with PTFE-share, fabric-reinforced back and stainless steel garter spring	general engine construction, heavy equipment, shipbuilding	up to 1,800 mm
T61	endless shaft seal ring with retaining ring for axial clamping pressure resistant because of PTFE back-up ring and modified profile	same as T51, however, additional back-up ring	general engine construction, heavy equipment, shipbuilding, water turbines	up to 1,800 mm

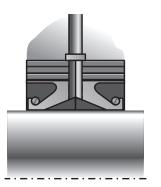


Universal Shaft Seal

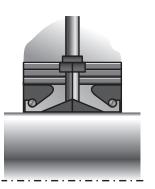
Special Versions



Type T51 with dust lip



Type T51 with radial lubrication grooves



Type T51 with radial lubrication grooves and circular groove

Materials

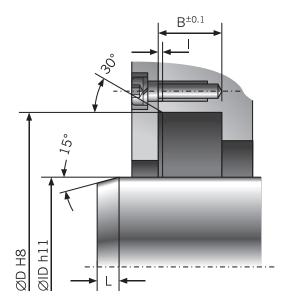
Material	Application	Temperature range of seal lip in °C
Nitril Rubber (NBR)	e.g. hydraulic oils and greases on mineral oil basis	-40 up to +120° C
Fluor Rubber (FKM)	mineral fluids and lubrication greases, water*, chemicals and solvents NOT suitable for flame resistant fluids on phosphoric acid/ester basis	-40 up to +200° C
Silicon Rubber (VQM)	motor and gear oils, vegetable oils, oils with high aniline point NOT suitable in aromatic and aliphatic hydrocarbon Good temperature consistency and cold flexibility	-60 up to +180° C
Butyl Rubber (IIR)	Hot water, steam, organic and anorganic acids and bases, flame resistant pressure fluids of group HSC, some types of group HSD, brake fluids on glycol basis NOT suitable for media on mineral basis	-40 up to +130° C

Additional lubrication is recommended.

Dimensions available

I.D. (mm)	l (mm)	L (mm)
up to 50	1.1	5.0
51 - 100	1.6	6.0
101 - 250	2.0	7.5
251 - 400	2.2	9.0
401 - 600	2.5	11.0
601 - 1,800	3.2	20.0

Installation dimensions and tolerances





Universal Shaft Seal

Technical Data

Peripheral speed

With optimum operating conditions the universal shaft seal ring T51 can be used for peripheral speeds of max. 25 m/s. As for type T61, the allowed peripheral speed depends on the pressure load (Please see diagram).

Hardness of seal surface

Depending on the operating conditions 40 – 45 HRC.

Quality of seal surface

up to 10 m/s	R _a R _{max}	0.5 - 0,6 μm 2.0 - 3.0 μm	
11 - 16 m/s	R _a R _{max}	0.3 - $0.5~\mu{\rm m}$ 1.0 - $2.0~\mu{\rm m}$	
over 16 m/s	R _a R _{max}	0.2 - $0.3\mu{\rm m}$ 0.8 - $1.0\mu{\rm m}$	

Grinding of the shaft surface must be plunge grinded.

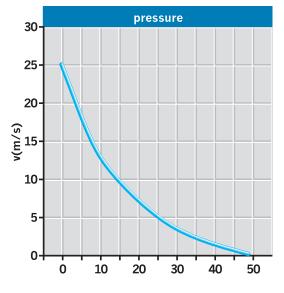
Pressure

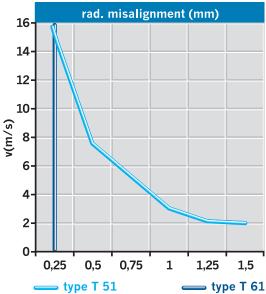
The universal shaft seals T51 and T53 are only used in applications without pressure load. With pressure differences, type T52 can be used according to DIN 3769 depending on the rotating speed and peripheral speed (max. 0.5 bar).

Run-out and misalignment

Because of their construction, the universal shaft seals are able to accept high rotation and concentric deviations in the radial direction. The diameter and the peripheral speed are the decisive parameters.

