

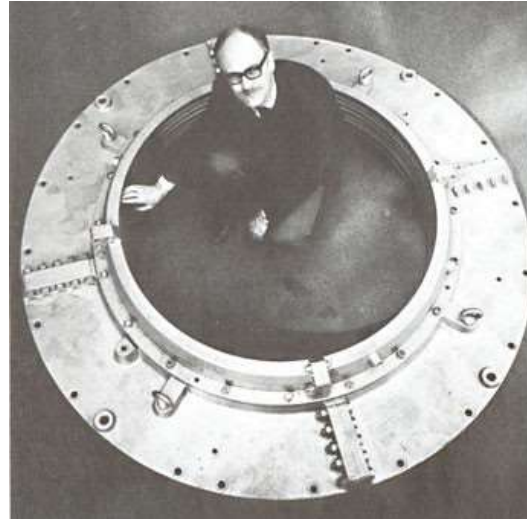
**3-A SSI Presentation 2016
Milwaukee, WI
Terry L Wolfe**

**What's New For
Hygienic Mechanical
Seals**

Table of Contents

- Brief history of Huhnseal AB and myself
- Secondary Seal design for mechanical seals
- Innovations in seal face technology
- EHEDG document 25 mechanical seal guidelines
- Examples of hygienic design cartridge seals

Huhnseal AB - History

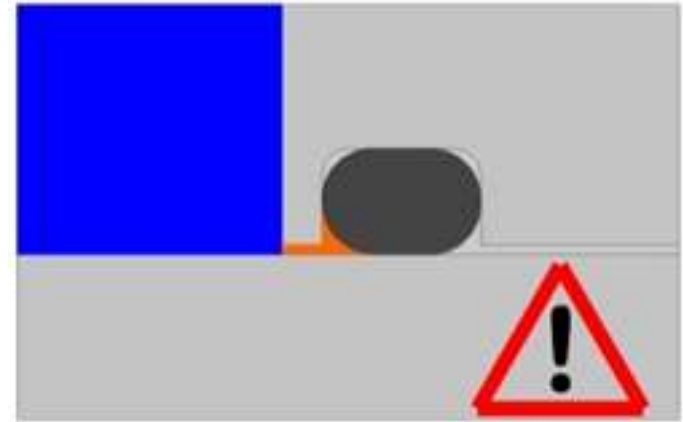


- 1901 Gustav Huhn establishes Gustav Huhn GmbH in Berlin.
- 1940 The son Felix Huhn takes over the business.
- 1946 Huhnseal moves to Sweden and Gustav Huhn AB is established in Stockholm.
- 1969 The grandson Dieter Huhn takes over.
- 1983 Göran Anderberg purchases the rights of Gustav Huhn AB and starts Huhnseal AB.
- 2008 The Italian Group Meccanotecnica Umbra purchases Huhnseal AB.
- 2011 Per Hellman is appointed new CEO after Göran Anderberg.
- 2013 Huhnseal celebrates 30 years.

Example of inadequate hygienic design elastomer secondary seal

Unsuitable design of O-ring groove installed in food and beverage application:

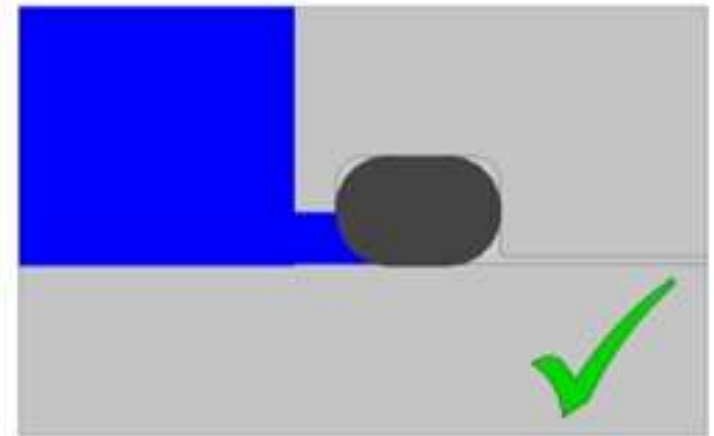
- **Closed spaces without adequate circulation.
CIP fails.**
- **Crevices where product enters but is not allowed to escape. CIP fails.**
- **Standard O-rings used with crevices, CIP fails.**
- **Micro organism is allowed to grow.**



**Standard O-ring in closed groove.
UNACCEPTABLE
Courtesy of EHEDG**

Design features – Half open O-ring groove

An O-ring in a half open groove-wall as shown will enhance the cleaning process and is consequently an acceptable design for hygienic applications.

