



SAFE OPERATION AND MAINTENANCE OF FURNACES INSULATED WITH REFRACTORY CERAMIC FIBRES (RCF)

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EUROPEAN INDUSTRIAL GASES ASSOCIATION AISBL

AVENUE DE L'ASTRONOMIE 30 • B – 1210 BRUSSELS

Tel: +32 2 217 70 98

E-mail: info@eiga.eu • Internet: www.eiga.eu



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EUROPEAN INDUSTRIAL GASES ASSOCIATION AISBL
Avenue de l'Astronomie 30 B 1210 Brussels Tel: +32 2 217 70 98
E-mail: info@eiga.eu Internet: www.eiga.eu



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Amendments from 207/17

Section	Change
4	Editorial
5.1	EU OEL added
6	Update
7	Update

NOTE Technical changes from the previous edition are marked with a line in the left margin

1 Introduction

Alumino silicate fibres, also known as Refractory Ceramic Fibres (RCFs), are used for the insulation of high temperature furnaces operated by EIGA members. See EIGA Doc. 155, *Best Available Technology for Hydrogen Production by Steam Methane Reforming* and EIGA Doc. 185, *Safe Start-Up and Shutdown Practices for Steam Reformers* for information on the operation of high temperature furnaces. [1,3]¹

Due to their health hazard characteristics, RCFs have been identified as Substances of Very High Concern (SVHC) according to the REACH Regulation [4].

This document is intended to demonstrate the safe use of RCF in the premises of EIGA members until an acceptable substitute material is found. At the time of publishing this document, no suitable substitute material for all uses of RCF in steam methane reformers had been identified.

2 Scope and purpose

2.1 Scope

This publication covers construction, inspection, normal repair and maintenance of furnaces insulated with RCFs as well as the demolition of the furnaces after decommissioning.

2.2 Purpose

The document describes best practices of EIGA members for the protection of their workers during operation of any fired heater where Refractory Ceramic Fibres are used, including Steam Methane Reformer furnaces. The best practices described in this document were developed for RCF but can also be applied to other high temperature insulation wools.

This document supplements the existing EIGA Doc. 172 *Combustion Safety for Steam Reformer Operation* [5].

3 Definitions

3.1 Publications terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May and need not

Indicate that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Occupational exposure levels (OEL, IOELVs, BOELVs)

- **Occupational exposure limit (OEL):** An **occupational exposure limit** is an upper limit on the acceptable concentration of a hazardous substance in workplace air for a particular material or class of materials. It is typically set by competent national authorities and enforced by legislation to protect occupational safety and health.
- **Indicative occupational exposure limit values (IOELVs):** OELVs published by the Commission in application of the Chemical Agents Directive [6]. Member States shall establish national occupational exposure limit values taking into account the Community values.
- **Binding occupational exposure limit values (BOELVs):** OELVs published by the Commission. For any chemical agent for which a BOELV is established, Member States should establish a corresponding national binding occupational exposure limit value based on, but not exceeding, the Community limit value.

4 Identification and characteristics of High Temperature Insulation Wool (HTIW)

4.1 Overview of HTIW

RCFs are one of a number of HTIW. RCFs are used in applications where other HTIWs cannot be used due to temperature, environment, etc.

HTIW fibres have different hazard classifications due to their differing characteristics. Inhaled fibres can be hazardous because they may be breathed deep into the lung and resist the body's attempts at removal. If they persist in the lungs for a sufficiently long time and in sufficient quantities, they can cause serious health effects such as irritation, inflammation, and eventually scarring. There are 3 important characteristics that determine the degree of hazard posed by a fibre:

- Dimension – fibre length and diameter.
- Durability – property that determines the extent to which a fibre will withstand the lung's natural removal processes.
- Dose – number of fibres reaching the deep lung, determined predominantly by exposure concentration and fibre diameter.

These properties vary from fibre to fibre, which means that fibres are not all the same in terms of their potential to cause harmful health effects.

Exposure to any type of fibres (regardless of classification) requires that proper workplace protection measures and good work hygiene practises should be used when working with all HTIW products. When recommended work practises are adhered to, HTIWs are safe to manufacture, install and use.

For more information see [8].

4.2 RCF - Identification as per ECHA dissemination data and EN 1094-1:2008

RCFs is a generic name that covers both Aluminosilicate Refractory Ceramic Fibres (Al-RCF) and Zirconia Aluminosilicate Refractory Ceramic Fibres (Zr-RCF). These types of fibres have typical composition ranges shown in the following two tables: