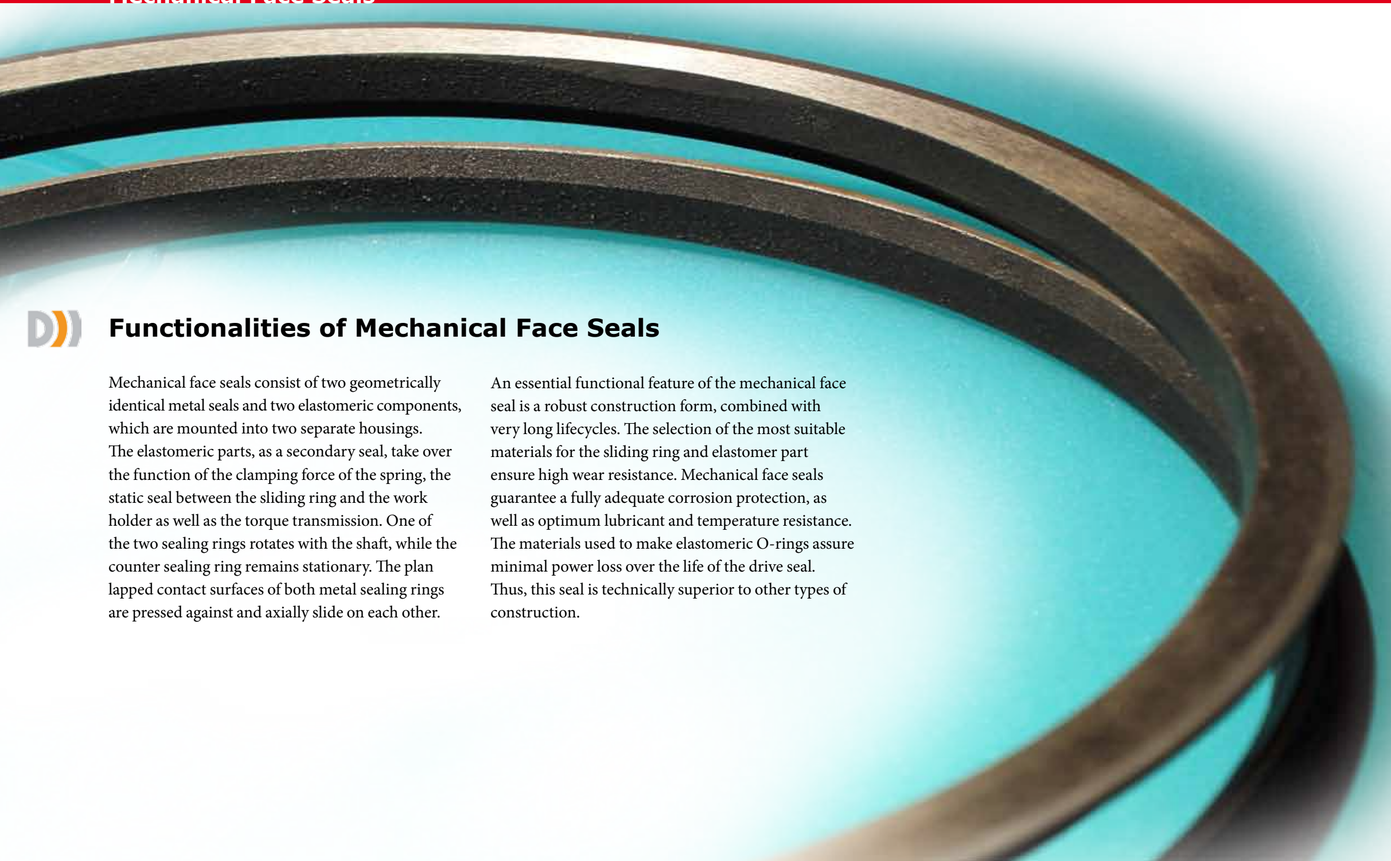
Mechanical Face Seals

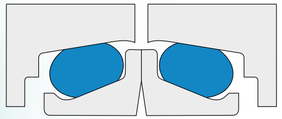
DICHTA®



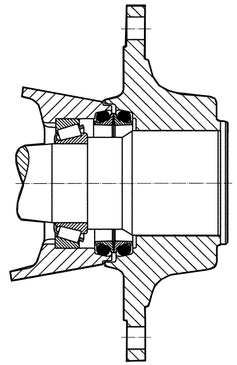
Functionalities of Mechanical Face Seals