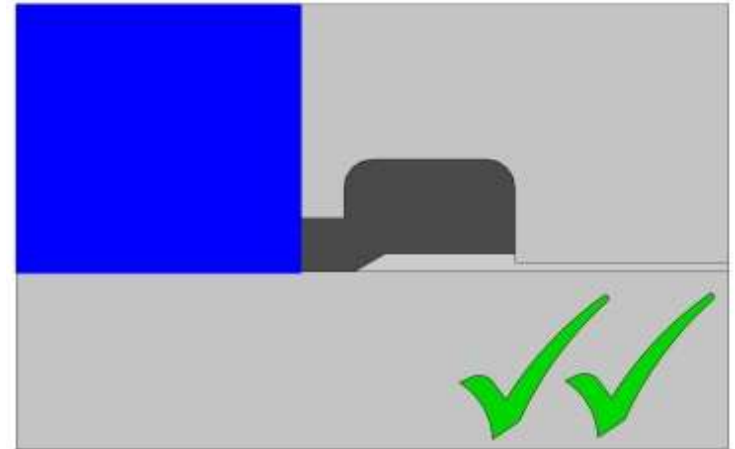


Standard O-ring in half open groove.
ACCEPTABLE! Courtesy of EHEDG

Hygienic design Lip-O-Ring or Form Ring

Suitable design of O-ring groove and O-ring

- O-ring fills out the groove toward product side.
- Crevices are not allowed to build up.
- Easy to CIP.
- Micro organism is not allowed to grow.
- From a hygienic point of view this is the recommended and preferred design



Form ring in half open groove. **ACCEPTABLE!**
Courtesy of EHEDG

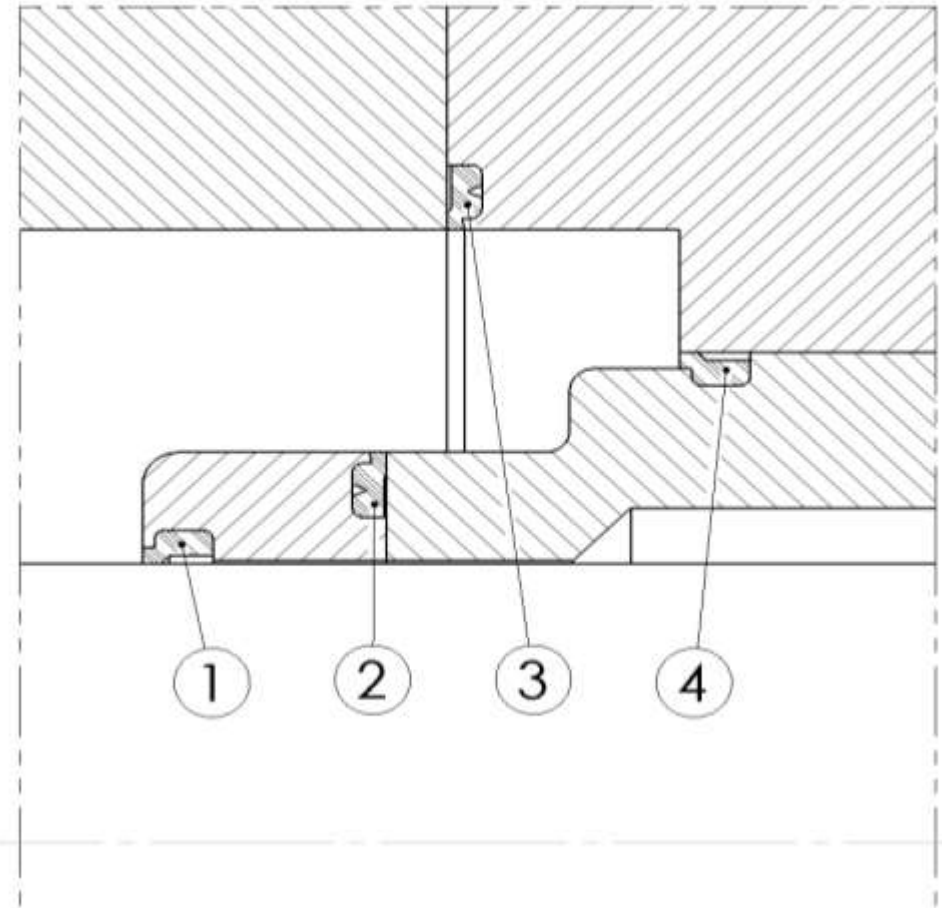
Examples of hygienic design Lip-O-Ring or Form Ring

