HTMS
High Tech Metal Seals

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www.htms.be

EURO-QUALITY SYSTEM
EN 9100

CBBCC
CERTIFIED
ISO 9001

Presentation Overview

Company Information

Capabilities

References & Markets

Product Line Overview

Sealing Principle

About cryogenic sealing

History

HTMS is a private owned limited company founded in 1999 by a group of sealing specialists with a life long sealing experience. The plant is located in Mechelen, Belgium.

High Tech Metal Seals, short HTMS, designs and manufactures elastic or resilient metal seals.

HTMS' Resilient Metal Seals are used in a wide variety of applications where normal seals cannot handle extremes of temperature, pressure, medium or combinations thereof.

Vision / Mission

Understand and **fulfill the customers' needs** through strategic investments in **market knowledge**, leading metal seal technologies, **operational excellence**, and **superior service** to assure sustainable growth.

Capabilities

Quality

- Quality according to EN9100;
- Controlled and registered production proces through all individual phases;
- Inspection following HTMS internal procedures or detailed specifications from the customer;
- Onsite auditing by individual customers.

Qualifications

EURO-QUALITY SYSTEM

EN 9100

LLOYD'S REGISTER QUALITY ASSURANCE · ISO 14001

UKAS
ENVIRONMENTAL
MANAGEMENT
001

EURO-QUALITY SYSTEM France
5 Avenue Joseph Paxton
77164 FERRIERES EN BRIE

ORGANISME DE CERTIFICATION DES SYSTEMES DE QUALITE — CERTIFICATION SOCIETY FOR QUALITY SYSTEMS

CERTIFICAT — **CERTIFICATE**

AS 9100 Révision B : 2004 / JIS Q 9100 : 2004 / EN 9100 : 2003

N° Certificat - Certificate : 090416/987B

Nous déclarons par la présente que, sur base du dossier de certification, et suite à l'audit subi avec succès, le fournisseur :

We, hereby, declare that, on the grounds of the certification record And after passing an audit, the supplier :

HTMS
Blarenberglaan 5
B-2800 MECHELEN

a été évalué conformément aux exigences de la norme EN 9104 et jugé conforme aux exigences des référentiels EN9100 V 2003

has been assessed in accordance with the requirements of EN 9104 standards and found to conform to the requirements of the standards EN 9100 V 2003

Date de Certification : 16 Avril 2009

Certification date : April 16th, 2009

pour une durée de 3 ans dans les domaines suivants

for a 3-year-long period of time in the following fields :

Conception, développement et fabrication de joints métalliques en alliage de haute performance pour des conditions d'utilisation extrêmes en aérospatial et aéronautique, off-shore, nucléaire et pétrochimie. Conseil technique en technologie d'étanchéité. Traitement de surface des produits métalliques.

Design, development and manufacturing of metal seals in alloys of high performance for extreme conditions used in aerospace, aeronautics and offshore, nuclear technology and petrochemical industry. Technical advice in sealing technology. Surface treatment of metal products

et a le droit d'utiliser ce certificat dans les domaines décrits ci-avant.

And has the right to use this certificate in the field here to mentioned.

Le Comité de Direction
Henri CHARLIER

General Management
Christian STEVENART

Portée disponible sur www.cofrac.fr

Paris, le 30 Avril 2009

Capabilities

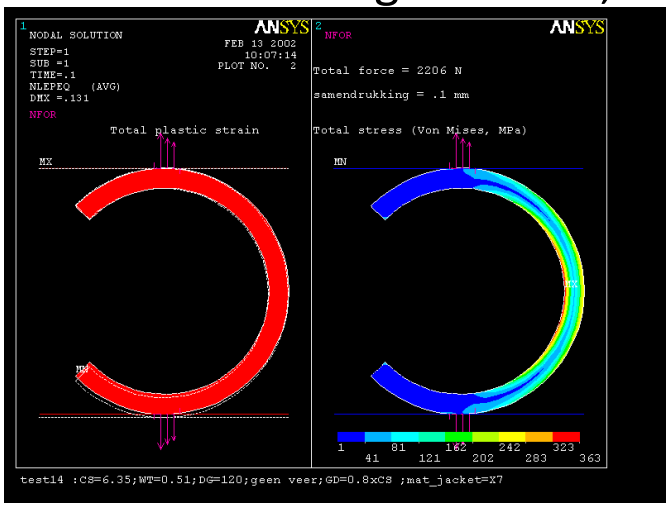
Expertise

Know-how: HTMS specialists with more than 25 years of experience;

