BROCHURE

PISTON RINGS

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SINCE 1940

Technical supplier

THN is a specialist in technical products, we have divided these products into five product groups: piston rings, Fey laminar rings, plain bearings, sintered filters en linear components.

We can deliver these millions of products superfast thanks to a smart stock, far-reaching IT automation and efficient logistics.

06

PISTON RINGS

16 Compression rings

17 Scraper rings

18 Oil control rings

19 Joint types

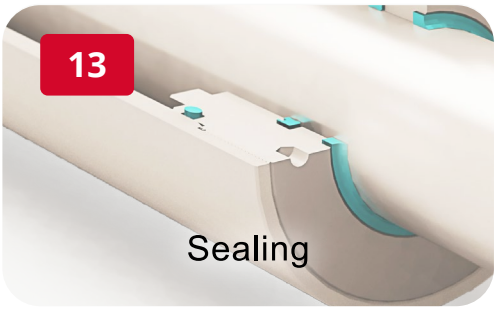
21 Options

22 Coatings

22 Joint gap

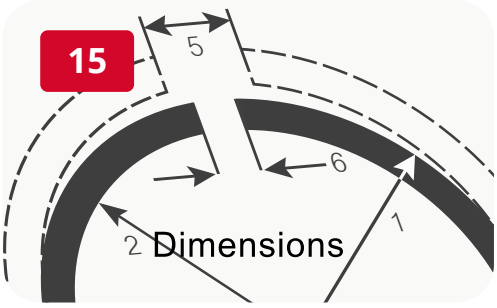
08

Function of piston rings



13

Sealing



The complete product line

FIVE PRODUCT GROUPS

Besides piston rings, THN also has an extensive range of Fey laminar rings, plain bearings, sintered filters and linear components.

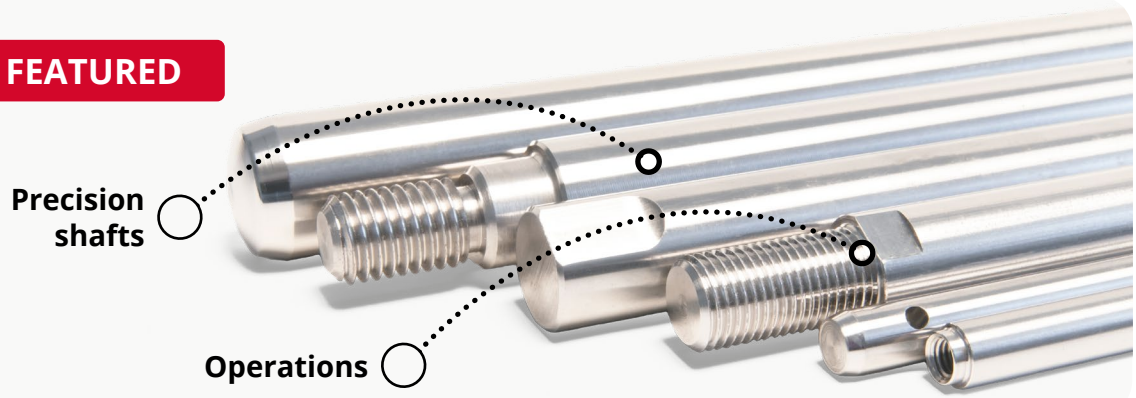
Fey laminar rings

Plain bearings

Sintered filters

Linear components

FEATURED

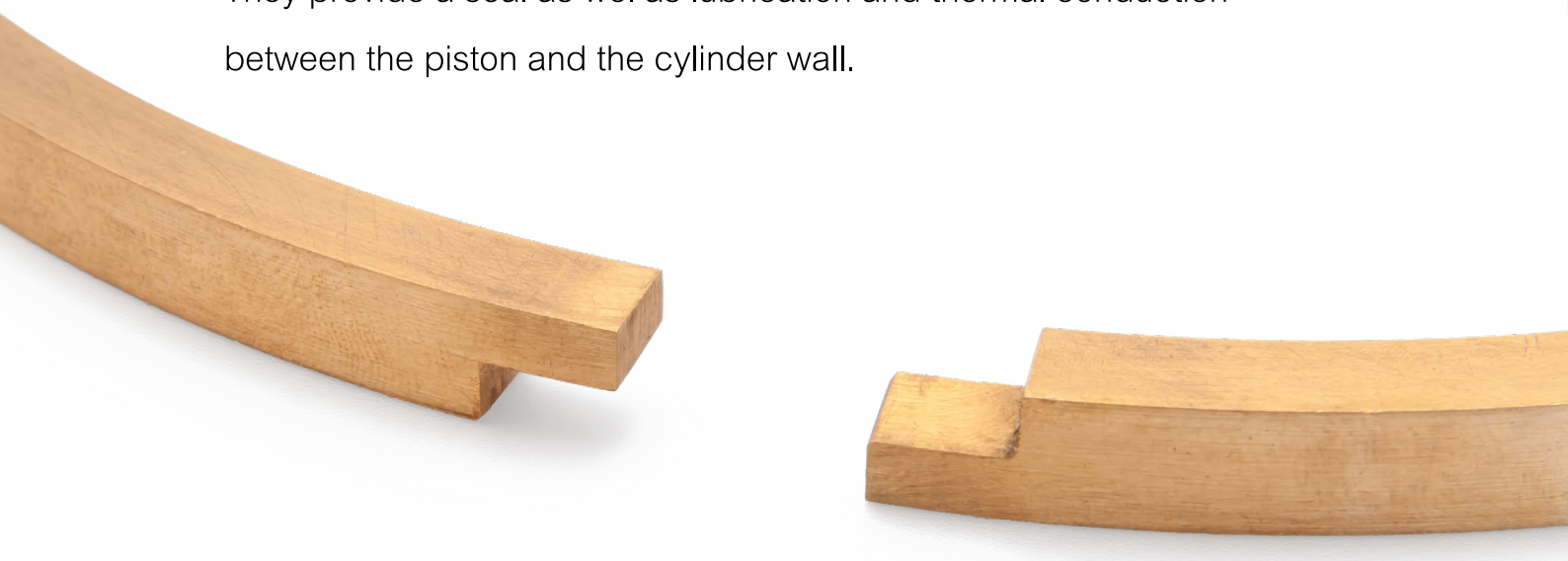


Piston rings

GENERAL

Piston rings are found in all piston engines and in many compressors and pumps. Piston rings are also found in many other applications such as gearboxes, turbochargers and gasification plants.

They provide a seal as wel as lubrication and thermal conduction between the piston and the cylinder wall.



MATERIALS

Piston rings are manufactured from many different materials, with cast iron and steel being the most common. Some more common materials are:

- Gray cast iron (incl. GG25)
- Nodular cast iron (incl. GGG50)
- Bronze (o.a. CuSn7 and CuSn10)
- (Stainless) steel (incl. X90CrMoV18 and 54SiCr6)

DESIGN & TEST

When designing a piston ring, consideration must be given to factors such as the application and sealing requirements, running characteristics and the expansion of materials. We will be happy to advise you on the design of a piston ring seal.

A new design should always include a running and assembly test under operating conditions to verify the design.

QUALITY

For the most part, piston rings are produced to comply with DIN and ISO standards. Some of the more common standards are:

