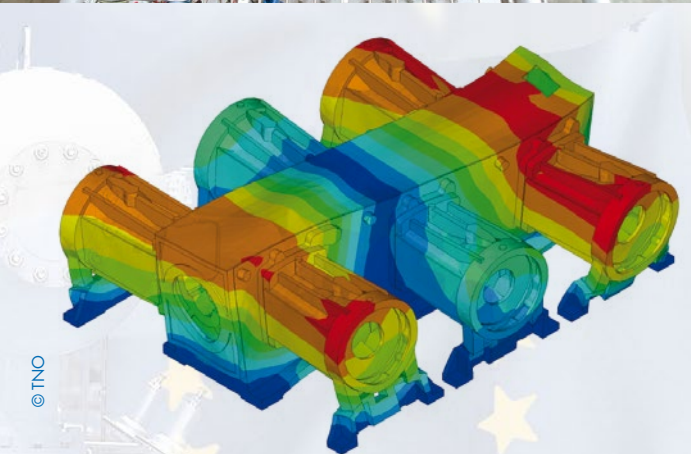


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E-Mail: contact@recip.org | maja.schuetz@mailbox.tu-dresden.de

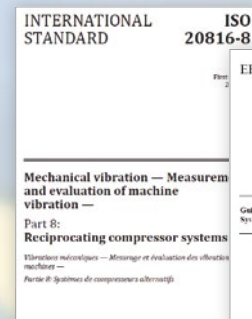
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European Forum for Reciprocating Compressors



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EFRC Standardisation Working Group



STANDARDISATION

WWW.RECIP.ORG

Who we are

The EFRC Organisation

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Its geographical reach has grown from Central Europe to entire Europe and to the US and from 8 initial members to 42 in 2018.

Our Goals

Exchange of Information and Experience

- Conferences (EFRC and IREC (with VDMA))
- Cooperation with KRMEA (South Korea)
- Internet (www.recip.org) & LinkedIn
- Workshops + Trainings

Improve image of reciprocating compressors

- Student Workshops and Excursions
- Standardisation and Guidelines (→ ISO-Standards)

Perform joint research

- Precompetitive R&D
- Aiming to improve the performance of the recip

Working Groups

- Goals of EFRC supported by activities of four working groups:
 - Precompetitive Research
 - Standardisation
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EFRC Standardisation Working Group

Our Aims

Serve as a platform to collect ideas from the industry for:

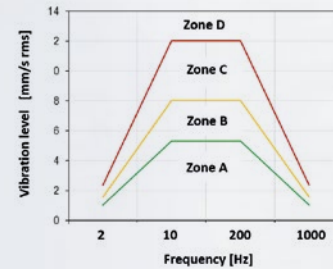
- improving, extending and development of standards and guidelines for reciprocating compressor systems

Our Actions

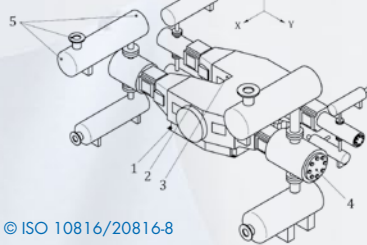
- Keeps the EFRC community up to date of recent developments on standards and guidelines for reciprocating compressor systems.
- Initiates, helps and facilitates the EFRC on improving and developing of standards and guidelines

Our EFRC Guidelines (download via: www.recip.org):

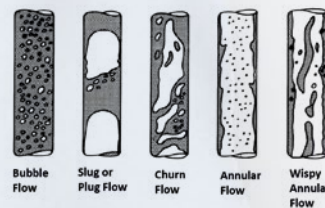
- Vibrations in Reciprocating Compressor Systems



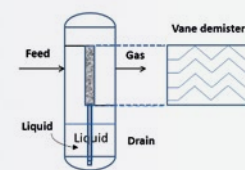
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- How to avoid Liquid Problems in Reciprocating Compressor Systems

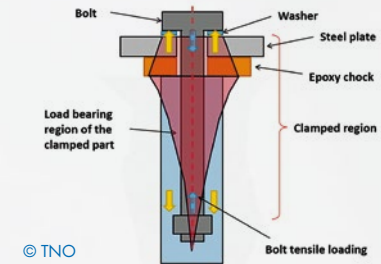


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Our other activities

- Development of the ISO 10816-8 and ISO 20816-8
- Participating in API 618, 5th and 6th edition and API 688
- Inventory of Anchor Bolts, Grouting, Foundation (download: www.recip.org)



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Chairman: André Eijk

Senior Mechanical Consultant
TNO, Department Heat Transfer and Fluid Dynamics
andre.eijk@tno.nl



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European Forum for Reciprocating Compressors



EFRC Training Working Group



TRAINING

WWW.RECIP.ORG

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EFRC Training Working Group

Exchange of knowledge and experience

This working group focusses on organising events to share valuable knowledge and experience between EFRC-members and other people from our industry. The trainings cover a broad spectrum of technical topics, with the reciprocating compressor in the focus.