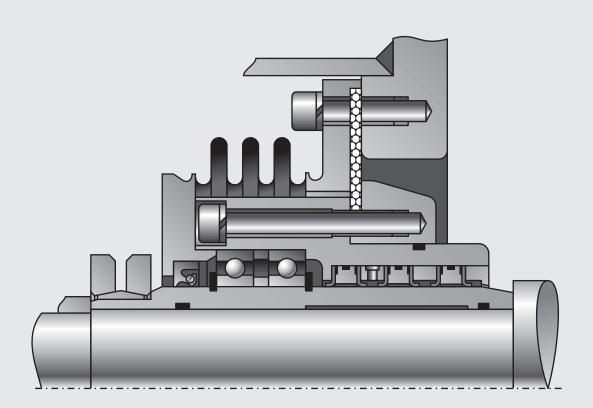
The data and recommendations of this brochure represent our up-to-date knowledge and experience. Since there is a wide variety of possible applications, these data can merely be considered as a guidance. Warranty claims cannot be deduced thereof.







Solutions for complex shaft seals



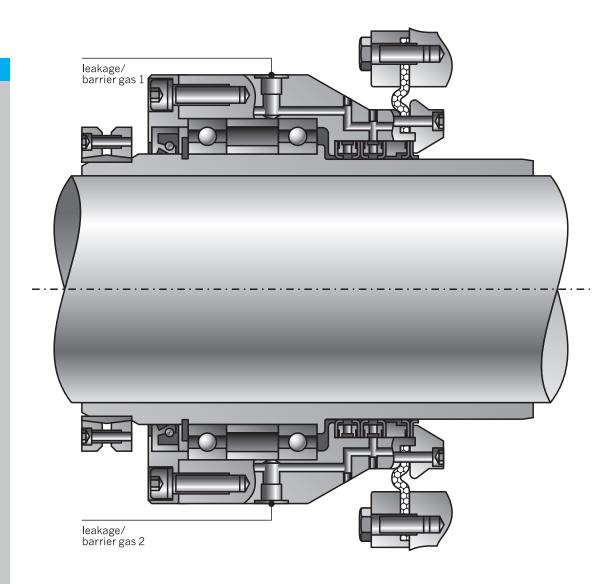
For more than 25 years now TEDIMA have been offering the solution for complex shaft seals

Without having to change the available installation spaces, the TEDIMA seals do solve your problems quickly and permanently.

TEDIMA re-fittings are not only 'replacement' or 'repair' – TEDIMA enhances the economy. Machine shutdowns are considerably reduced. In addition, the environmental safety is upgraded as a result of remarkably reduced emissions.



Seals for Mixing Machines



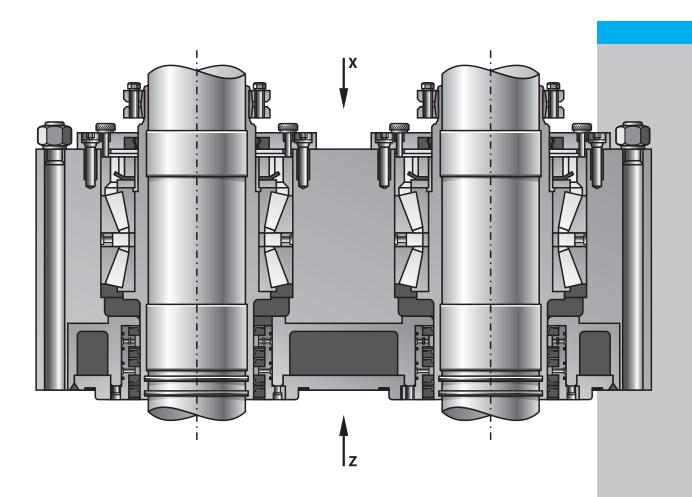
Alteration from packing to floatingly mounted seal lip construction – Chemopetrol, Czech Republic.

