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THN has compiled this brochure with great care. At the time of going to press, all data included in this brochure is up to date for the latest range of products. All information and all technical specifications have also been checked carefully. However, in the event of any advertent errors or omissions with regard to qualities, capacities, types or otherwise, THN cannot be held liable in any way.

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THN specializes in technical products which we can deliver rapidly with smart stocks and efficient logistics. Our aim is to score 100% customer satisfaction at all times, and we’re improving all the time as we work hard day after day. We can also build on the more than 75 years of experience which THN has accumulated, and on our three pillars: commitment, innovation and delivery.

For THN it’s all about the customer. That is because we get involved, helping each other as colleagues and as a team for our customers. For when developments need change, we will innovate. To serve you - the customer - even better. And so we can deliver what you need.

You will find everything about our range of piston rings in this brochure. THN has over 4 million piston rings in stock in 20,000 different sizes and types. A major portion of this stock comprises piston rings between 30 mm and 150 mm in diameter.

As well as its standard components, THN can produce custom piston rings that meet the client’s exact specification. For these rings, there is a minimum lead time of 24 hours.

As you can see. At THN, you’ve come to the right place for piston rings. You can be assured of sourcing the very best piston rings on the market and of super-fast delivery too.
THN ensures its product offering is always up-to-date by training a keen eye on the market. For as well as piston rings, THN also has a wide range of plain bearings, Fey laminar rings, sintered filters and linear components.

How can we assist you with our other products?

### Plain Bearings
- 1 million plain bearings in stock
- over 6,500 sizes and models
- custom plain bearings also available

### Fey Laminar Rings
- high-quality steel seals
- internal/external clamping or combined
- types available up to +700 °C

### Sintered Filters
- sintered silencers
- a wide range of products in stainless steel and bronze
- custom design sintered filters

### Linear Components
- hardened ground shafts
- shaft support rails
- linear ball bearings and bearing housings
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 well 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 (incl. CuSn7 and CuSn10)
- (Stainless) steel (incl. X90CrMoV18 and 54SiCr6)

**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
**Design**

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.

**Test**

Testing is an essential part of any design. These days a lot of things can be calculated, but with a new design, a running and assembly test under actual operating conditions must always be carried out in order to verify the design.

**Custom Made**

If the required rings are not in stock, they can be specially produced to order in any desired size and type. These custom orders have a minimum lead time of 24 hours.
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.

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 dispenses 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 so as to regulate the generation of heat.

MATERIALS
- Cast iron
- Nodular cast iron
- Steel

COATINGS
- Chrome
- Phosphate
- Nitride
**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.
SEALING

HYDRAULIC

Piston rings are also frequently used in hydraulic applications. They are found in control valves, pumps and 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 virtually 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.

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.
**Sizes**

**Dimensions and Options**

- **Outside diameter (1):** The outside diameter (OD) of the piston ring when fitted in the cylinder
- **Inside diameter (2):** The 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, ID to OD dimension
- **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

<table>
<thead>
<tr>
<th>Type</th>
<th>Section</th>
<th>Description</th>
<th>Outside</th>
<th>Inside</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td></td>
<td>Rectangular Compression Ring</td>
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<tr>
<td>C2</td>
<td></td>
<td>Taper Faced Compression Ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td></td>
<td>Internally Beveled Compression Ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td></td>
<td>Internally Stepped Compression Ring</td>
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<td>C5</td>
<td></td>
<td>Ridge Dodger Ring</td>
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<td>C6</td>
<td></td>
<td>Keystone Compression Ring</td>
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<td>C7</td>
<td></td>
<td>Half-Keystone Compression Ring</td>
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</tr>
<tr>
<td>C8</td>
<td></td>
<td>Taper Faced Scraper Ring</td>
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</table>
## Compression Rings

<table>
<thead>
<tr>
<th>Type</th>
<th>Section</th>
<th>Description</th>
<th>Outside</th>
<th>Inside</th>
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<tbody>
<tr>
<td>C9</td>
<td></td>
<td>Barrel Faced Compression Ring</td>
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<tr>
<td>CL</td>
<td></td>
<td>L-Ring</td>
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## Scraper Rings