Informal and social atmosphere

The workshops are always embedded in a social and amicable atmosphere. They allow for personal interaction with sufficient time for discussions. A training dinner promotes further exchange of experiences.



Working group

We are an enthusiastic team from various EFRC members involved in the technical supervision, the practical organisation, selection of speakers as well as PR & advertisement.

Want to take part?

We invite all members and non-members to participate in the EFRC training. It is valuable for new, young engineers but also for the more experienced engineers who want to stay ahead in their field of technology. Participants and speakers love our training! Don't hesitate to contact us with suggestions for relevant training topics, and interesting venues for the training event. We encourage you to act as a host of an EFRC training event. EFRC also welcomes you to promote that the chief engineers in your company volunteer as a lecturer during a training.

Examples

Conference trainings

- "Foundation Design for Reciprocating Compressors" (2014, Vienna, Austria)
- "Lubrication and Wear in Reciprocating Compressors" (2016, Düsseldorf, Germany)
- "State-of-the-art design and selection of Reciprocating Compressors" (2018, Madrid, Spain)

Trainings for young engineers & specialized topics

- "Basic design and operation of reciprocating compressors" (2013, 2015 and 2017, Delft, The Netherlands)
- "Foundation design" (2017, Delft, The Netherlands)
- "Condition monitoring" (2017, Delft, The Netherlands)

Next EFRC Training Workshop

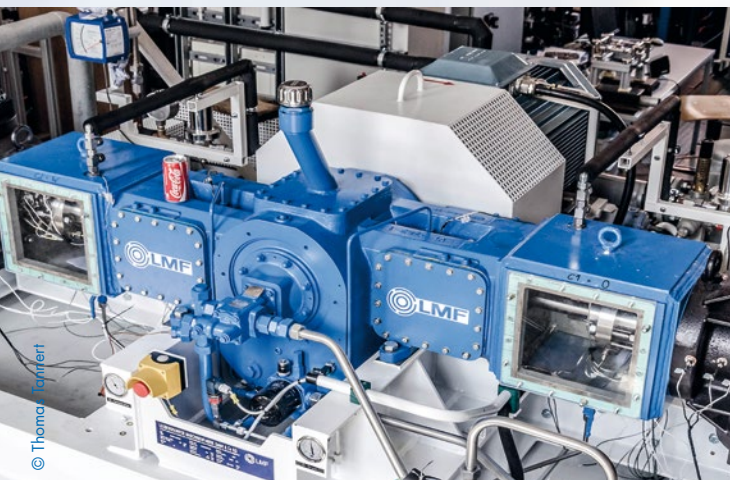
Basic training and in-depth specialist topics June 13th-14th, 2019, Delft, The Netherlands

Learn the basic concepts of reciprocating compressor technology and discover the state-of-the-art developments from the experts in our industry!



Chairman: Leonard van Lieer

Pulsation and Vibration Consultant
TNO, Business Unit Energy
leonard.vanlier@tno.nl



Balanced Opposed Compressor BS102, Leobersdorfer Maschinenfabrik (AUT) – test compressor for R&D project “Internal Piston Rod Cooling”

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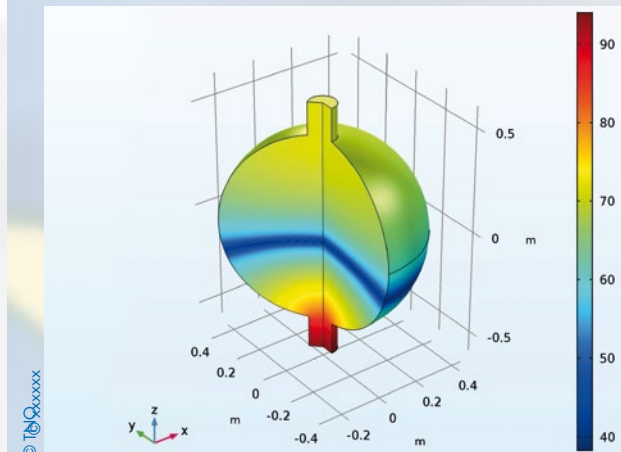
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European Forum for Reciprocating Compressors