Type 1 – LIPORING HRI
(Hygienic radial inside)

Type 2 – LIPORING HFO
(Hygienic flange outside)

Type 3 – LIPORING HFI
(Hygienic flange inside)

Type 4 – LIPORING HRO
(Hygienic radial outside)



Innovations in seal face technology

Nanocrystalline diamond

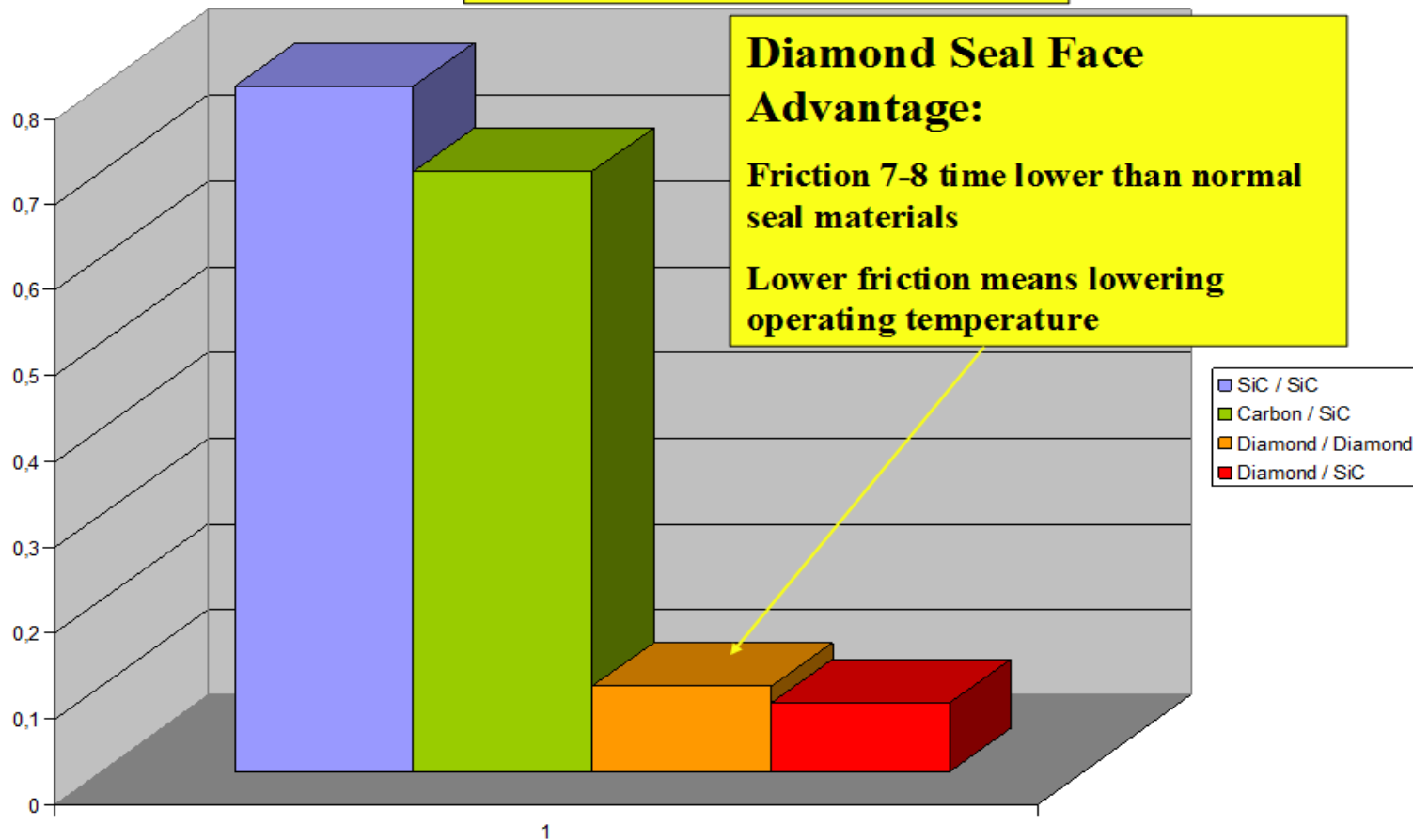
The diamond seal faces are fabricated by growing a polycrystalline diamond film onto the face of a conventional finished SiC ring. The SiC ring is then placed into a chamber where the pressure, gas composition and temperature are accurately controlled. A carbon bearing gas such as methane is introduced into the chamber and, under the right combination of processing conditions, diamond crystals grow on the SiC. The process occurs under vacuum at temperatures around 800-deg C (1,472-deg F). This process is called Chemical Vapor Deposition (CVD).