- ISO 662x series
- DIN 709xx series
- DIN 2491x series

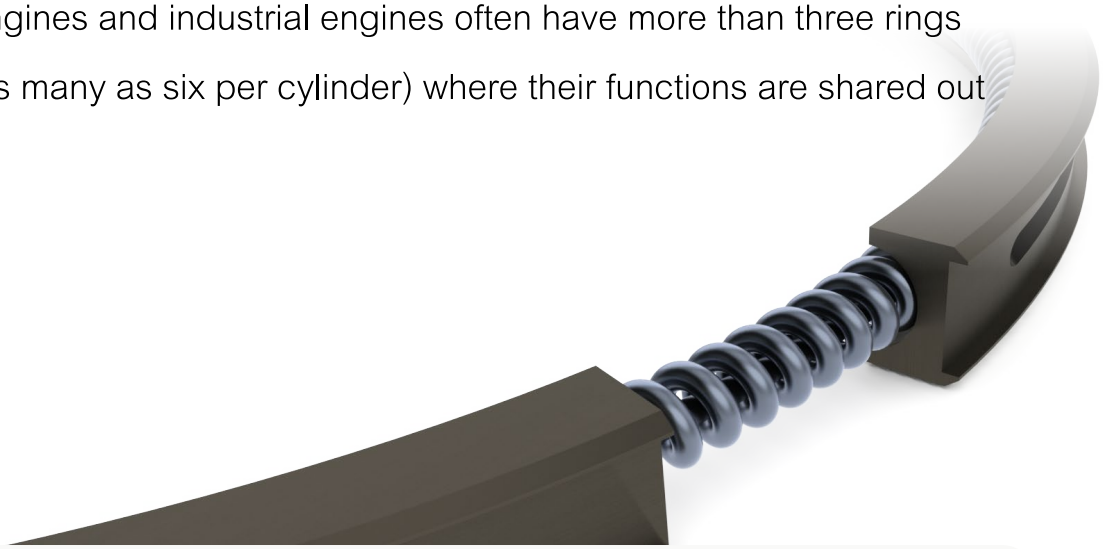
Function of piston rings

INTERNAL COMBUSTION ENGINES

Piston rings play a very important part in internal combustion engines. They must absorb the combustion pressure, cool the piston, keep the oil in the crankcase and provide a film of oil on the cylinder wall.

Most modern 4-stroke engines are usually fitted with three piston rings per cylinder. The first ring holds back the combustion gases. The second ring helps to hold back combustion gases and also scrapes the oil downward. The third ring holds the oil where it needs to be.

Older engines and industrial engines often have more than three rings (some as many as six per cylinder) where their functions are shared out more.



CUSTOMIZED

In the case of very specific applications, the necessary piston rings may not be in stock. We also offer options for specially produced piston rings in any desired size and design. Delivery times are possible from 24 hours.

SPOTLIGHT ON COMBUSTION

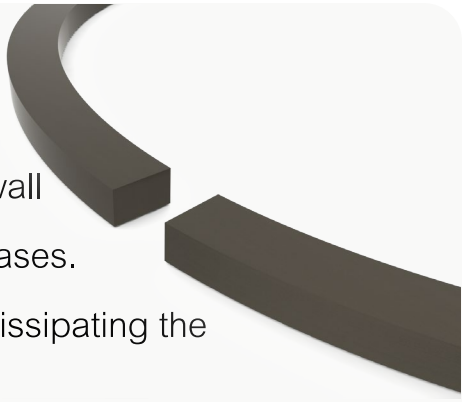
Because a piston ring is elastic, its own elastic force is always pressing it against the cylinder wall. However, this elastic force is only 10% of the total force with which the compression ring is pressed against the cylinder wall, because no less than 90% of the force comes from the actual combustion pressure.

As a result, the compression ring is pressed down into the piston groove by the combustion pressure. As a consequence, the combustion gas can flow through the axial groove clearance to the inside of the piston. From there, the gas pressure provides the extra sealing force for the piston ring.

When the engine is idling, more oil escapes toward the combustion chamber and the exhaust manifold. This is due to the less efficient filling of the combustion chamber, as a result of which the gas pressure has less sealing force.

Function of piston rings

COMPRESSION RING



The top ring seals tight against the cylinder wall and so holds back most of the combustion gases. The top ring also plays an important part in dissipating the heat from the piston to the cylinder wall.