Medium:	Isophetan, 5% chrome solution in Toluol Diethylethoxyaluminium	
Grain size of product:	micro and coarse-grained particles	
Product information:	drying of the powdery product up to 0.1 $\%$ of the final moisture.	
Pressure:	50 mbar abs., up to 2 bar abs.	
Temperature:	e: 120°C, product is filled with 120°C	
Gas:	Nitrogen	
Rotating speed:	42 - 21 rpm	
Radial movement:	max. 3 mm in total	
Axial movement:	max. 5 mm in total	
Axial offset with installation:	max. ±2.5 mm	





Screw Conveyor Seal



Twin-shaft paddle heating screw conveyor

Product: solvent-based solids Pressure: from -1 up to 6 bar Temperature: 220°C

floating bearing axial movement 15 mm in total





Tedex PTFE High-Performance Gaskets



Tedex red

A high-quality, multi-directional sealing material on PTFE basis, filled with quartz.

Colour: light red

Application

Because of the chemical resistance it is ideal for all chemicals in the ph range of 0-14.

Exceptions: Hydrogen fluorides, fluorine compounds, melting of alkaline metals.

Complies with the FDA-, KTW- and WRC regulations, hence explicitly appropriate for the food and pharmaceutical industries.

Operating Data

Temperature:	-200°C up to 260°C
Pressure:	80 bar

These data are guide values which are based on the standard thickness of 2.0 mm and may not occur simultaneously. The values are to be modified depending on the thickness.

Technical Data

[Density:		2.2 g/cm ³
(Compressibility:	ASTM F 36 A	6.5 %
F	Resilience:	ASTM F 36 A	44 %
1	Tensile strength cross:	DIN 52910	16 N/mm ²
(Compressive stability:	DIN 52913/175°C	25 N/mm ²
(Gas permeability:	DIN 3535/6	>0.1 ml/min.

Available Sizes

Standard sheet $1,500 \times 1,500 \text{ mm}$ Thickness 0.75 mm up to 3.2 mm

Important installation note

Before installation make sure that the flange surface is free from any seal remains, dirt and rust. Tedex blue may only be installed dryly. Do not additionally use greases, seal compounds or rinsing agents.



Tedex soft/white

A high-quality, multi-directional seal material on PTFE basis, with compressible surface layers and creep resisting core.

Colour: white/pigment free

Application

Because of the chemical resistance it is ideal for flanges of glass and enamel.

Complies with the FDA-, KTW- and WRC regulations, hence explicitly appropriate for the food and pharmaceutical industries.

Operating Data

Temperature: -200°C	up to 260°C
Pressure: 60 bar	

These data are guide values which are based on the standard thickness of 2.0 mm and may not occur simultaneously. The values are to be modified depending on the thickness.

Technical Data

Density:		2.2 g/cm ³
Compressibility:	ASTM F 36 A	25 %
Resilience:	ASTM F 36 A	26 %
Tensile strength cross:	DIN 52910	9.5 N/mm ²
Compressive stability:	DIN 52913/175°C	20 N/mm ²
Gas permeability:	DIN 3535/6	<0.1 ml/min.

Available Sizes

Standard sheet $1,500 \times 1,500 \text{ mm}$ Thickness 0.75 mm up to 3.2 mm





Tedex white

A high-quality, multi-directional seal material on PTFE basis, filled with barium sulphate.

Colour: white/pigment free

Application

Because of the chemical resistance it is ideal for all chemicals in the ph range of 0-14.

Exceptions: Hydrogen fluorides, fluorine compounds, melting of alkaline metals.

Complies with the FDA-, KTW- and WRC regulations, hence explicitly appropriate for the food and pharmaceutical industries.

Operating Data

Temperature:	-200°C up to 260°C
Pressure:	80 bar

These data are guide values which are based on the standard thickness of 2.0 mm and may not occur simultaneously. The values are to be modified depending on the thickness.

Technical Data

Density:		2.9 g/cm ³
Compressibility:	ASTM F 36 A	8 %
Resilience:	ASTM F 36 A	43 %
Tensile strength cross:	DIN 52910	15 N/mm ²
Compressive stability:	DIN 52913/175°C	24 N/mm ²
Gas permeability:	DIN 3535/6	<0.1 ml/min.