Innovations in seal face technology

Nanocrystalline diamond

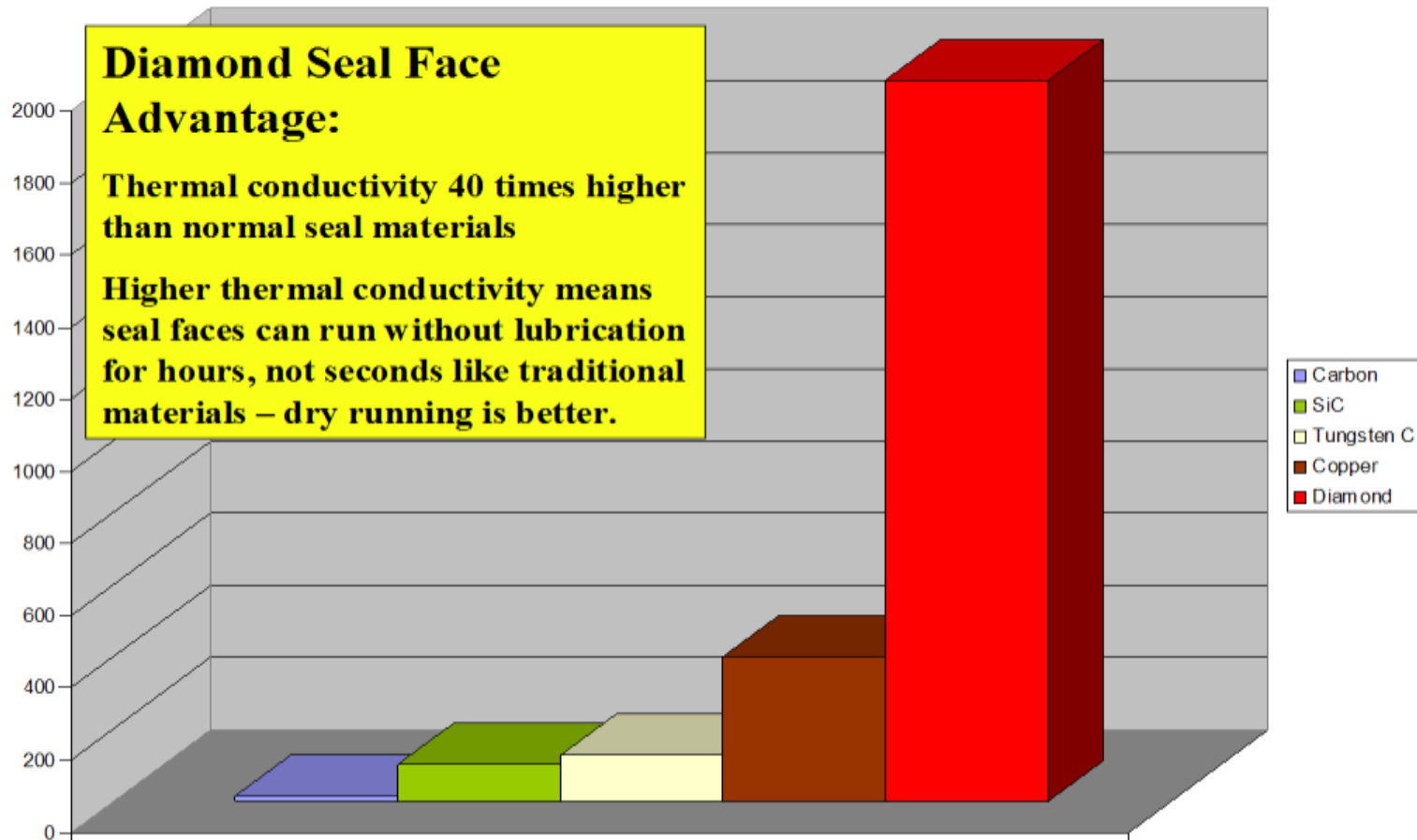
Coefficient of Friction



Innovations in seal face technology

Nanocrystalline diamond

Thermal Conductivity



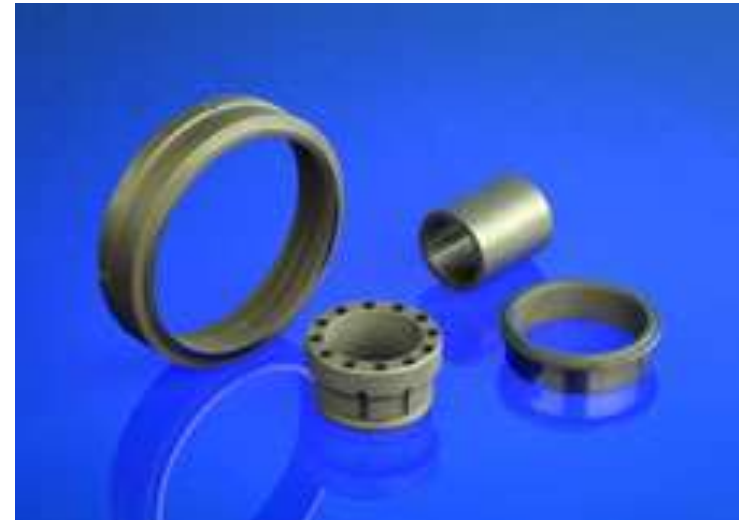
Applications for diamond seal faces

- **Top entry mixers and agitators with an air gap at the top of the tank. Diamond vs Silicon carbide can run dry at normal mixer speeds.**
- **Improved seal face performance in Aseptic applications where there is a chance of the condensate quench flashing to steam.**
- **Boiler feed pumps used in production of plant sterile steam. Increased seal life due to diamond seal face thermal conductivity and lower coefficient of friction.**