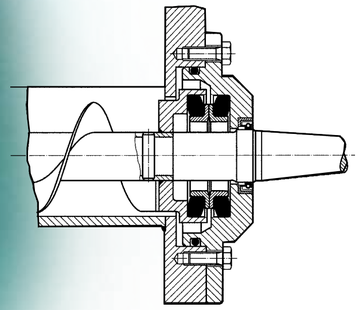
Mechanical face seals consist of two geometrically identical metal seals and two elastomeric components, which are mounted into two separate housings. The elastomeric parts, as a secondary seal, take over the function of the clamping force of the spring, the static seal between the sliding ring and the work holder as well as the torque transmission. One of the two sealing rings rotates with the shaft, while the counter sealing ring remains stationary. The plan lapped contact surfaces of both metal sealing rings are pressed against and axially slide on each other.

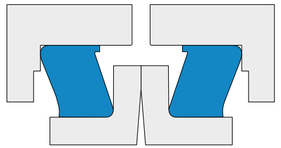
An essential functional feature of the mechanical face seal is a robust construction form, combined with very long lifecycles. The selection of the most suitable materials for the sliding ring and elastomer part ensure high wear resistance. Mechanical face seals guarantee a fully adequate corrosion protection, as well as optimum lubricant and temperature resistance. The materials used to make elastomeric O-rings assure minimal power loss over the life of the drive seal. Thus, this seal is technically superior to other types of construction.



Standard Seal







Square Bore Seal

Nomenclature and Construction Forms

Mechanical face seals – also known as “Duo Cone Seals“ or “Toric Seals“ – are used especially for rotary shafts in adverse and dirty environments. Due to their outstanding technical features mechanical face seals have achieved worldwide distribution.
Different geometric designs and material modifications of the metal and rubber parts can be found depending on application and construction of the sealed units.

The **standard seal** usually utilised consists of two metal rings and two O-rings assembled to a set, which is inserted into specially shaped, conical cavities.

Alternatively, seals are called **“Square Bore Seals“**, established in the market, which fit in cylindrical cavities, using belleville-washer springs. Depending on application, design characteristics and operating conditions, the selection of the most appropriate sealing system is carried out.

Functionality in Adverse and Dirty Environments

As a result of permanent operations in adverse and dirty environments the sealed units and vehicles are exposed to extreme and constant strain. In all “Outdoor” implementations, such as coal-mining, open-cast mining, construction industry, agricultural- and forestry applications, chemistry, waste disposal and removal industries, water treatment, wind craft energy, offshore drilling etc. the following abrasive and corrosive media have to be taken into account, which standardized oil seals or rotary shaft seals cannot cope with:

- Sand, loam, mud, earth, stone, lime sandstone, granite, basalt
- Concrete, lime, potash, rubble, grit, slag, glass, asphalt, bitumen
- Chemicals, liquids, salts, lye, acids
- Sewage water, rainwater, harbor water, dirty water, sea water
- Secondary raw materials, liquid manure, metal scrap, metal recycling & disposal materials

Additionally, in combination to extreme weather conditions such as -55 °C/-131 °F to +200 °C/+392 °F and corrosive surroundings, e.g. maritime climate, the mechanical face seal solutions prove exceedingly reliable and functional in a wide range of applications.

Assignments and employment of labor in advers and dirty environments

Product and Functionality Advantages

Mechanical face seals prove themselves in application due to three outstanding advantages:

- Prevention of entry of abrasive dirt, contamination and media into the sealing space
- Avoidance of leakage (oil or grease escape) from the sealing space
- Extremely high wear resistance according to application

Leaking oil

Selection of the Appropriate Mechanical Face Seal

Cast in Ni-Hard

As a result of very high requirements for the wear resistance of mechanical face seals we make use of a special cast with a natural hardness of 58 to 64 HRC, which consists of a material called Ni-Hard.