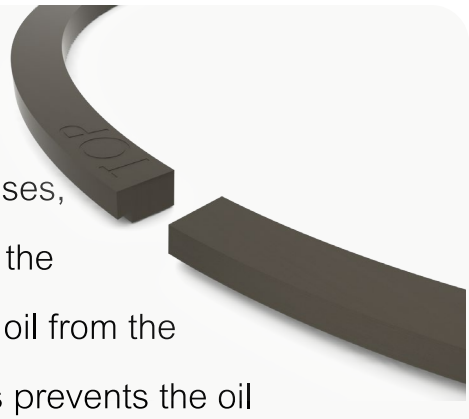
MATERIALS

- Cast iron
- Nodular cast iron
- Steel
- Stainless steel

COATINGS

- Chrome
- Plasma Molybdenum (moly)
- Nitride
- Phosphate

SCRAPER RING



The scraper ring seals off the combustion gases, helps to dissipate the heat from the piston to the cylinder wall and lubricates and scrapes the oil from the cylinder wall towards the oil control ring. This prevents the oil from entering the combustion chamber.

MATERIALS

- Cast iron
- Nodular cast iron
- Steel

COATINGS

- Phosphate

OIL CONTROL RING

The oil control ring disperses and regulates the oil on the cylinder wall and scrapes the oil back down to the crankcase. This is necessary to ensure that the cylinder wall always has a thin, cooler film of oil from the crankcase. This guarantees that the friction between the piston and the cylinder is reduced to regulate the generation of heat.

MATERIALS

- Cast iron
- Nodular cast iron
- Steel

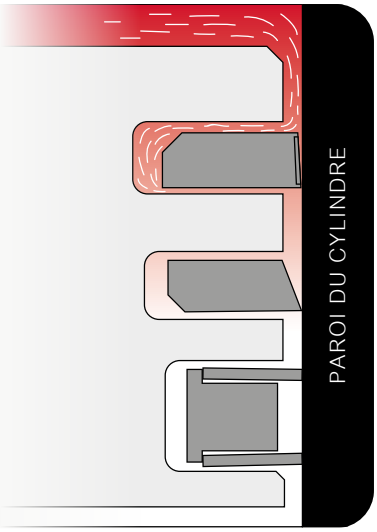
COATINGS

- Chrome
- Phosphate
- Nitride

Function of piston rings

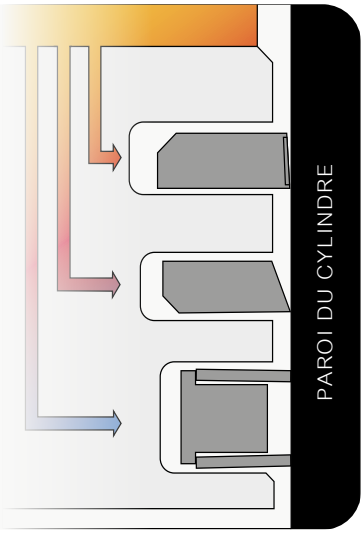
GAS-TIGHT SEAL

10% of the gas-tight seal is due to the piston ring's own elastic force and 90% to the actual combustion pressure.



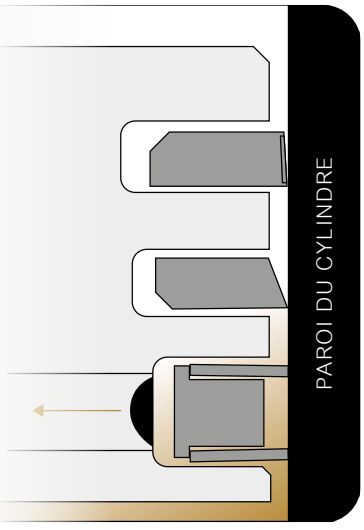
HEAT DISSIPATION

The top piston ring, the compression ring, makes sure that most of the heat is dissipated.



OIL DISPERSAL

The bottom piston ring, the oil scraper ring, provides a nice thin layer of oil on the cylinder wall.