In-house testing: mechanical properties, new materials and production methods;

Customer support: thinking together with the customer;

R&D: custom designed seals, coöperation with University



Capabilities

Flexibility

Short delivery terms: within days in case of emergency (e.g. plant breakdown)

Seals in any size (starting from 5mm) from one piece;

Products according to the customers' requirements.

Capabilities

Manufacturing Equipment

Forming and welding, TIG - Laser

Presses up to 40 ton

He- lecktest equipment, He Mass spectrometer

Compression/Load measurement equipment

CNC optical measurement equipment

XRF thickness measurement equipment(X-Ray Fluorescense)

Machine shop, CNC lathes, milling and grinding equipment

Hardness measurement equipment

Capabilities

HTMS has its own in-house technical plating. For extreme low leakage, metal seals are plated or coated with a soft ductile material. Depending on the application parameters HTMS can select from the following materials:

- Nickel
- Copper
- Lead
- Indium
- Gold
- Silver
- Tin

- PTFE
- Peek

Modern processing facilities guarantee clean waste water and the economical use of natural resources.

Capabilities

CNC Optical Measurement

Load/Compression

Laser welding equipment

References

Oil and Gas

- Seals for Valves, compressors, turbines
- Other downhole equipment up to 45000 PSI

Power plants

- Cooling systems and steam applications under high pressure and temperature;
- Standard metal seals according to the customer's specifications.

References

Aerospace

- Seals for cryogenic rocket engines, -260°C , + 200 bar
- Satellites,

Nuclear Power stations

- Valves -Pumps

Medical nuclear

- Medical research equipment e.g. MRI-scanners, cyclotrons, ‘Proton Therapy’...

Application Fields

Aerospace

Application Fields

Nuclear power plants

Petrochemical

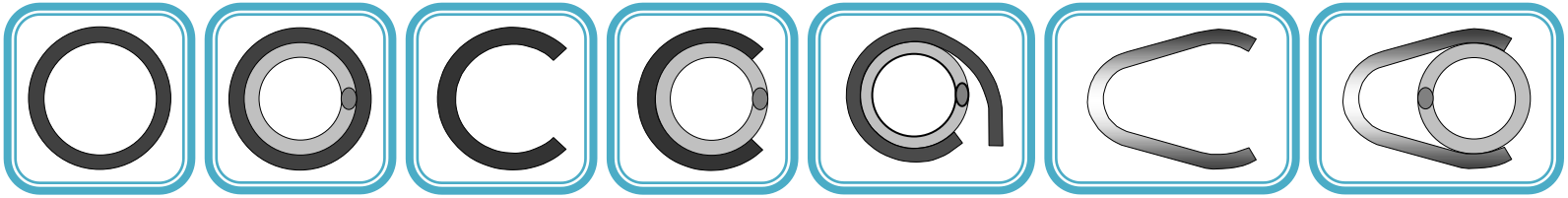
Offshore

Racing

Product line overview

Resilient metal seals

for static and semi-dynamic applications:



Resilient Metal O-Ring

Resilient Metal C-Ring

Resilient Metal Y-Ring

Available materials

Inconel 600-X750-718
Stainless steel 302 – 304
Elgiloy-Nimonic and others

Product line overview

Available in any shape (oval, rectangular...) and any size.

Sizes ranging from 5mm to 3m
(with possibility to expand on demand).