The extremely high wear resistance is reached by a carbidic-martensite structure of the material and a selection of the alloy elements as well as their concentration. By means of the combination of selected alloy elements and the high carbon content a structural composition is achieved, which proves to be advantageous with respect to wear resistance compared to other materials such as steel. At the same time this material performs with a low corrosion index.

Peripheral Speeds

Mechanical face seals in high alloy cast allow peripheral speeds up to 10 m/s with oil- and up to 3 m/s with grease lubrication, while mechanical face seals in bearing steel (100CR6) can be used with rotary speeds up to 2 m/s.

Individual Material Recipes

Depending on the media to be sealed off, it is possible to compile individual material recipes for a special high alloy cast in order to substantially increase life span and wear resistance of the mechanical face seal.

Individual recipes of high alloy cast for sealing solutions in biogas fermentation plants or harrowing machinery with chemical exposure to slurry show substantial improvements with respect to life cycles, wear resistance and corrosion resistance.

Selection of O-ring Material

High thermal resistance and a low compression set are the essential criteria specified for the elastomeric material in demanding applications.

The standard design NBR meets these requirements with the use of nitrile-butadiene-rubber. For higher thermal stresses the O-rings are constructed of HNBR, VMQ or FKM. The oil compatibility of several elastomers has to be examined.

The elastomeric materials listed are offered in various degrees of hardness (ShoreA), so that the O-ring can adequately perform its function of generating a permanent and consistent contact pressure within the sealing system.

NBR - Nitrile-Butadiene-Rubber

Nitrile is recommended for temperatures ranging from -35 °C to 100 °C (-95 °F to 212 °F) continuous and is compatible with most mineral based lubricant oils. Nitrile O-rings offer the maximum resistance to abrasion. It is the most common O-ring material choice and is used in most standard axle, final drive and undercarriage applications.

HNBR - Hydrogenated Nitrile-Butadiene-Rubber

HNBR is a nitrile-based material recommended for temperatures ranging from -40 °C to 135 °C (-104 °F to 275 °F) continuous. It has very similar abrasion resistance characteristics to standard nitrile, but HNBR has better resistance to compression sets (permanent deformations) when exposed to high temperatures for extended periods of time.

VMQ - Silicone-Rubber

Silicone is recommended for temperatures ranging from -55 °C to 200 °C (-131 °F to 392 °F) continuous. It is not compatible with fuels or certain types of gear lubricants. Silicone also has inferior abrasion resistance to nitrile. Typically, silicone uses are: extreme high (wet disc brake systems) or extreme low (arctic environment) temperature applications.

FKM – Fluorocarbon-Rubber

FKM has a recommended temperature range between -10 °C to 180 °C (-50 °F to 356 °F). FKM is typically used in steel mill type applications where extremely high temperatures are a concern and low temperatures are not a problem. FKM has a very weak low temperature capability and will harden at temperatures near freezing.

Nomenclature	NBR	HNBR	VMQ	FKM
Low T Limit (°C)	-35	-40	-55	-10
High T Limit (°C)	100	135	200	180
Tear Resistance	Good	Good	Poor	Good
Abrasion Resistance	Excellent	Excellent	Poor	Good
Oil Resistance	Excellent	Excellent	Poor	Excellent
Water Resistance	Excellent	Excellent	Excellent	Fair
Cost	Low	Medium	Medium	High

Typical Applications of Mechanical Face Seals

Products in construction industry:

Wheel loaders, ditch rollers, tar machines, dump trucks, trucks, concrete mixers, concrete pumps, bulldozers, earth movers, etc.

Components: Undercarriages, axles, gears, driving wheels, drive chains, grubbers, shovels, etc.

Products in agricultural engineering industry

Tractors, towing vehicles, soil cultivation machineries, harrows, ploughs, fertilizer machines, harvesting machines, hay balers, etc.

Components: Undercarriages, axles, gears, driving wheels, drive chains, grubbers, shovels, hubs etc.

Applications in construction: Shovels, axles, grubbers

Cutting head and cutter wheels in mining industry

Agricultural engineering: Harrow and hub for a cultivation slice

Undercarriage application

Grubber application

Sealing of track roller in military applications

Products in mining industry

Tunnel boring machines, wheel loaders, ditch rollers, dump trucks, transportation systems, concrete mixers, concrete pumps, bulldozers, earth movers, etc.

