

TECHNICAL GUIDE · QUICK REFERENCE

Intumescent Paint and Fire Protection for Steel

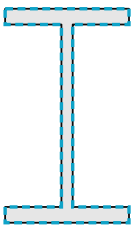
Fire protection thickness for steel depends on three things: the fire resistance period required (such as R30, R60 or R90, in minutes, set by Approved Document B or the fire engineer), the section factor H_p/A (heated perimeter divided by area, in m^{-1}), and the design temperature of the member. Intumescent coating thickness comes from the manufacturer's data assessed to BS EN 13381-8.

TERM	MEANING	SOURCE
R30, R60, R90	Minutes a member keeps its load-bearing capacity (R) in the standard fire test	BS EN 13501-2
Required period	Set by Approved Document B (Appendix B) or a fire engineer	ADB
Section factor H_p/A or A/V	Heated perimeter $\div$ cross-section area, in m^{-1}	BS EN 1993-1-2, ASFP
Higher section factor	Heats faster, needs more protection	ASFP Yellow Book
3-sided / 4-sided	Beam under a slab is heated on 3 sides; a column usually on 4	ASFP
Intumescent test data	BS EN 13381-8 (older data: BS 476-20/21)	ASFP, SCI
Boards and sprays	BS EN 13381-4 (non-reactive)	SCI

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Cyan = heated perimeter H_p . Higher H_p/A heats faster and needs more protection.
 H_p/A in m^{-1} = heated perimeter (m) $\div$ cross-section area (m^2).

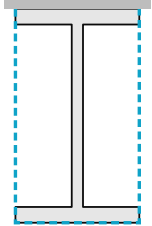
Profile, 4 sides



Coatings follow the outline

Box, 3 sides

slab above (3-sided exposure)



Boards enclose a box

■ **Section factor** · H_p/A (A/V): heated perimeter $\div$ area

BS EN 1993-1-2 · ASFP YELLOW BOOK

Section factor

For a profile (coating) protection, the heated perimeter follows the outline of the section. For a box (board) protection, it is the perimeter of the box. A beam supporting a slab is usually heated on three sides. Section factors for UK sections are tabulated in the SCI Blue Book and the ASFP Yellow Book.

Types of protection

- Thin-film intumescent coatings: applied off-site or on site. Keep the steel shape visible.
- Boards: fixed around the section as a box. Tested to BS EN 13381-4.
- Sprayed non-reactive coatings: usually for hidden steelwork.
- Concrete encasement and filling: less common in new buildings.

Specifying

- State the fire resistance period, the exposure for each member, and the design temperature from the engineer.
- Specify compatible primer and topcoat, and the corrosivity category (see galvanising, powder coating and duplex).
- Use third-party certified products and applicators, and check dry film thickness on completion.

We have not reproduced Approved Document B's tables of fire resistance periods because they depend on building purpose, height and sprinklers; use the current ADB or a fire engineer.

Common questions

What is intumescent paint?

A thin coating that swells into an insulating char when heated, slowing the rise in steel temperature. Its thickness is specified as a dry film thickness from the manufacturer's tested data.

What does R60 mean?

The member must keep its load-bearing capacity for 60 minutes in the standard fire test. The 'R' is from the BS EN 13501-2 classification; E (integrity) and I (insulation) apply to separating elements such as walls.

What is section factor H_p/A ?

The heated perimeter of the steel divided by its cross-section area, in m^{-1} . Thin, light sections have high section factors and heat up quickly; heavy sections have low section factors. Protection thickness increases with section factor.

Sources

1. SteelConstruction.info: structural fire resistance and steel fire protection (section factor, intumescent coatings) · <https://steelconstruction.info/topics/fire-and-steel-construction/>
2. SteelConstruction.info: fire protecting structural steelwork · https://www.steelconstruction.info/Fire_protecting_structural_steelwork
3. ASFP Yellow Book: fire protection for structural steel in buildings (Association for Specialist Fire Protection) · <https://www.asfp.org.uk/>
4. Approved Document B: fire safety, Volumes 1 and 2, Appendix B fire resistance (GOV.UK) · <https://www.gov.uk/government/publications/fire-safety-approved-document-b>
5. BS EN 13381-8 test methods for contribution to fire resistance: applied reactive protection to steel; BS EN 13501-2 classification; BS 476-20/21 (BSI)

Full guide: www.koyda.com/guides/intumescent-paint-fire-protection/

Need fire-protected structural steel? Send us your drawings.

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