<table>
<thead>
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<tr>
<td>S11</td>
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<td>Napier Ring</td>
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<tr>
<td>S13</td>
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<td>Taper Faced Napier Ring</td>
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# Piston Ring Types

## Oil Control Rings

<table>
<thead>
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<th>Outside</th>
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<tbody>
<tr>
<td>O21</td>
<td></td>
<td>Oil Control Ring</td>
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<tr>
<td>O23</td>
<td></td>
<td>Double-Beveled Oil Control Ring</td>
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</tr>
<tr>
<td>O25</td>
<td></td>
<td>Beveled Oil Control Ring</td>
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<td></td>
</tr>
<tr>
<td>WO21</td>
<td></td>
<td>Coil Spring Loaded Slotted Oil Control Ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WO23</td>
<td></td>
<td>Coil Spring Loaded Double-Beveled Oil Control Ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WO25</td>
<td></td>
<td>Coil Spring Loaded Beveled-Edge Oil Control Ring</td>
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<td></td>
</tr>
<tr>
<td>3XO</td>
<td></td>
<td>3-Piece Steel Oil Control Ring</td>
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### Joint Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Section</th>
<th>Description</th>
<th>Open</th>
<th>Closed</th>
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<tr>
<td>-</td>
<td></td>
<td><strong>Standard Joint</strong></td>
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<tr>
<td>BS</td>
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<td><strong>Lap Joint</strong></td>
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<td>HS</td>
<td></td>
<td><strong>Hook Lap Joint</strong></td>
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<tr>
<td>SSR</td>
<td></td>
<td><strong>Bevel Joint Right</strong></td>
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<tr>
<td>SSL</td>
<td></td>
<td><strong>Bevel Joint Left</strong></td>
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<tr>
<td>GS</td>
<td></td>
<td><strong>Gas-Tight Joint</strong></td>
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<tr>
<td>GSW</td>
<td></td>
<td><strong>Gas-Tight Joint</strong></td>
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</table>
## Joint Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Section</th>
<th>Description</th>
<th>Open</th>
<th>Closed</th>
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</thead>
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<tr>
<td>E</td>
<td></td>
<td>Side Joint</td>
<td></td>
<td></td>
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<tr>
<td>Z</td>
<td></td>
<td>Inner Joint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>Enlarged Joint</td>
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# Options

<table>
<thead>
<tr>
<th>Type</th>
<th>Section</th>
<th>Description</th>
<th>Outside</th>
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</thead>
<tbody>
<tr>
<td>KA</td>
<td></td>
<td>Outside edges broken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KI</td>
<td></td>
<td>Inside edges broken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF</td>
<td></td>
<td>Internally beveled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IFU</td>
<td></td>
<td>Internally beveled bottom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IW</td>
<td></td>
<td>Internally stepped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IWU</td>
<td></td>
<td>Internally stepped bottom</td>
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<td></td>
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</table>
## Coatings

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>D</td>
<td>Chrome-plated</td>
</tr>
<tr>
<td>M</td>
<td>Molybdenum filled</td>
</tr>
<tr>
<td>T</td>
<td>Tinned</td>
</tr>
<tr>
<td>N</td>
<td>Nitrided</td>
</tr>
<tr>
<td>P</td>
<td>Black phosphated</td>
</tr>
<tr>
<td>F</td>
<td>Ferrox-filled</td>
</tr>
</tbody>
</table>
## Joint Gap

### Standard Joint Gap

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Compression ring (mm)</th>
<th>Oil control ring (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 to 60 mm</td>
<td>0.20 - 0.35</td>
<td>0.15 - 0.30</td>
</tr>
<tr>
<td>60 to 75 mm</td>
<td>0.25 - 0.40</td>
<td>0.20 - 0.35</td>
</tr>
<tr>
<td>75 to 90 mm</td>
<td>0.30 - 0.45</td>
<td>0.25 - 0.45</td>
</tr>
<tr>
<td>90 to 105 mm</td>
<td>0.35 - 0.55</td>
<td>0.25 - 0.45</td>
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<tr>
<td>105 to 120 mm</td>
<td>0.40 - 0.60</td>
<td>0.30 - 0.50</td>
</tr>
<tr>
<td>120 to 135 mm</td>
<td>0.45 - 0.65</td>
<td>0.35 - 0.55</td>
</tr>
<tr>
<td>135 to 150 mm</td>
<td>0.50 - 0.70</td>
<td>0.40 - 0.60</td>
</tr>
</tbody>
</table>

