



Gaskets Selection for the Use in Liquid Chlorine and Dry or Wet Chlorine Gas Service

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Euro Chlor

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Euro Chlor is working to:

- Improve awareness and understanding of the contribution that chlorine chemistry has made to the thousands of products, which have improved our health, nutrition, standard of living and quality of life;
- Maintain open and timely dialogue with regulators, politicians, scientists, the media and other interested stakeholders in the debate on chlorine;
- Ensure our industry contributes actively to any public, regulatory or scientific debate and provides balanced and objective science-based information to help answer questions about chlorine and its derivatives;
- Promote the best safety, health and environmental practices in the manufacture, handling and use of chlor-alkali products in order to assist our members in achieving continuous improvements (*Responsible Care*).

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Prior to 1990, Euro Chlor's technical activities took place under the name BITC (Bureau International Technique du Chlore). References to BITC documents may be assumed to be to Euro Chlor documents.

RESPONSIBLE CARE IN ACTION

Chlorine is essential in the chemical industry and consequently there is a need for chlorine to be produced, stored, transported and used. The chlorine industry has co-operated over many years to ensure the well-being of its employees, local communities and the wider environment. This document is one in a series which the European producers, acting through Euro Chlor, have drawn up to promote continuous improvement in the general standards of health, safety and the environment associated with chlorine manufacture in the spirit of *Responsible Care*.

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This edition of the document has been drawn up by the Equipment Working Group to whom all suggestions concerning possible revision should be addressed through the offices of Euro Chlor.

Summary of the Main Modifications in this Version

The table with gaskets used with good experiences was deleted because there are much more (good) gaskets used than that was mentioned in the list. We did not want to limit the developments of new good alternatives and to avoid the use of other types of gaskets and/or brands with good experiences.

Added references to EN norms.

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1. INTRODUCTION

The guideline gives some recommendations on how to select gaskets to be used in a chlorine environment.

Norms for gaskets are:

- **EN 1591**
Flanges and their joints - Design rules for gasketed circular flange connections.
Mainly: part 1 calculation, part 2 gasket parameters, part 4 qualification of personnel competency in the assembly of the bolted connections of critical service pressurized systems.
- **EN 13555**
Flanges and their joints - Gasket parameters and test procedures relevant to the design rules for gasketed circular flange connections.

Before installation inspections should be executed and these should include:

- flange face condition
- flange alignment (offset and angular misalignment)
- gasket condition
- stud/nut condition

At installation it is critical that a suitable gasket seating stress is reached, whilst not overloading the gasket, as well as ensuring that a suitable bolt tightening pattern is followed (requires an experienced installer).

The gasket seating stress may be controlled using a torque wrench, although consideration should be given to the fact that these tools typically give a seat stress accuracy of +/-30%.

Training of the personnel who install gaskets is a critical component of a leak-free assembly.

2. GENERAL REMARKS

Euro Chlor recommends the use of blow-out proofed gaskets on liquid chlorine pipeline outside buildings and on transport vessels.

Blowout proof gaskets include:

- Spiral wound gaskets
- Grooved or serrated gaskets
- Or tong and groove flanges

Rubber gaskets should never be used on dry gaseous or liquid chlorine.

The temperature and pressure (absolute) ranges given are tested operating values. Manufacturers may rate gasket materials for different ranges.

Gaskets must be installed in accordance with manufacturer's instructions. The bolted flange design, condition, installation method and process duty are all critical to the success in service, as well as the material selected.

Note: PTFE-based gasket materials tend to exhibit some creep relaxation after installation. The impact of this can be minimised by:

- Ensuring the correct roughness (gramophone) finish of the flange is used as specified by the gasket manufacturer (the grooves help prevent gasket flow);
- Lubricating the bolts with a fluorinated grease or similar grease (non-reactive with chlorine) to better control the torque;
- Re-tightening the bolts sometime after installation if required by the gasket manufacturer.

Note: Sometimes grease is used to help retain the gasket in position during the assembling work; this practice is not permitted as the reduction in friction at the gasket surface increases the likelihood of creep and blow-out; special materials exist to temporarily immobilise gaskets.

When possible, the installation of flange shields should be avoided to allow for easy detection of possible small leak.

Good practice to avoid installing an incorrect gasket is to use a colour coding (on the circumference) for the different types of gaskets.

Gasket thicknesses trialled are as follows.

2.1. PTFE

- The gasket thickness varies between 1.5 and 3.2 mm.

2.2. GRAPHITE

- The gasket thickness varies between 1.5 and 3.0 mm.

2.3. ARAMID FIBRE

- The gasket thickness is standard 2.0 mm.
- The gasket thickness is at least 3.0 mm for gaskets with a steel jacket.

2.4. CARBON FIBRE

- The gasket thickness is standard 2.0 mm.
- The gasket thickness is at least 3.0 mm for gaskets with a steel foil bordered to the smaller diameter.

Remark: Graphite gaskets are usually impregnated for corrosion inhibition but not all impregnation material is resistant to chlorine; great care must be taken and only field test can confirm the reliability of the material chosen.

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