Available Sizes

 $\begin{array}{ll} \text{Standard sheet} & 1,500 \times 1,500 \text{ mm} \\ \text{Thickness} & 0.75 \text{ mm up to } 3.2 \text{ mm} \end{array}$



Tedex blue

A high-quality, multi-directional seal material on PTFE basis, filled with tubular micro glass beads.

Colour: blue

Application

Because of the chemical resistance it is ideal for all chemicals in the ph range of 0-14.

Exceptions: Hydrogen fluorides, fluorine compounds, melting of alkaline metals.

Complies with the FDA-, KTW- and WRC regulations, hence explicitly appropriate for enamelled flanges and gauge glasses.

Operating Data

Temperature:	-200°C up to 260°C
Pressure:	80 bar

These data are guide values which are based on the standard thickness of 2.0 mm and may not occur simultaneously. The values are to be modified depending on the thickness.

Technical Data

Density		1.4 g/cm ³
Compressibility	ASTM F 36 A	35 %
Resilience	ASTM F 36 A	40 %
Tensile strength cross	DIN 52910	14 N/mm ²
Compressive stability	DIN 52913/175°C	30 N/mm ²
Gas permeability	DIN 3535/6	< 0.1 ml/min.
Cold buckling $\Sigma_{\rm KSW}$	DIN 28090-2	8.5 %
Cold resilience Σ_{KSW}	DIN 28090-2	4 %
Warm settling $\Sigma_{\text{WSW/200/16}}$	DIN 28090-2	42 %
Warm resilience $\Sigma_{WRW/200}$	DIN 28090-2	6.4%

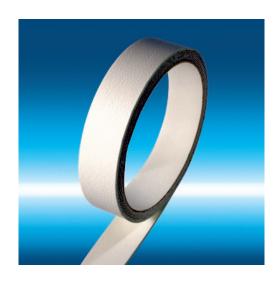
Available Sizes

Standard sheet $1,500 \times 1,500 \text{ mm}$ Thickness 0.75 mm up to 3.2 mm



TediFlex

Universal PTFE Gasket



Do benefit from the cold flow qualities of 100 % pure PTFE with uneven or damaged seal surfaces!

Tests and Approvals:

- TÜV Test No. MP 4/0051
- BAM Tgb No. 6228/89 4-2346
- DVGW Reg. No. G88e089

Tested Values:

- T: -240 up to +280°C
- P: 300 bar
- pH: 0 up to 14



Dimensions

Flatt ribbon (mm)	Coil length (m)	Dim	ension in compressed condit	ion (mm)
3 × 1.5	25	3.5×0.42	4.7×0.38	5.7×0.30
5 × 2	25	5.9×0.76	7.2×0.62	8.9×0.50
7×2.5	25	8.1×1.01	10.6×0.79	12.3×0.70
10 × 3	10	11.8×1.18	14.8×0.93	17.8×0.85
12 × 4	10			
14 × 5	10	18.4×1.65	23.2 × 1.25	26.4×1.00
17 × 6	8	22.3×2.12	26.1×1.45	28.2×1.25
20 × 7	5	26.7×2.35	32.4×1.80	36.0×1.40
22 × 5	5	33.3×1.65	41.5×1.25	48.0×1.00
24 × 8	5			
28 × 5	5			
40 × 5	5			

Round cord (mm)	Coil length (m)	Dimension in compressed condition (mm)		
1.0	25	3.5×0.42	4.7×0.38	5.7×0.30
3.0	25	5.9×0.76	7.2×0.62	8.9×0.50
5.0	25	8.1×1.01	10.6×0.79	12.3×0.70
7.0	10	11.8×1.18	14.8×0.93	17.8×0.85
10.0	10			
12.0	10	18.4×1.65	23.2 × 1.25	26.4×1.00
14.0	8	22.3×2.12	26.1 × 1.45	28.2×1.25
17.0	5	26.7×2.35	32.4×1.80	36.0×1.40

Important installation note:

- 1. The seal surface must be clean, free from grease and dry.
- 2. Pull off cover, affix the sealing whereas starting at the bolt hole and overlap the ends at the bolt.
- 3. Gradually pull the screws crosswise
- 4. If necessary, adjust screws when operating temperature has been reached.



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