### Standard Recommended Values

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.
Article 1 Definitions

In these terms and conditions, the terms below have the following meanings, unless specifically stated otherwise:

THN : Technische Handelsonderneming Nederland B.V.; Buyer : the other party; Agreement : the agreement between THN and the Buyer;

Article 2 General

2.1 The provisions of these terms and conditions apply to all offers, quotations, agreements and legal relations between THN and the Buyer, irrespective of whether the parties have agreed to these general terms and conditions or not.
2.2 These terms and conditions also apply to all agreements between THN and the Buyer for the execution of which the services of the Buyer are required.
2.3 These terms and conditions shall always replace those of the Buyer, unless the parties have agreed otherwise.
2.4 If THN and the Buyer enter into more than one agreement, these terms and conditions apply to all subsequent agreements, regardless of whether these have been explicitly

Article 3 Offers, quotations and agreements

3.1 All offers made by THN in any form are without obligation, unless the offer specifies a time scale for acceptance.
3.2 A quotation or offer of which THN is party will only become enforceable:
   a) after an agreement has been drawn up for that purpose by both parties, or
   b) after acceptance of the Buyer of the written acceptance of an offer made by THN.
3.3 In cases of verbal agreement, the invoice will be deemed to correctly and fully represent the Agreement, unless it is disputed within 14 days of the date of the invoice.
3.4 If a natural person enters into an Agreement on behalf of or on account of another natural person or legal entity, that natural person or legal entity shall be held to be binding in accordance with the above,

Article 4 Execution of the Agreement

4.1 THN cannot be held liable for damage of any kind caused by incorrect or incomplete information provided by the Buyer, unless the error or omission should have been recognised by THN.
4.2 THN has the right to deliver quantities that deviate within a margin of 5% either way from the quantities agreed between THN and the Buyer.

Article 5 Supply and completion

5.1 The Buyer is obliged to accept goods and services produced under the Agreement at the moment these are supplied or completed by THN, unless the Buyer has deliberately refused to accept the goods or services.
5.2 If the Buyer does not accept goods or services in accordance with the terms of delivery, THN has the right to invoice the delivery part or part of the delivery.

Article 6 Inspection and defects

6.1 The Buyer must inspect the supplied goods or services at the moment of supply or completion. In doing so, the Buyer should verify whether the goods supplied or completed correspond with the agreed specifications.
6.2 THN must be notified of any visible defects within 8 days of supply or completion. Invisible defects should be reported in writing within 8 days of discovery but no later than 3 months after supply or completion.
6.3 THN must be notified of any natural defects after the goods have been delivered.
6.4 If timely notice of defects is given and the defects have been verified by THN, THN has the right to make the goods or services supplied or completed, or the payment of the invoice.
6.5 THN has the right to supply or complete work partially, unless the Agreement states otherwise. If the Buyer accepts the goods or services or completes the work as supplied or completed, THN has the right to invoice the delivery part or part of the delivery.

Article 7 Compensation, price and costs

7.1 The Buyer has the right to demand a deposit amount of 10 to 50% of the agreed price before work is commenced.
7.2 THN has agreed a fixed price with the Buyer, THN reserves the right to increase that price if the costs stated below.
7.3 THN has the right to pass on to the Buyer changes in costs relating to social contributions, exchange rates, wages, materials, semi-products, packaging materials or other costs occurring after the Agreement was made.

Article 8 Changes to the Agreement

8.1 The Buyer may ask THN to make changes to the Agreement. The payment of the cost of this as soon as possible.
8.2 If the changes and/or supplements to the Agreement to affect the time and mutually agreed upon.
8.3 If changes and/or additions to the Agreement have financial and/or qualitative consequences, THN will notify the Buyer of this in advance;
THN

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