Model Code

for

GRP Liners

CICIND

COMITÉ INTERNATIONAL DES CHEMINÉES INDUSTRIELLES
INTERNATIONAL COMMITTEE FOR INDUSTRIAL CHIMNEYS
INTERNATIONALER AUSSCHUSS FÜR INDUSTRIESCHORNSTEINE

CICIND

Model Code for GRP Liners in Chimneys

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FOREWORD

When CICIND (Comité International des Cheminées Industrielles) was formed in 1973 it adopted as a major goal the harmonisation of national Codes for the design of industrial chimneys.

As a means to this end several committees were appointed, charged with drafting proposals for Model Codes reflecting the current "state-of-the-art" for concrete chimneys with brick liners or steel liners as well as steel chimneys. The resulting documents were published in the period from 1981 to 1989.

Due to the development of the flue gas desulphurisation a new material for chimney linings became more and more important: GRP. In view of this development CICIND formed a committee with the aim of drafting a corresponding Model Code which is herewith presented.

The GRP Committee comprises:

Steven Reid (USA, Chairman)
Klaus Kaemmer (Germany, Secretary)
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Expert advice and a major contribution to this code was received from

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0 INTRODUCTION

Chimneys are required to carry vertically and discharge to the atmosphere gaseous products of combustion, chemical waste gases, exhaust air or industrial gases for combustion. Chimney liners are required to isolate the structural outer shell from contact with these gases.

The traditional materials for chimneys and liners construction: concrete and bricks as well as steel are for some time squeezed out of the Chimney market by a new class of products: GRP.

The term glass reinforced plastic (GRP) covers a range of modern composite materials most commonly comprising a polyester resin reinforced with glass fibres. It has found increasing usage over the last half-century in situations where its high strength to weight ratio and its ability to be moulded into all manner of shapes.

Other types of resin and reinforcing fibre can be combined for particular applications. Epoxy resin has excellent chemical resistance at elevated temperatures. Carbon fibre and aramid fibre have a better strength to weight ratio than glass and are finding increasing usage in the Chimney Industry.

In terms of chimney linings the main advantage of GRP is its ability to resist chemical attack, which has become an increasingly important property in the last 20 years with the advent of flue gas desulphurisation (FGD) systems. FGD generally results in gas temperatures below acid dew point, so although there is much less sulphur in the flue gas, acid condensation within the liner is a much greater problem.

With the advent of FGD, GRP is finding increasing use in large diameter liners and acceptable operating temperatures are rising, as resin properties are refined. Although the normal operating temperature of a power plant fitted with FGD may be only 50 °C to 80 °C, by-pass operation produces a much higher temperature, say 125 °C, and short-term design temperatures may be up to 200 °C. Recent experience of plants in Europe and the USA has shown that GRP is capable of withstanding these operating conditions. New types of resin have a resistance of up to 180 °C for long term.

This Model Code contains guidelines which reflect the current state-of-art in the design and construction of GRP liners. Nevertheless, the design, fabrication and erection of GRP liners require a thorough knowledge of these structures, the properties of the materials used, the actions occurring upon the structure and the recognized rules of the relevant technologies. The design of GRP liners should therefore only be entrusted to appropriately qualified and experienced engineers. The construction and erection should be carried out by firms competent in this class of work. At all times the work should be under the direction of appropriately qualified supervisors.

CICIND will continue to try to improve the understanding of the behaviour of GRP liners. Revisions of this Model Code will therefore be published from time to time.