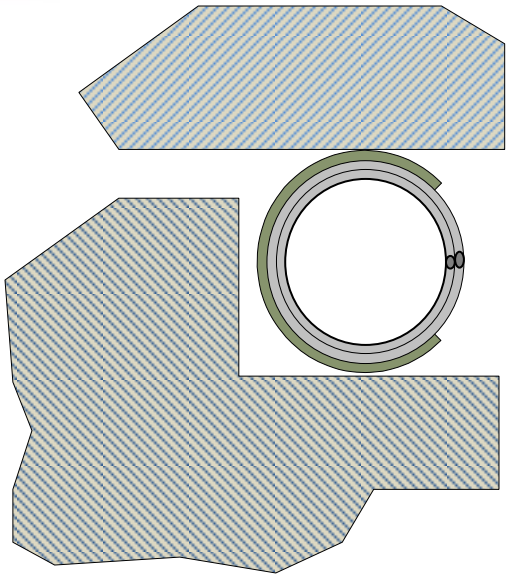
Cross sections from 0.79mm to 12.70mm.

Available with or without spring.

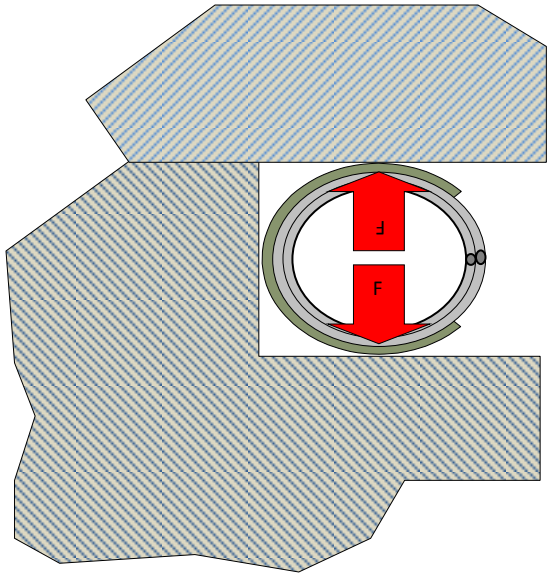
Seating loads from 10N/mm to +500N/mm.

Soft platings enhance sealing performance.

Sealing Principle



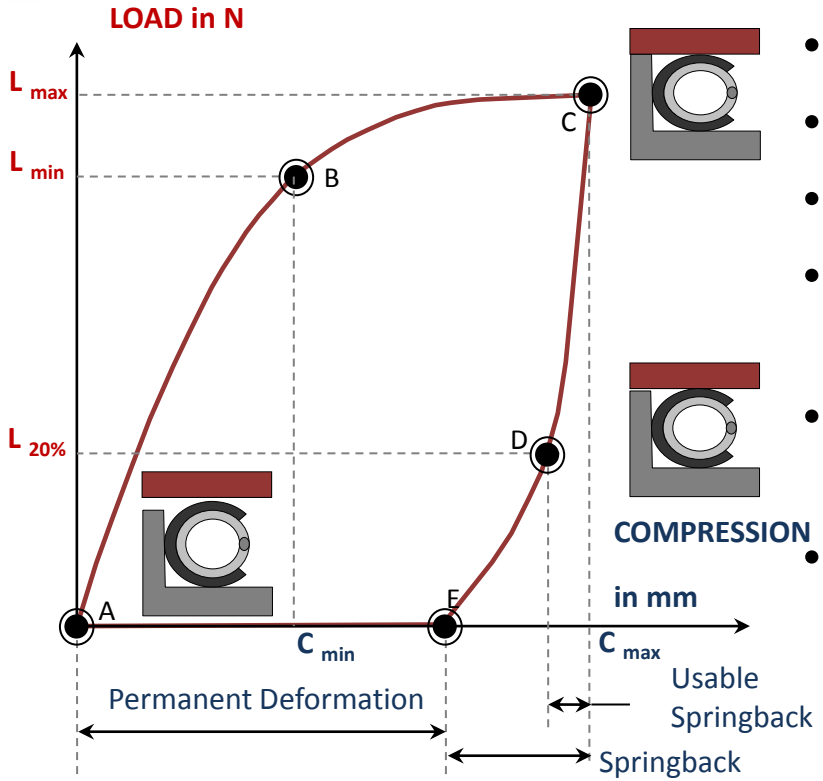
The seals are located in a machined groove.



By compression, a seating load is generated.

Surface irregularities will be filled out, thereby reducing eventual leaks.