EFRC R&D Working Group



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EFRC R&D Working Group

Our Aims

- Joint research → only explorative research and precompetitive R&D
- Improve performance of reciprocating compressors
- Combine knowledge of users, manufacturers and research institutes
- Discuss, initiate and finance projects executed by universities or research institutes

Our precompetitive research

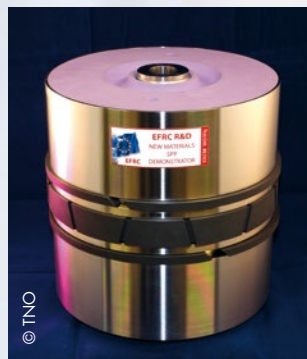
- Pain points in operation of recip (e.g. studies on vibration, oil or noise related topics)
- Feasibility studies of new technologies (e.g. cooled piston rod, new piston materials or recip operated as expansion machines)
- Develop simulation tools (e.g. for the simulation of flow and thermodynamics in compression chambers or for the simulation of oil film thickness on the cylinder wall)

How we do it

- All EFRC members can join the R&D Working Group
- Annual budget funded by participating members
- Two meetings every year
- Results are disclosed to Working Group members and owned by EFRC

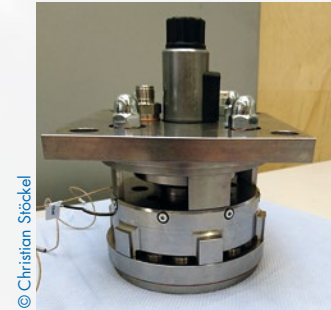
Project examples

- Lightweight materials for compressor pistons

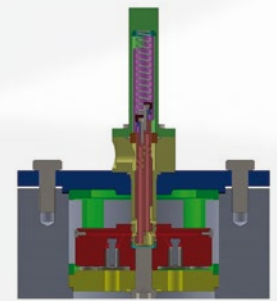


Light weight piston demonstrator from a project exploring the feasibility of using non conventional materials

- Valve Systems for piston expansion machines



© Christian Stöckel



Forced actuated poppet valves enables existing compressor being operated reversible as expansion machine

How to join

- First: Join the EFRC! Send "Application for Membership" form to contact@recip.org.
- Form available on EFRC website www.recip.org
- Contact the R&D Working Group chairman to get an invitation for the next meeting



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Chairman: Luzi Valär

Head of Global R&D Systems & Services
Burckhardt Compression AG, Systems Division
Luzi.Valaer@burckhardtcompression.com

EFRC Board



Chairman:
Dr. René Peters
TNO



Secretary:
Dr. Gunther Machu
HOERBIGER



Cashier:
Matthias Tanner
BURCKHARDT Compression

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Membership and Fees

The EFRC is generally open to everybody interested.

You want to become a member?

Send "Application for membership" to the Office Manager Maja Schütz, contact@recip.org.

Form available on EFRC's website or at the EFRC Office.

Entrance fee: EUR 2,500.– Annual fee: EUR 2,000.–
(EUR 600.– for non-profit-organisations and companies with a turnover < EUR 1 Mio.)

Statutes

Please find our STATUTES on our website www.recip.org.



R&D Working Group

Aims

The R&D Working Group combines the forces of the EFRC members to investigate and solve problems which are beyond the scope of a single player. In collaboration with research institutes precompetitive R&D is pursued.

Actions

- Precompetitive research on recip development and the compressor system
- Discuss, initiate and finance projects executed by universities or research institutes
- 3 Focus Groups
 - New concepts and technology
 - Emissions
 - Operations and reliability

Standardisation Working Group

Aims

This working group serves as a platform to collect ideas from the industry to improve, extend and develop standards and guidelines for reciprocating compressors.

Actions

- Keep EFRC community up to date on recent developments in standards and guidelines
 - Development of own guidelines for vibrations and liquid problems in Reciprocating Compressors
- Work on different ISO and API

Training Working Group

Aims

This working group focusses on organising events to share valuable knowledge and experience between EFRC-members and other people from our industry. The trainings cover a broad spectrum of technical topics, with the reciprocating compressor in the focus.