Sealing

HYDRAULIC

Piston rings are also frequently used in hydraulic applications. They are found in control cylinders in particular. In these applications, the piston rings are regularly used in conjunction with non-metallic seals.

This combination gives the metallic piston ring great strength and makes for a virtual hermetic soft seal.

PNEUMATIC

Piston rings are also extensively used in pneumatic applications, with reciprocating compressors being probably the most familiar.

Here the piston rings have a function equivalent to that in an internal combustion engine. The piston rings seal off the compression chamber, ensure that heat is transferred, regulate the oil film on the cylinder wall and scrape the surplus oil back into the crankcase.

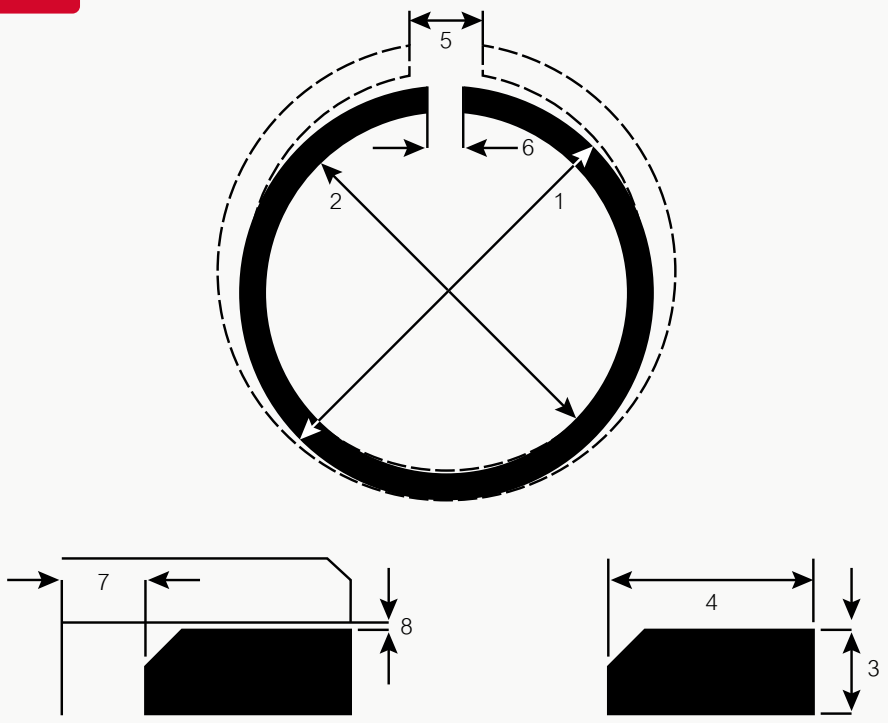
Sealing

ROTARY

Rotary seals with their (greater) pressures, high temperatures or aggressive media are often troublesome, and it is in such situations that piston rings can offer a widely used solution.

As piston rings are metallic, they are very hard, strong and are temperature-resistant. Once the system is running, and given the correct lubrication, the piston rings generate almost no resistance and so make the system highly efficient.

SECTION



Dimensions and options

DIMENSIONS AND OPTIONS

Outside diameter (1):	Outside diameter (OD) of the piston ring when fitted in the cylinder.
Inside diameter (2):	Inside diameter (ID) of the piston ring when fitted in the cylinder.
Axial height (3):	The height of the ring in the axial (vertical) direction, from the top to the bottom of the ring.
Radial wall thickness (4):	The ring's width in the radial (horizontal) direction, from the top to the bottom of the ring.
Free joint gap (5):	The opening of the piston ring in the free (non-fitted) condition.
Joint gap (6):	The joint gap of the piston ring when fitted in the cylinder.
Rear gap (7):	When fitted, the distance between the bottom of the piston groove and the inside diameter of the piston ring (horizontal measurement).
Groove gap (8):	When fitted, the distance between the axial height of the piston ring and the piston groove (vertical measurement).

