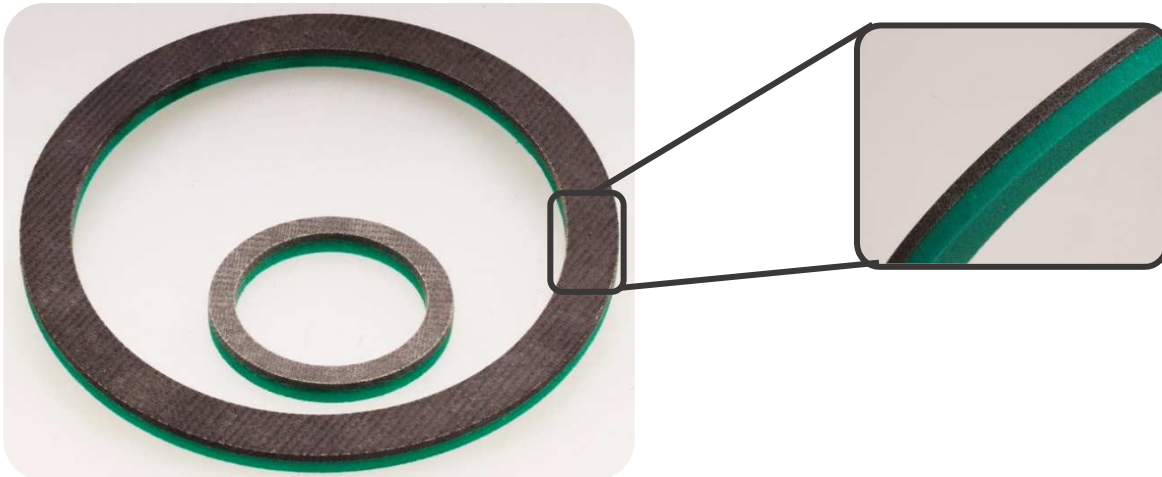


Short Discription

Deva.ThrustSeal® ND541 is a 2-layer-combination with one layer out of a composite sliding material and second layer out of an elastic material. The sliding layer is based on an epoxy resin, which contains solid lubricants (color: black), which has excellent tribological properties. The second layer (color: green) is an elastic PU (PolyUrethan) material.

Basic Designs



Explanations

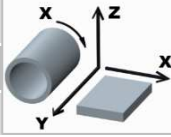
- Compound thickness and dimensions can be adapted to costumer applications
- Slyding layer is machineable
- Very good damping properties and excellent steadyness for shock resistance
- Good wear behavior even at small relative movements
- Additional lubrication ist not acceptable
- Compound has a sealing function against aprasive partcels if it is assempeld with axial pre-load**

Main field of application of deva.ThrustSeal® are bearing systems for thrust washers, discs or plates where an additional function for sealing is needed. The elastic PU-Layer allow an assemplay with an initial pre-stressing. This will close the axial gaps and and the other bearings in the sliding system will be protected against abrasive particles.

Typical Applications

- Special purpose vehicle
- Agriculture
- Transportation
- Machinery and constructions

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Bearing properties		Symbol	Materialcompound		Unit
Compressive strength ⁽¹⁾		σ_{dB}	300		N/mm ²
Max. recommended static load		p_s	25		N/mm ²
Max. recommended dynamic load		p_d	15		N/mm ²
Friction coefficient (dry) ⁽²⁾		μ	0,10	bis 0,24	-
Friction coefficient (water) ⁽²⁾		μ	0,11	bis 0,25	-
Friction coefficient (grease) ⁽³⁾		μ	-		-
Temperature range		T	-30	bis 70	°C
Max. recommended sliding speed		U_{max}	0,1		m/s
Max. recommended pU-value (dry)		pU	1,2		MPa*m/s
Max. recommended pU-value (water)		pU	0,9		MPa*m/s
Min. counterpart hardness		-	180		HB
Roughness of counterpart		Ra	0,4	bis 1,0	μm
Mechanical properties		Symbol	Sliding Layer	PU-Layer	Unit
Compressive strength flatwise to laminate ⁽¹⁾		σ_M	300	-	N/mm ²
Compressive yield point flatwise to laminate ⁽¹⁾		σ_x	100	-	N/mm ²
	E-Modul X- direction	E	4100	3,5	N/mm ²
	E-Modul Y- direction	E	4100	3,5	N/mm ²
	E-Modul Z- direction	E	2500	3,5	N/mm ²
Physical properties		Symbol	Sliding Layer	PU-Layer	Unit
Density (average)		ρ	1,8	-	g/cm ³
Swelling in water		-	<0,10	-	%
Thermal conductivity		λ	~0.3	0,1	W/mK
Coefficient of thermal expansion flatwise to laminate (20°C - 80°C)		α	100 - 130	-	$\times 10^{-6}$ 1/K
Coefficient of thermal expansion parallel to laminate (20°C - 80°C)		α	40 - 50	-	$\times 10^{-6}$ 1/K