Silicon carbide/carbon graphite composite

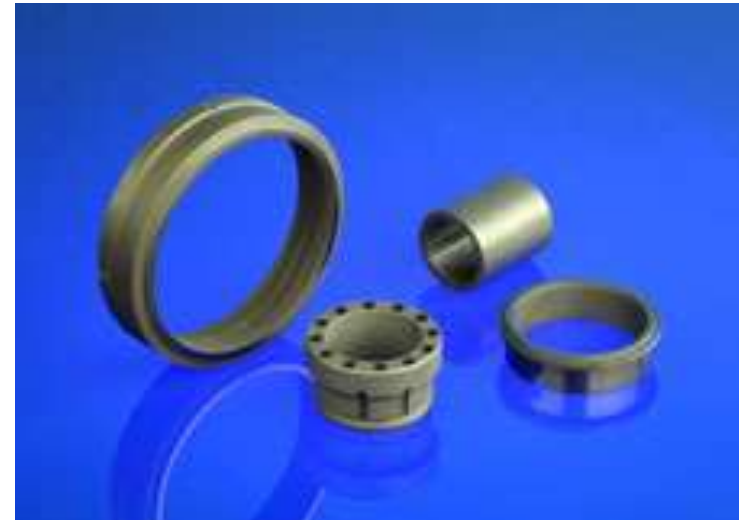
- **Morgan Advanced Materials developed graphite-loaded silicon-carbide material that will reduce seal face wear, increase uptime, and offer twice the service length of competitive components.**
- **The PGS-100 material enhances seal face pressure-velocity characteristics beyond that of monolithic sintered silicon carbide, and the ensuing topography remains for the life of the product.**
- **Thermal shock tolerance is improved as well—it will survive and maintain integrity despite rapid temperature changes of several hundred degrees.**