Actions

- Training every two years prior to the EFRC conference
- Training workshops every two years for EFRC members, operators and suppliers

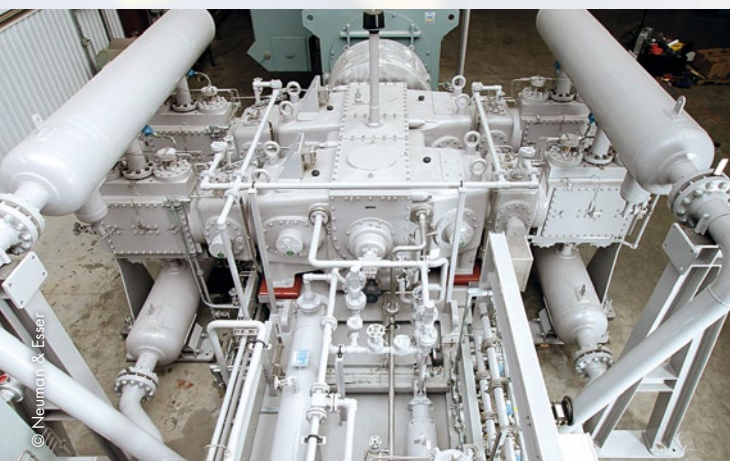
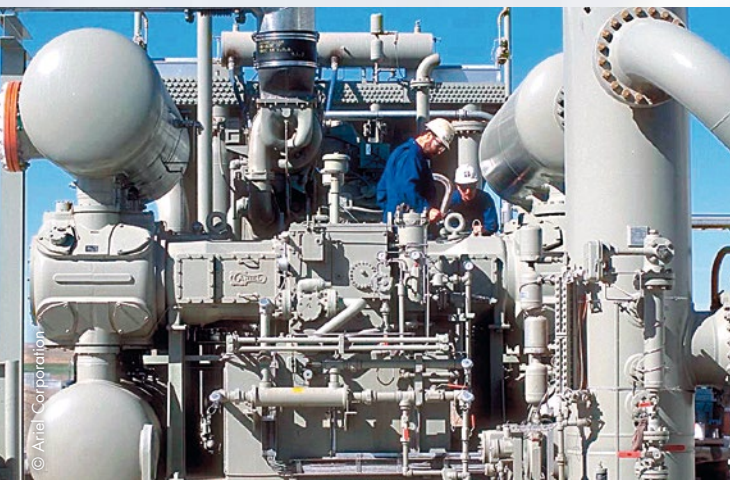
Young Talents Working Group

Aims

The Young Talents Working Group wants to introduce students to the reciprocating compressor industry and gain well trained and motivated university graduates.

Actions

- 4-day EFRC Students Workshop every two years
 - Lectures by EFRC members
 - Excursions to production sites
 - Awarded exercise to apply gained knowledge



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The Young Talents Working Group / EFRC Student Workshop

Our aims

- Introduce students to the reciprocating compressor industry
- Give them theoretical knowledge and practical experience in the field
- Gain well trained and motivated university graduates for the industry
- Consolidate cooperation between industry and educational institutions

Our Actions

EFRC Student Workshop

Every second year we organise a **4-day student excursion** with a usual group size of 25 students. Therefore we provide a good mix of theory and hands on experience by having lectures on fluid mechanics, thermodynamics and the basics of design of the reciprocating compressors and their components.

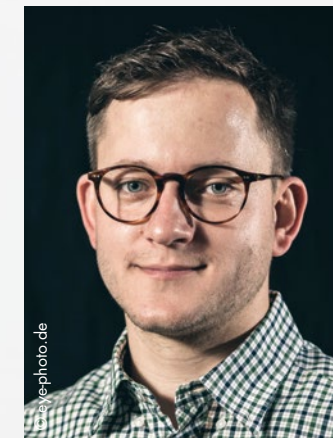


The hands-on part includes field trips to reciprocating compressor original equipment manufacturers (OEM), to component manufacturers and last but not least the users of the equipment, customers in the oil and gas industry. Typically process gas, natural gas and chemical plant end-users are visited and the students get a chance to understand the role of the reciprocating compressor in those plants and see it in action.



The EFRC Students Excursion took place for the first time in the year 2000 in Germany. Since then the following companies have been visited, et al:

- HOERBIGER, AT
- Shell Refinery, NL, DE
- TOTAL, FR
- GE Nuovo Pignone, IT
- Atlas Copco, FR
- Burckhardt Compression, CH
- Neuman & Esser, DE
- Rothaus Brewery, DE



Chairperson: Konrad Klotsche

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