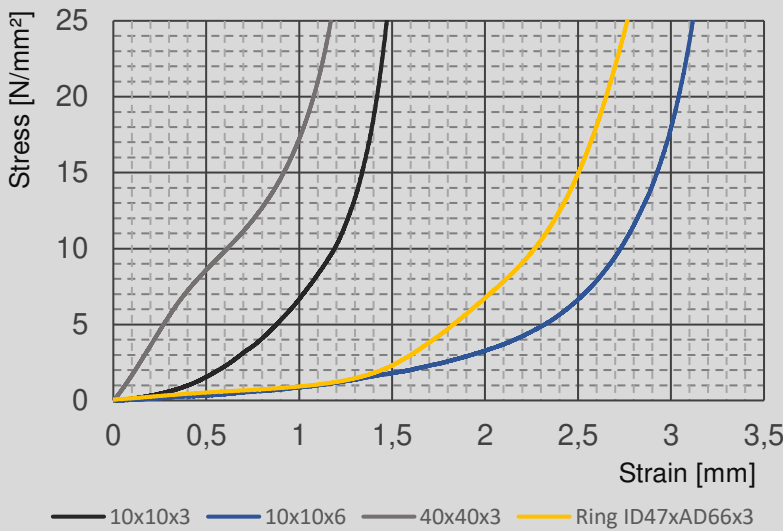
(1) Compressive test based on DIN EN ISO 604 2003

(2) Information is for sliding layer <15 MPa (friction coefficient is depending on the load); Friction coefficient PU $\mu \sim 0,7$

(3) Additional lubrication is not recommended

Technical construction and information

Spring characteristic by full faced contact

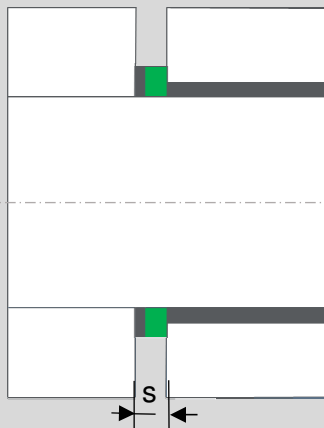


The graph shows the deformation behavior in dependence to the specific surface load.

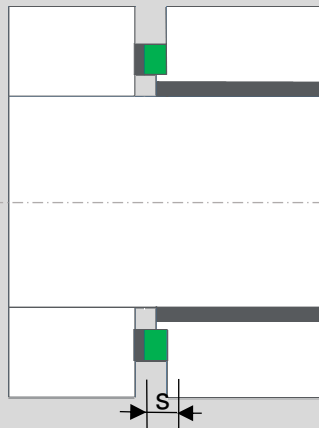
Based to the different form factors (Square, Ring and two different thicknesses (3 and 6 mm of the PU) characteristic curves was established.

The PU Thickness is nearly linear for the total deformation. The resulting relation between lateral face and loaded surface affected the rising of the characteristic curves.

