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Case history
SEAL GROUP (DUO-CONE)

Based on the needs that the market demands, we have renewed the Seal Group (Duo-cone) seal line to meet increasingly extreme operating conditions.

Mechanical face seals are used to keep oil inside the system where they are mounted and to guarantee the seal from harmful contamination from outside.

The initial goals were:

- Design the floating face seal to withstand the most extreme conditions.
- Improve and differentiate the type of material used for the two metal faces.
- To improve and differentiate the elastomers that make up the o-rings for the different conditions of use.

Our solutions:

A) The choice of design for the mechanical part was determined by a thorough examination of the various applications. Fundamental parameters were taken into account, such as:

- Speed
- Internal and external pressure
- Environment and external contamination
- Temperature of use
- Available housing space

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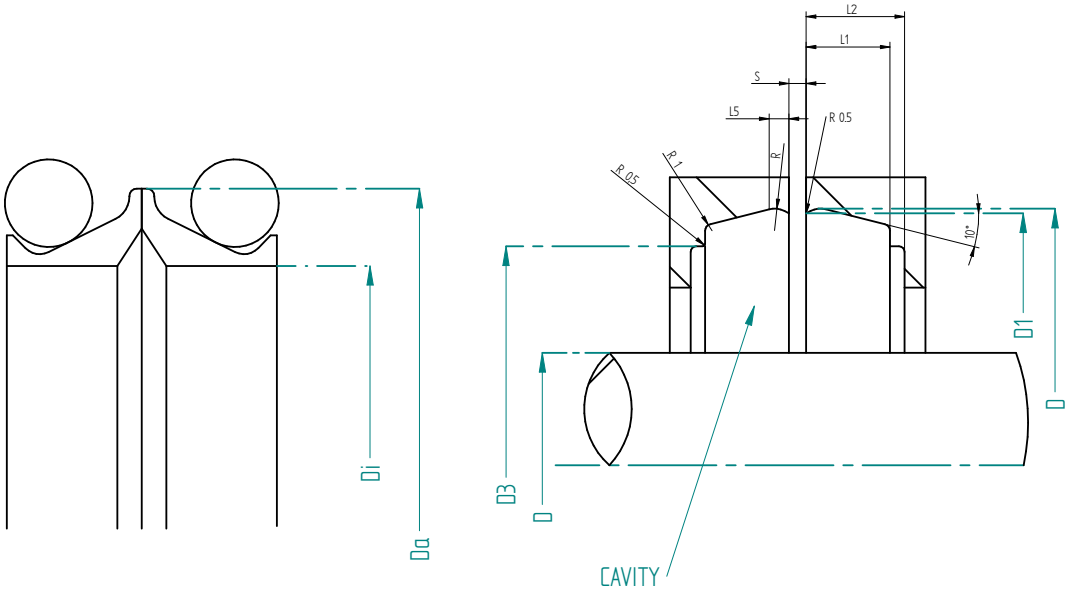

In connection with the investigation, the Duo-cone seals were classified according to the size of the fitted O-ring chord, thus harmonising the cross-section of the metal part according to the housing. For small axle applications, the O-ring chord cross-section is 6.22mm. Rope cross-section of 9.47mm normally used in the undercarriage of tracked earth-moving machines. Rope cross-section of 12.70 mm applied to axles, wheels and final drives of earth-moving and construction machinery. At the end rope section of 16mm for large seals.

B) Based on the metal part, metal types made by casting or forging were used.

The first industrialised for applications exposed to abrasion and corrosion with moderate rotational speeds.
The second for high speeds and excellent corrosion resistance.

DESCRIPTION *(Material SAE52100/1.3505)*	**MATERIAL CHECKED IN %** *(Forging)*	**MATERIAL CHECKED IN %** *(Casting)*
C *(carbon)*	0,98	3,69
Mn *(manganese)*	0,29	0,66
Si *(silicon)*	0,31	1,6
AL *(aluminium)*	-	-
Cu *(copper)*	0,01	0,05
Sn *(tin)*	-	-
Cr *(chromium)*	1,49	14,88
Ni *(nickel)*	0,03	0,13
Mo *(molybdenum)*	0,01	0,73
As *(arsenic)*	-	-
Pb *(lead)*	-	-
Ti *(titanium)*	-	-
W *(tungsten)*	-	-
Co *(cobalt)*	-	-
V *(vanadium)*	0,09	-
S *(sulphur)*	0,006	0,022

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C) Elastomers industrialised to suit various applications are NBR, NBR-AW, Silicone, HNBR and FKM.

The range of materials used covers temperature requirements, minimum and maximum, resistance to abrasion and tearing, water oils and greases, etc.

NBR: nitrile rubber recommended for temperature ranges from -20 C° to +120 C°; compatible with mineral oil with excellent resistance to abrasion and tearing.

NBR-AW: all weather nitrile rubber suitable for temperature ranges from -30 C° to +110 C°; compatible with mineral oil with excellent resistance to abrasion and tearing.

SILICONE: recommended for low temperatures from -55 C° to + 180C°. Generally recommended for high temperatures, e.g. lubricated brake systems and low temperature applications.

HNBR: hydrogenated nitrile rubber suitable for applications with temperatures from -40 C° to + 150C°, with similar characteristics to NBR for abrasion and tearing. Best resistance to permanent deformation when exposed to high temperatures.

FKM: Viton, fluoroelastomer recommended for temperatures from -10 C° to + 200 C°. Recommended in applications where there are constantly high temperatures.

	NBR	NBR-AW	SILICONE	HNBR	FKM
Low T Limit (°C)	-25	-40	-60	-40	-10
High T Limit (°C)	120	105	200	150	200
Tear Resistance	Good	Good	Poor	Good	Good
Abrasion Resistance	Excellent	Excellent	Poor	Excellent	Good
Oil Resistance	Excellent	Excellent	Poor	Excellent	Excellent
Waper Resistance	Excellent	Excellent	Excellent	Excellent	Fair

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