Components: Cutting heads, conveyors, undercarriages, axles, gears, driving wheels, drive chains, grubbers, shovels, etc.

Products in military applications

Tanks, transporters, trucks, towing vehicles, bulldozers, cranes, etc.

Components: Drive chains, track rollers, carrier rollers, undercarriages, axles, gears, driving wheels, forklifts, grubbers, shovels, etc.

Products in industrial applications

Chemical industry, pumps and hydraulics industry, waste and removal management, truck industry, logistics, cranes and forklifts, shipyards, harbor and embarkement equipment, railway and wagons, etc.

Components: mixers, agitators, bubblers, pumps, waste and concrete shredders, axles, drive chains, gears, etc.

Portfolio-List in Reference to Goetze and Trelleborg

Our portfolio- and reference list presents an overall view of competitive products and their seal and O-ring dimensions. In order to substitute running applications a technical product comparison and evaluation must be conducted with regard to material and dimensions for the seal ring and the O-ring. All other dimensions and types are available on demand.

Conceptions for Mechanical Face Seals
johannes-orlowski@gmx.de
hans_henning_zutz@web.de
Fon/Fax: + 49 2174 - 495 98 27

Type No	Goetze Type No	Trelleborg Type No	Seal Ring Inside Diameter	Seal Ring Outside Diameter	Seal Ring Height	O-Ring Inside Diameter	O-Ring Cross Sectional Diameter
Type 51	H-50	TLDOA 0380	38	51	20	41	6
Type 51/6,7	H-50A1	-	38	51	20	40	6,7
Type 58	H-021	TLDOA 0450	45	58	21	48	6,1
Type 59	H-01	TLDOA 0460	46	59	20	47,5	6,5
Type 62	H-019	TLDOA 0480	48	62,15	25	50	7,5
Type 70	H-32	TLDOA 0555	55,5	70	22	58	7,5
Type 70/8	H-32A1	-	55,5	70	22	58	8
Type 73	H-57	TLDOA 0600	60,2	73	20	60	6,5
Type 78	H-020	TLDOA 0640	64	78	25	66	8,2
Type 80	H-01A1	-	67	80	20	68,5	6,5
Type 80/5	H-53	-	63	80,5	26	66	8
Type 82	H-02	TLDOA 0635	63,5	82,4	32	66	9,5
Type 84	H-02A1	TLDOB 0710	71	84	20	72,5	6,5
Type 85/5	H-03	TLDOA 0675	67,5	86,5	31,8	71	9,5
Type 88/5	H-113	-	77,5	88,5	15	78	4,3
Type 89	H-05	TLDOB 0690	68	89	24	75	8
Type 91	H-04A1	TLDOA 0710	71,5	91	29	75	9
Type 92	H-04	TLDOA 0730	73	92	32	75,7	9,5
Type 92,5	H-45	TLDOA 0795	79,5	92,5	20	81	6,5
Type 98	H-039	TLDOA 0810	81	98	28	82	8
Type 100	H-003	TLDOB 0800	79	100	30	85	9,5
Type 100/80	H-016	-	80	100	29	83	9
Type 102	H-07	-	83	102	28	87	8,5
Type 104,5	H-05A3	TLDOB 0900	90,5	104,5	26	93	6,3
Type 108	H-05A2	-	88	108	24	93	8