Morgan PGS-100

Silicon carbide/carbon graphite composite

- **Improved seal face performance in aseptic applications where there is decreased seal face lubrication due to the temperature of the sterile condensate.**



Morgan PGS-100



3-A Sanitary Standards, Inc. 2016 Education Program

Background of EHEDG Doc.25

Late 90's - Starting Point

- Hub Lelieveld. Unilever
- Göran Anderberg, Huhnseal AB

2002 - Release of Doc. 25

2010 - First attempt to update Doc. 25

2011 - WG Meeting in Frankfurt

2012 – Release of new draft, revision 1 to WG

2014 – Draft revision 2 was sent to EHEDG

2015 - Release of draft, revision 3 to WG

2016 – Meeting in Amsterdam

EHEDG Working Group “Mechanical Seals”

WG-Meeting in Amsterdam 3 February 2016

Participants

- Mohamed Andasmas, Cyclam SAS, France
- Susanne Berezin, Huhnseal AB, Sweden
- Zeudy Bianchi, Huhnseal AB, Italy
- Thomas Böhm, Eagle Burgman GmbH, Germany **Co-Chairman**
- Oliver Damm, Weber Maschinenbau GmbH, Germany
- Andreas Eiletz, Eagle Burgmann GmbH, Germany
- Yann Goerger, Cetim, France
- Rico Gonser, Metax, Germany
- Gerard Guret, GIM Conceil, France
- Marco Hanzon, AW Chesterton, USA
- Per Hellman, Huhnseal AB, Sweden **Chairman**
- Frits Hobelman, Hosokawa Micron BV, Netherlands
- Jesper Raabjerg Jensen, Alfa Laval Kolding A/S, Denmark
- Anette Rangmark, Alfa Laval Tumba AB, Sweden
- Ferdinand Schwabe, Hygienic Design Consultant, Germany
- Malin von Knorring, Alfa laval Tumba AB, Sweden
- Karl-Johan Westin, Roplan inc, USA
- Patrick Wouters, Cargill B.V. Netherlands

Excused/Absent

- Maik Bluhm, Freudenberg Sealing
- Steven Bullen, AW Chesterton Company
- Lyle Clem, Electrol Specialties Company
- Roland Cocker, Cocker Consulting
- Robert Elliott, ZM Technologies
- Gerson Henning, Aventics
- Marco Antonio Leon Félix, SOMEICCA
- Andy Timperley, Timperley Consulting

EHEDG Working Group “Mechanical Seals”

Responsibilities of WG members

and lead authorship of guideline chapters

- Lead authorship of **guideline chapter** is with the **Subgroup** and its leader
- Lead authorship of **Doc. 25** is with the **WG** and its Chairman

EHEDG Working Group “Mechanical Seals”

Subgroups

- Each open topic/chapter in Doc. 25 is handled by a Subgroup
- Each Subgroup have a Subgroup leader
- The Subgroup leader is responsible of coordinating meetings and will report to the Chairmen continuously
- The Subgroups will have continues Web-ex meetings
- Each Subgroups will hand in a written proposal of their chapter
- Once the proposal is approved by the WG, Doc. 25 will be updated accordingly

EHEDG Working Group “Mechanical Seals”

Subgroups

- Clarification of EHEDG test and certification requirements
- Delivery tests made at the supplier
- Secondary seal installation
- Further investigations of materials, including legal requirements (EC 1935/2004 etc)
- Definitions- Corresponding to 3A , API682 and other documents
- Further investigation of hygienic classes
- Mechanical seal design, types of mechanical seals
- Installation requirements
- Consideration of seal auxiliary systems for single and dual mechanical seals

EHEDG Working Group “Mechanical Seals”

WG Meeting schedule 2016

- Subgroups will meet every 6-8 weeks
- Work Group will meet every 3 months
- Next WG meeting on May 3, 2016 on WebEx
- The draft from the Work Group should be handed in to EHEDG in December 2016
- Dead line for the release of the new revision is set to March 2017

EHEDG Working Group “Mechanical Seals”