Sealing Principle



- Typical compression rate 20% (C_{max}).
- Minimum compression rate is 10%.
- Max. Load is reached in point (C),
- Approximatly 80% of the max load is reached at 10% compression.
- When the flanges rotate, then the seating load will rapidly decrease.
- Point (D) indicates the usable spring back. Not more then 35% of the total springback should be used.

About cryogenic sealing

The ductile layer needs to be pressed into the surface irregularities and even important the load which got the ductile layer to flow needs to be maintained.

General

- Clearance between seal and groove wall should be high enough
- Surface on both mating surface to be 1 to 1,6 Ra
- Flanges should be stiff enough to avoid flange detoriaties or
- Seal elasticity should be high enough to maintain min. required load

About cryogenic sealing

Using harder ductile layers as silver or gold

– Seating load should be well above 250 N/mm, preferably higher

– For a given seal cross section this means relative small elasticty and thus not much margin for flange movements

Using softer ductile layers such as Tin, Lead or Indium, PTFE

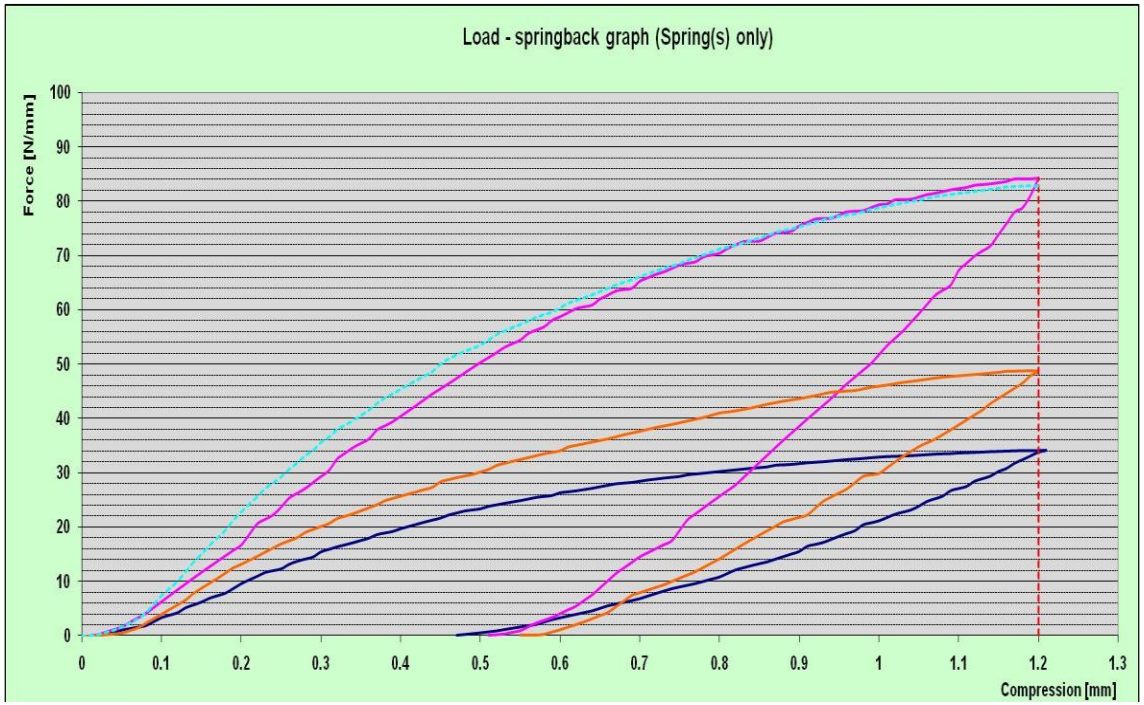
– Seating load should be in the range of 80 to 100 N/mm

– The seal can be designed for max. elasticty

– PTFE coating reduces He tightness to the porosity level for He (10^{-7} mbar.l/sec)

About cryogenic sealing

Example of optimized seal: 5.6 mm cross section-Tin plated



Seating load 80 N/mm

Elasticity 0,6 mm

Tightness 10^{-10} mbar.l/sec
Up to 0,3 mm lift off

Can be reused

Also available in 7,9-11
and 12,7 mm cross section

High Tech Metal Seals

Thank you for your attention

Q & A