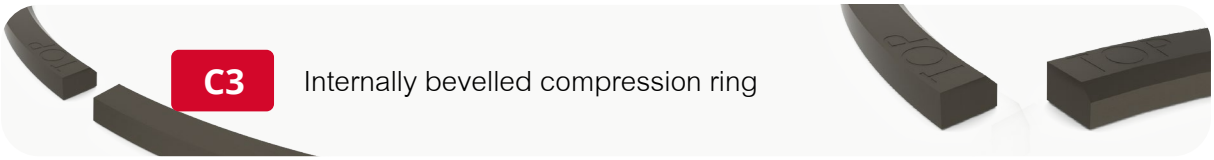
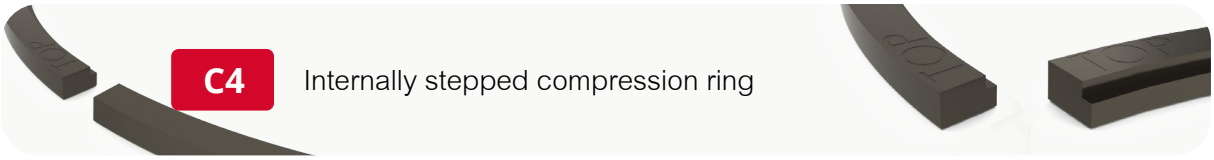
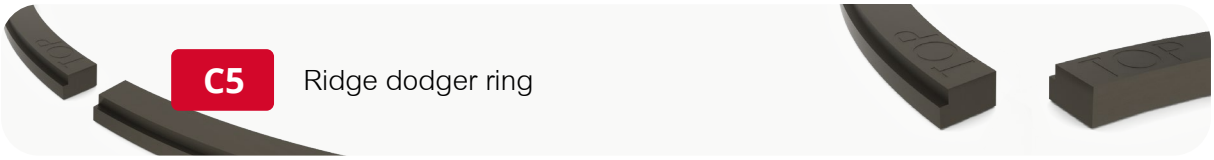
CODING STRUCTURE

The coding structure for the type, version and size is as follows:

[cylinder diameter] x [axial height] x [radial width] [type] [coating] [joint type] [extra]

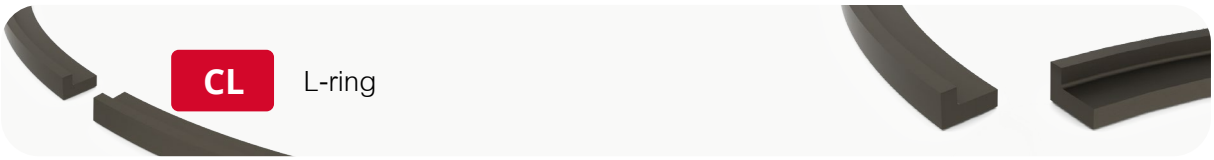
Piston ring types

COMPRESSION RINGS

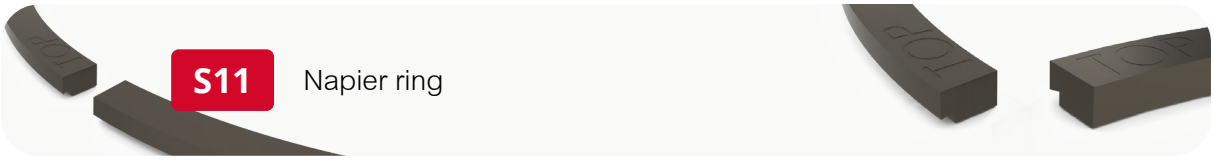
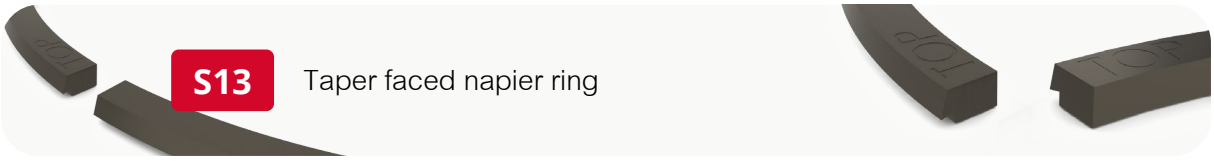
Type	Description	Outside	Inside
C1	Rectangular compression ring		
C2	Taper faced compression ring		
C3	Internally bevelled compression ring		
C4	Internally stepped compression ring		
C5	Ridge dodger ring		
C6	Keystone compression ring		
C7	Half-keystone compression ring		