Type No	Goetze Type No	Trelleborg Type No	Seal Ring Inside Diameter	Seal Ring Outside Diameter	Seal Ring Height	O-Ring Inside Diameter	O-Ring Cross Sectional Diameter
Type 109,5	H-06	TLDOA 0900	90,5	109,5	32	93,2	9,5
Type 111	H-08A5	TLDOA 0950	95	111	24	99	7,7
Type 117	H-45A1	-	103	117	20	105	6,5
Type 119	H-08	TLDOA 1000	100	119	32	102,8	9,5
Type 120	H-08A3	TLDOA 0990	99	120	28	105	8,5
Type 125	H-08A2	TLDOF 1040	104	125	28	110	8,5
Type 125/24	H-08A4	TLDOA 1070	107	125	24	110	8,5
Type 125/7,7	H-08A9	-	107	125	24	110	7,7
Type 128	H-017	-	110	128	32	113	9,2
Type 129	H-16A8	TLDOA 1145	114,5	129	21	117	7
Type 138	H-09	TLDOA 1170	120	138	32	122,5	8,4
Type 138/9	H-09A3	TLDOA 1170	120	138	32	124,3	9
Type 139	H-09A1	TLDOA 1200	120	139	31,8	123,5	9,5
Type 139,5	H-52	TLDOA 1190	118,5	139,5	28	124	8,5
Type 140	H-09A2	-	117	140	29	124	8,7
Type 140,7	H-12A6	TLDOD 1270	127	140,7	25	130	6
Type 141	H-12	TLDOC 1270	127	141	29	130	6
Type 141/8,3	H-12A3	-	127	141	29	130	8,3
Type 141/9	H-12A5	-	127	141	29	124,3	9
Type 142	H-022	TLDOA 1200	120	142	38	122	11,3
Type 144	H-11	TLDOB 1250	125	144	31,8	128,5	9,5
Type 146	H-10	TLDOA 1260	127	146	32	130	9,5
Type 146/31	H-10A1	-	127	146	31	130	9,5
Type 154,5	H-12A2	-	135,5	154,5	28	139	8,3
Type 156,6	HNO-149	TLDOA 1427	143	156,6	25	143	6,5

Type No	Goetze Type No	Trelleborg Type No	Seal Ring Inside Diameter	Seal Ring Outside Diameter	Seal Ring Height	O-Ring Inside Diameter	O-Ring Cross Sectional Diameter
Type 157	H-14	TLDOB 1430	143	157	27	145	6,3
Type 160	H-13	TLDOA 1430	143	160	27	145,7	8,3
Type 167	H-15	TLDOA 1470	150	167	28	153,8	8,5
Type 168.2	H-16	TLDOA 1540	154	168	27	158	6
Type 168/155	H-16A5	-	155	168	27	158	6
Type 168/6,5	H-16A4	TLDOA 1539	154	168	27	150	6,5
Type 169	H-16A3	TLDOD 1540	154	169	22	158,1	7
Type 169/9,2	H-16A9	-	154	169	22	158,1	7
Type 170	H-16A1	TLDOE 1540	154	170	21	158,1	7
Type 171,5	H-15A3	-	153	171,5	28	157	8,3
Type 172	H-18	TLDOA 1463	146	172	38	147	12,7
Type 172/40	H-023	TLDOC 1500	150	172	40	151	11,2
Type 173,5	H-17	TLDOC 1540	154	173,5	32	155	9,65
Type 180,5	H-17A3	-	165	180,5	27	170	7
Type 181	H-17A7	TLDOA 1650	165	181	27	170	7
Type 185,3	H-140	-	171,3	185,3	20	172	6
Type 189	H-55	TLDOA 1640	164	189	30	170	9,5
Type 191,5	H-20	TLDOA 1630	163	191,5	38	166	12,7
Type 194,4	H-124	-	172	194,4	31,8	175	9,5
Type 195	H-47	-	176	195	28	182	8,3
Type 199	H-56	TLDOA 1780	178	199	32	184	9,5
Type 200	H-21	TLDOA 1770	177	200	30	184	9,5
Type 200/00	H-21A3	-	177	200	30	184	9,5
Type 205	HNO 150	-	178	205	38	178	12,7
Type 209	H-94	-	192	209	30	190	9,5
Type 210	H-22A2	TLDOA 1910	191	210	28	190	8,5
Type 210,5	H-22	TLDOA 1823	182	210,5	38	185	12,5
Type 216,5	H-22A1	TLDOA 1950	195	216,5	31,8	198	9,5
Type 222,8	H-81	TLDOA 2020	208,7	222,8	26	208	6,2
Type 227	H-23	TLDOA 2050	205	227	30	210	9,5
Type 227/10	H-23A2	-	205	227	30	210	10
Type 223	H-81	TLDOA 2020	208,7	222,8	26	208	6,2
Type 228,5	H-25	TLDOA 2000	200	228,5	38	205,5	13
Type 237	H-93	-	216	237	30	218	9,5
Type 239,5	H-24A3	TLDOA 2200	220	239,5	31,8	224	9,5
Type 241,4	H-109	-	220	241,4	25	226	7,7
Type 251,5	H-24	TLDOA 2240	223	251,5	38	226	12,7
Type 261	H-40	-	238	261	31,8	245	9,58