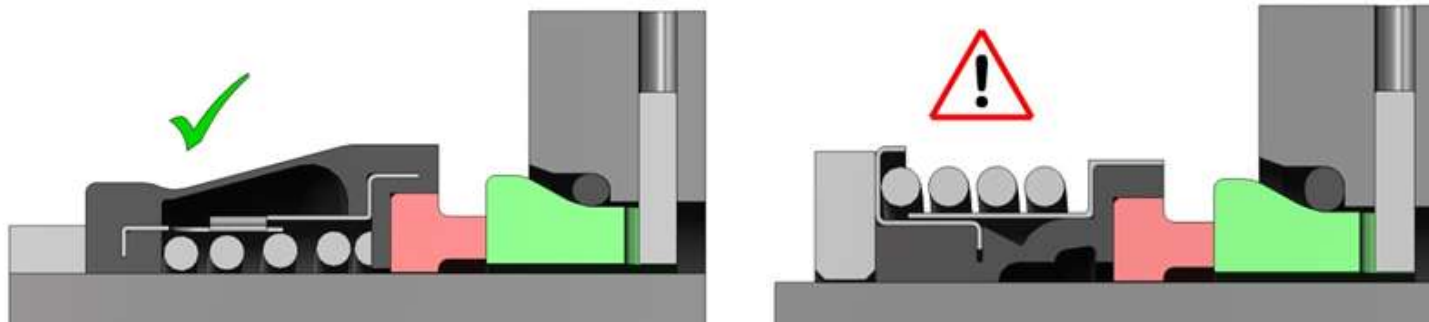


Figure 1 Rubber bellow seal

Left: Spring hidden from the product

Right: Spring exposed to the product

EHEDG Working Group “Mechanical Seals”

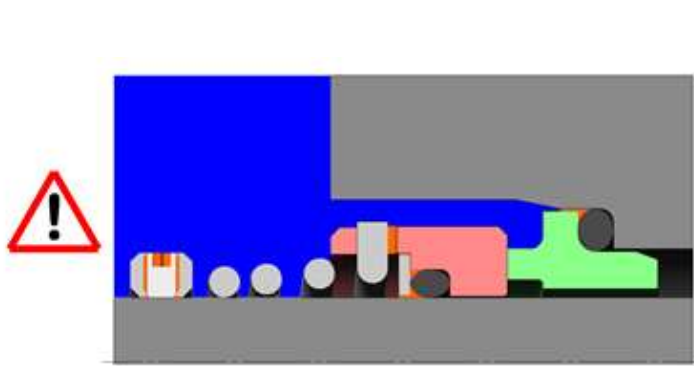


Figure 11 Commonly used seal with springs in the product. **UNACCEPTABLE!**

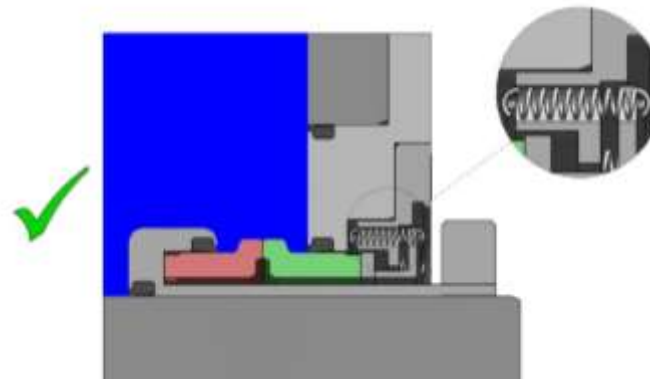


Figure 12 Springs on the non-product side for food applications. **ACCEPTABLE!**

EHEDG Working Group “Mechanical Seals”

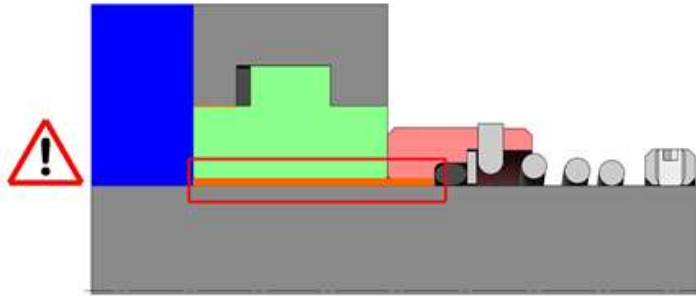


Figure 9 Outboard seal with dead end, not possible to clean.
UNACCEPTABLE!