Piston ring types

COMPRESSION RINGS

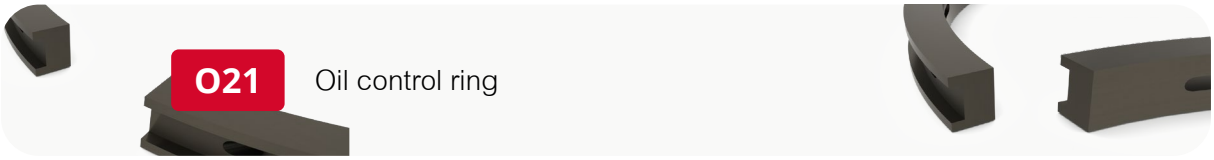
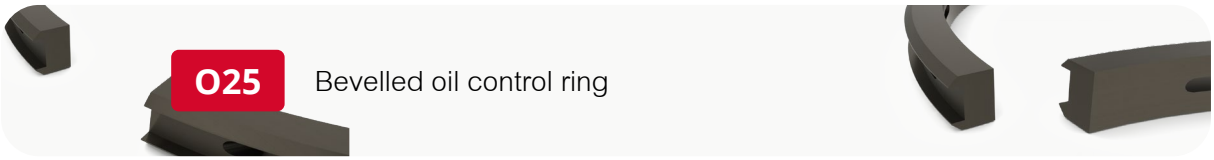
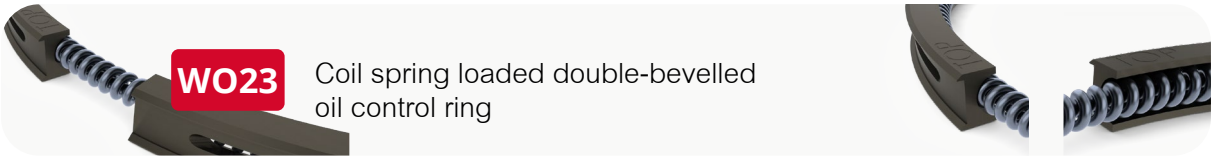
Type	Description	Outside	Inside
C8	Taper faced scraper ring		
C9	Barrel faced compression ring		
CL	L-ring		

SCRAPER RINGS

Type	Description	Outside	Inside
S11	Napier ring		
S13	Taper faced napier ring		

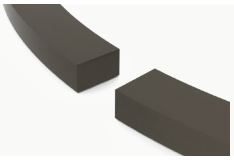
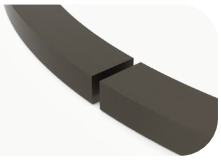
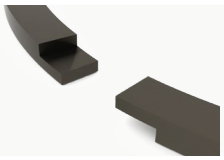
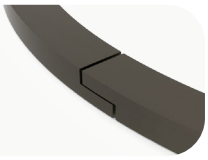
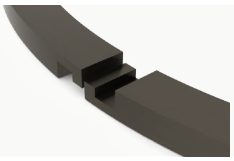
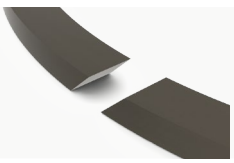
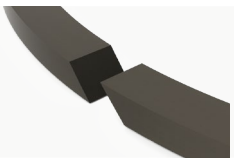
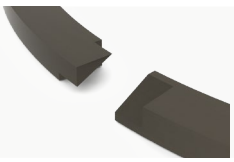
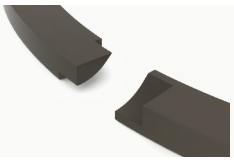
Piston ring types

