

Introduction

With the refurbishment of old buildings still popular, there is a requirement for the fire protection of cast iron columns and beams.

The following recommendations are based on the work of Barnfield and Porter, published in the Structural Engineer Volume 62a, No 12, dated December 1984. They found wide variations in the behaviour of unprotected cast iron in fire. Sometimes sections survived unscathed, whilst other elements would crack (either during the fire itself, or when sprayed with water afterwards). The one common factor was that fracture occurred wherever there was severe deflection of the member due to excessive thermal movement of the structure.

- When cast iron columns are used in conjunction with timber beams, a normal critical temperature of 550°C may be assumed.
- Cast iron sections (either beams or columns), when fixed to other iron or steel members, should not be allowed to exceed 300°C. In addition, any iron or steel members connected to these systems should also be kept below 300°C.

Section Factor and VERMICULUX® Thickness

Whilst the section factor (A/V) is calculated in the normal way, if the cast iron is of an ornate design, particular care must be taken to ensure that it is based on the most onerous cross section.

If the VERMICULUX® casing is to be spaced off of the structural element to accommodate head and foot plates, the heating perimeter (A) should be based on the actual perimeter of the VERMICULUX® cladding used.

Care is also required in calculating the cross sectional area (V). The thickness of cast iron is notoriously variable, and the lowest estimate of thickness - and hence cross section should be taken.

The thickness of VERMICULUX® required for a critical temperature of 550°C may be taken from the Promat Fire Protection Handbook. Where the critical temperature of 300°C is used, the thickness of VERMICULUX® should be taken from Table 1 below.

Table 1

Fire Protection Thickness
VERMICULUX® A/V Ratio for Cast Iron Sections
(Critical Temperature of 300°C)

Thickness (mm)	Limiting Section Factor A/V (m^{-1}) for fire resistance periods of:					
	30 minutes	60 minutes	90 minutes	120 minutes	180 minutes	240 minutes
20	260	119	61	41	24	-
25	260	183	84	54	32	22
30	260	260	112	70	40	28
35	260	260	148	88	48	33
40	260	260	194	109	58	39
45	260	260	255	134	68	46
50	260	260	260	163	79	52
55	260	260	260	199	92	60
60	260	260	260	244	106	67

Note: The irregular shape of cast iron section may require the use of stand off channels, or framing sections to be used to space off the VERMICULUX® cladding, to compensate for feet and head plates. Direct fixings to the cast iron should be avoided. For specific details, please contact Promat Technical Services Department.

AUTHORITY: BRE Assessment report: CC88496

Technical Data
Sheet – 029

Page 1 of 1
(Mar 2004)



Promat UK Limited
Technical Service Department
The Sterling Centre, Eastern Road
Bracknell, Berkshire RG12 2TD
Tel: 01344 381 400
Fax: 01344 381 401
E-mail: technicaluk@promat.co.uk