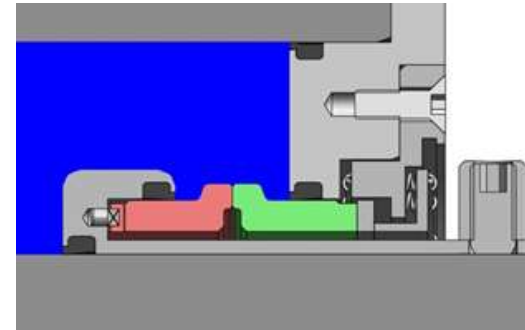
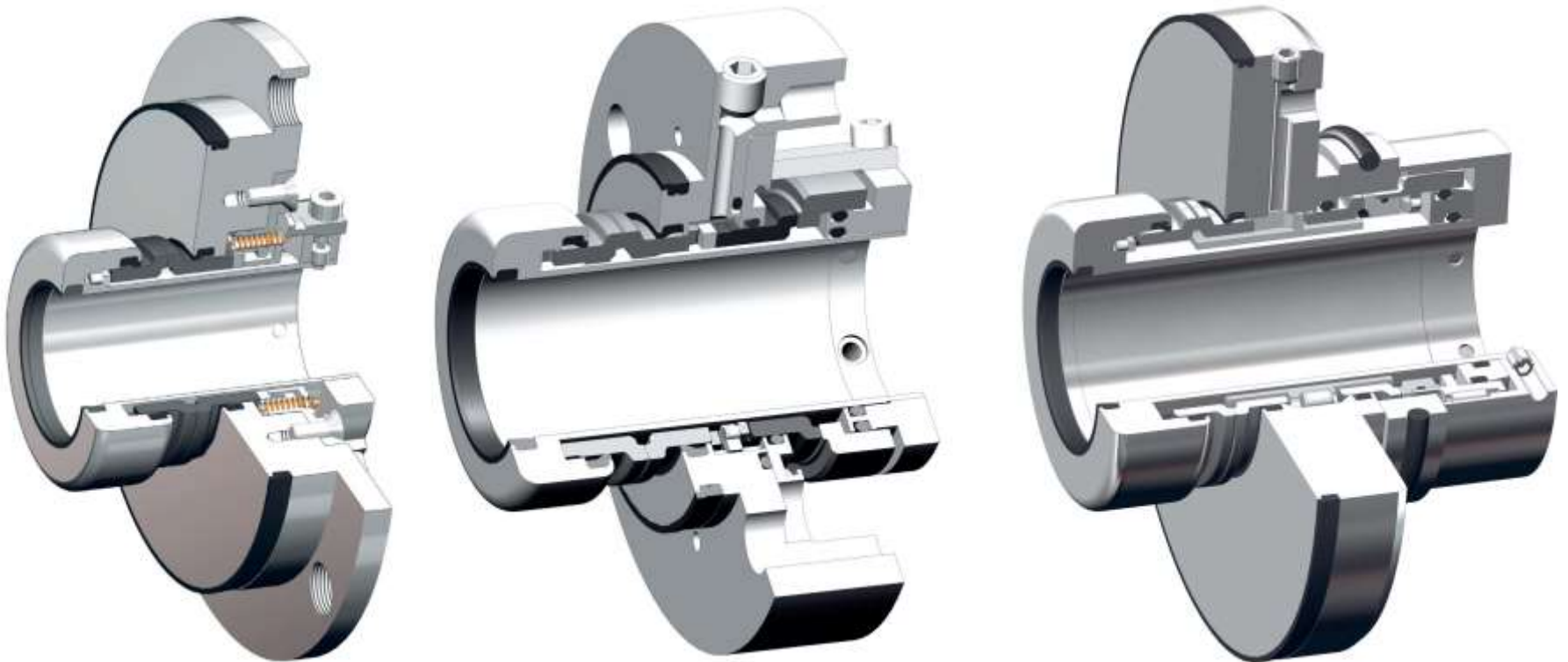


Figure 10 Mechanical seal in the product flow.
ACCEPTABLE!

Examples of hygienic design single & double cartridge seals



For more information

www.huhnseal.com