OIL CONTROL RINGS

Type	Description	Outside	Inside
O21	Oil control ring		
O23	Double-bevelled oil control ring		
O25	Bevelled oil control ring		
WO21	Coil spring loaded slotted oil control ring		
WO23	Coil spring loaded double-bevelled oil control ring		
WO25	Coil spring loaded bevelled-edge oil control ring		
3XO	3-piece steel oil control ring		

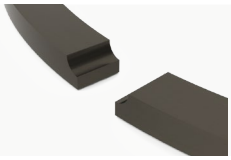
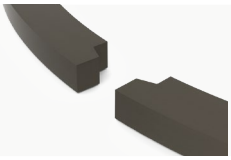
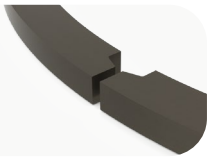
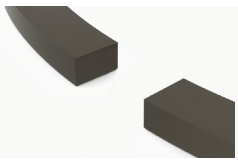
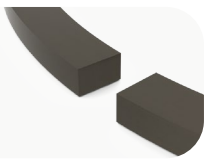
Piston ring joints

JOINT TYPES

Type	Description	Open	Closed
-	Standard joint		
BS	Lap joint		
HS	Hook lap joint		
SSR	Bevel joint right		
SSL	Bevel joint left		
GS	Gas-tight joint		
GSW	Gas-tight joint		

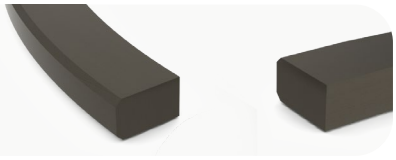
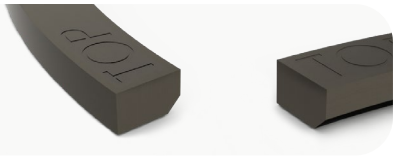
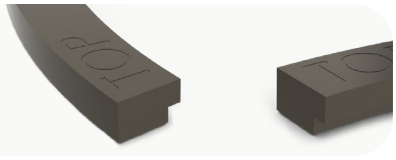
Piston ring joints

JOINT TYPES

Type	Description	Open	Closed
E	Side joint		
Z	Inner joint		
K	Enlarged joint		

Piston ring options

OPTIONS

Type	Description	Outside	Inside
KA	Outside edges broken		
KI	Inside edges broken		
IF	Internally bevelled		
IFU	Internally bevelled bottom		
IW	Internally stepped		
IWU	Internally stepped bottom		

Coatings and joint gap

COATINGS

Type	Description
D	Chrome-plated
T	Tinned
P	Black Phosphated

Type	Description
M	Molybdenum filled
N	Nitrided
F	Ferrox-filled

STANDARD JOINT GAP

Diameter (mm)	Compression ring (mm)	Oil control ring (mm)
45 to 60 mm	0,20 - 0,35	0,15 - 0,30
60 to 75 mm	0,25 - 0,40	0,20 - 0,35
75 to 90 mm	0,30 - 0,45	0,25 - 0,45
90 to 105 mm	0,35 - 0,55	0,25 - 0,45
105 to 120 mm	0,40 - 0,60	0,30 - 0,50
120 to 135 mm	0,45 - 0,65	0,35 - 0,55
135 to 150 mm	0,50 - 0,70	0,40 - 0,60

The above overview gives the standard recommended values for piston rings in the assembled condition. It is always advisable to carry out another check in the cylinder when the rings have been fitted.

NEED TECHNICAL ADVICE?

We are at your service

Are you looking for piston rings and would like to contact one of our specialist directly? Call us on +31 (0)53 - 432 34 46 or send an e-mail to info@thn.nl. We'll be happy to help.

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