Type No	Goetze Type No	Trelleborg Type No	Seal Ring Inside Diameter	Seal Ring Outside Diameter	Seal Ring Height	O-Ring Inside Diameter	O-Ring Cross Sectional Diameter
Type 262,8	H-41	TLDOA 2400	240	262,8	38	243	13
Type 263/242	H-41A1	TLDOA 2400	242	262,8	38	243	13
Type 270	H-130	-	250	270	300	250	9,5
Type 280,5	H-62	TLDOA 2520	252	280,5	38	255	12,7
Type 293	H-26	TLDOA 2650	265	293	38	268	12,7
Type 303	H-26A1	TLDOA 2750	275	303	38	278	12,7
Type 328	H-042	TLDOA 3780	300	328	38	300	12,7
Type 324,6	H-27	-	300	324,65	38	305	12,7
Type 325	H-27A4	TLDOA 3000	300	325	38	305	12,7
Type 328	H-042	TLDOA 1780	300	328	38	300	12,7
Type 341	H-28	TLDOA 3180	318	341	38	315	12,7
Type 346	H-28A4	TLDOA 3185	318	346	38	315	12,7
Type 346/40	H-28A6	-	318	346	40	320	12,7
Type 375	H-30	TLDOA 3500	350	375	38	355	12,7
Type 375/355	H-30A1	-	355	375	38	355	12,7
Type 394,4	H-60	TLDOA 3665	366	394,4	38	359,5	12,7
Type 394,4/40	H-60A2	-	366	394,4	40	359,5	12,7
Type 398	H-60A3	TLDOA 3700	370	398	38	370	12,7
Type 415	H-70	TLDOA 3870	388	415	38	385	12,7
Type 416,2	H-70A1	-	388	416,2	38	385	12,7
Type 457	H-61	TLDOA 4290	430	457	38	420	12,7
Type 459,2	H-61A4	-	430	459,2	38	420	12,7
Type 480	H-65A1	-	450	480	50	454	16
Type 495	H-65A2	-	465	495	43,6	460	12,7
Type 497,2	H-65A5	-	465	497,2	43,6	460	12,7
Type 500	H-65	TLDOA 4700	470	500	50	474	16
Type 533	H-74	TLDOA 5054	505	533,4	43,6	493	12,7
Type 535,8	H-74A2	-	505	535,8	43,6	493	12,7
Type 560	H-89	TLDOA 5300	530	560	50	530	16
Type 566,8	H-146	-	538	566,8	43,6	535	12,7
Type 590	H-82	-	559	590	50	560	16
Type 608	H-83	TLDOA 5800	576	608	43,6	582	12,7
Type 608/581	H-83A2	-	581,5	608	43,6	582	12,7
Type 623	H-76	TLDOA 5910	591	623	50	595	16
Type 628	H-90	-	596	628	50	595	16
Type 695	H-75	-	660	695	53	660	16
Type 700/43,6	H-75A2	TLDOA 6670	667	700	43,6	660	12,7
Type 700	H-75A3	-	667	700	50	660	12,7

The Tradition of Highest Quality

DICHTA designs, produces and distributes shaft seals and other sealung products with highest quality standards using advanced manufacturing techniques and approved quality systems.

Building on 30 years experience, DICHTA GROUP has developed to a true world class supplier, serving clients on all continents through offices in Switzerland and Italy, with modern production facilities in Italy and the Far-East.

DICHTA manufactures products in accordance to ISO 9001:2008 system ensuring to supply continuous high quality with full batch traceability, encoded in a barcode system. In addition, the newly obtained ISO 14001:2004 certification ensures our attention to the latest rules in terms of respect to the environment.

Through its in-house design team, the company is capable to produce bespoke solutions with realistic lead times at competitive condition.

A worldwide distributor network backed by highly qualified personnel, ensures that our customers receive a fast and reliable service to solve even their most demanding requirements.

Moreover, the recently new built Headquarter is hosting a large modern warehouse with a wide range of items which availability is published and updated every 24 hours.