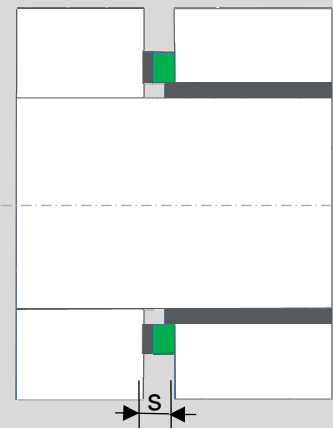
Possibilities for assembly



bevor bearing



with a ledge at the housing

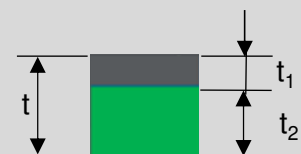


with overlaying bushing

Design-information

- s ... gap clearane for assembly
- t ... total thichness Thrustseal
- t₁ ... thickness slyding layer
- t₂ ... thiccknes PU Layer
- x ... oversize for prestressing
(typ. Minimum oversize x = 0,1 mm)

- Minimum thickness slyding layer:** t₁ = 1 mm
- Minimum thickness PU layer:** t₂ = 3 mm
- Total thickness t:** t = (s + x) ^{+0,5}/₋₀
- Standardtolerance contour:** 0,3 mm



Chemical resistance

Medium	Conc.	Temp.	Compound	Medium	Conc.	Temp.	Compound
Alcohols							
Allyl alcohol			⊗	Hydroxy acetone			-
Amyl alcohol			-	Isobutyl alcohol			-
Butyl alcohol			⊗	Isopropyl alcohol			-
Ethyl alcohol			-	Methyl alcohol			-
Ethylene glycol			-	Propyl alcohol			-
Solvents							
Aceton***	100%	23°C	⊙	Naphthalene			-
Benzene			⊗	Toluene			-
Methyl chloride			-	Trichloromethane			-
Methyl ethyl ketone			⊗				
Fuels							
Petrol			⊙	Kerosene			✓
Diesel fuel			✓				
Oils							
Cotton seed oil			-	Hydraulic oil			⊙
Curde oil			✓	Linseed oil			⊙
Gear oil			✓	Motor oil			✓
Gases							
Acetylene			-	Fluorine			⊗
Äther			-	Carbon dioxid			-
Bromine			⊗	Ozone			✓
Butane			-	Propane			-
Chlorine			⊗	Nitrogen			-
Natural gas			-	Hydrogen			-
Sulfur dioxide			-				
Salts							
Ammonium chloride			-	Magnesium carbon			-
Ammonium nitrate			-	Magnesium sulphate			-
Ammonium sulphate			-	Sodium acetate			-
Iron chloride			-	Sodium bisulphate			-
Magnesium chloride			-	Sodium carbonate			-
Acids							
Arsenic acis	10%		⊗	Carbonic acid	10%		⊗
Boric acid	10%		-	Hydrochloric acid*	10%	23°C	✓
Acetic acid	10%		✓	Citric acid	10%		-
Hydroflouric acid	10%		⊗	Sulphuric acid*	10%	23°C	✓
Phosphoric acid*	10%	23°C	✓		10%	70°C	⊙
	10%	70°C	✓	Hydrogen peroxide*	35%	23°C	✓
Nitric acid*	10%	23°C	⊙		35%	70°C	⊙
	10%	70°C	⊗				

Chemical resistance							
Medium	Conc.	Temp.	Compound	Medium	Conc.	Temp.	Compound
Bases							
Ammonium hydroxide			✓	Sodium hydroxide*	5%	23°C	✓
Calcium hydroxide			✓		5%	70°C	⊙
Potassium hydroxide*	5%	23°C	⊙	Sodium hypochlorite*	15%	23°C	⊙
	55%	70°C	⊗		1%	70°C	⊗
Magnesium hydroxide			-				
Others							
Ammoniak			⊗	Calcium oxide			-
Ethylene glycol			✓	Sodium nitrate			✓
Freon			-	Water*	100%	23°C	✓
Formaldehyde			-		100%	70°C	✓
Inhibitor Glycol-based e.g. Dowcal N *	50%	70°C	-		100%	100°C	⊗
Inhibitor Potassium hydroxide-based e.g. Performax CL1300*	3%	70°C	-	Steam >100°C			⊗
				Zinc sulphate			-
Additional information for PU material and bonding							
The used PU material is a closed cell system, therefore the absorption of water is low (only in the machined surfaces where the cells were cut) >> generally water swelling behavior is negligible.							

* based on DIN EN ISO 175:2010 (only for the sliding layer)

- ✓ = durable
- ⊙ = limited/conditioned durable
- ⊗ = not durable
- = actual no information available