



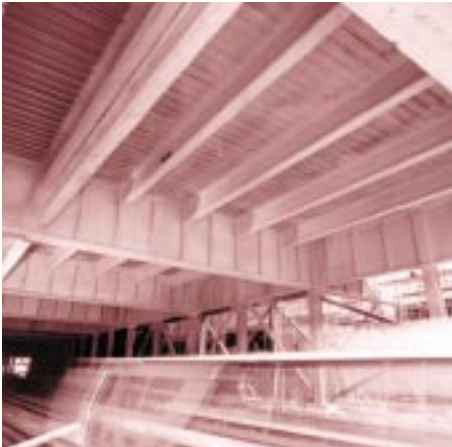
Construction

Mandolite HS3

Data Sheet C/F/C-9

Use with:

SBR Bonding Latex	See Data Sheet C/F/A-5
SC 125	See Data Sheet C/F/A-6
Topcoat 200	See Data Sheet C/F/T-5
Mesh Fixings	See Data Sheet C/F/R-2
Plastic Coated Galv. Mesh	See Data Sheet C/F/R-3



Structural steel beams at Liverpool Street Station are protected with Mandolite HS3

Mandolite HS3 is a spray applied, single package factory controlled premix, based on vermiculite and Portland cement.

Mandolite HS3 produces a monolithic coating able to withstand the thermal shocks experienced in a high intensity cellulosic fire. Concrete structures in particular, will be protected from explosive spalling when coated with Mandolite HS3.

Although low in density, thus significantly reducing dead load, Mandolite HS3 is highly durable and will not crack or spall under mechanical impact.

Mandolite HS3 does not release toxic or hazardous fumes, and presents no known health hazards either before, during or after application.

The surface may either be spray textured or float finished.

Mandolite HS3 is suitable for application to construction elements such as individual steel or concrete sections particularly where off-site application is required.

Building types that will benefit from the use of Mandolite HS3, include a wide range of educational, leisure and entertainment centres or commercial projects.

Properties and performance

Colour and finish

Off-white, with a monolithic spray texture or floated.

Minimum practical thickness

8mm when unreinforced. 15mm when reinforced.

Theoretical coverage

92m²/tonne at 15mm thickness.

Number of coats

One or more, as required.

Cure

By hydraulic set.

Initial set

2 to 6 hours at 20°C and 50%RH.

Drying time

After initial set: 50% strength	5 days
75% strength	12 days
98% strength	28 days.

Density

750kg/m³ ± 15% (when dry and in place).

Properties and performance (cont)

Cohesion/adhesion	169kPa (3533lb/ft ²) to ASTM E736.
Compressive strength	3933kPa (569psi) to ASTM E761.
Hardness	No penetration by a load less than 2.5kgf (BS 3900: Part E2 - scratch test).
Combustibility	Non-combustible to BS 476: Part 4.
Flame spread	Class 0 as defined by the Building Regulations.
Smoke generation	Does not contribute to smoke generation.
Thermal conductivity	0.225W/mK at 20°C.
Specific heat	0.97kJ/kgK at 25°C to 35°C.
Corrosion resistance	Does not promote corrosion of steel. However, a primed substrate is recommended for long term corrosion resistance, particularly when the structure is to be fully exposed to the elements. See 'preparation'.
pH value	12.0 - 12.5.
Sound absorption	Noise Reduction Coefficient (NRC) 0.35.
Fire resistance	<p>Structures protected with Mandolite HS3 have undergone fire resistance tests in approved independent laboratories to recognised standards in the UK (to BS 476: Parts 20-22: 1987 Appendix D)</p> <p>The fire resistance test results relate solely to the constructions tested and test conditions imposed.</p> <p>Cafco International provides computer based thickness calculations to meet specific fire ratings on receipt of details. See 'Fire protection thickness'.</p> <p>Mandolite HS3 protected structures have been successfully tested under BS 476: Part 21: 1987 to failure temperatures up to 800°C. This allows the specifier the freedom to adopt a fire engineering approach in accordance with BS 5950: Parts 3 and 8: 1990, as well as the Fire Appendices of the forthcoming Eurocode.</p>

Fire protection thickness

Establishing the correct thickness

The thickness of the fire protection for a given period of fire resistance in a cellulosic type fire, relates to the H_p/A ratio of the section. H_p/A is the ratio of the heated perimeter exposed to fire to the cross-sectional area of steel.

All column and beam sections have their own specific H_p/A ratio. Refer to the 'Technical Introduction' to establish the H_p/A ratio for a particular beam or column section, or contact Cafco International. Then use Tables 1 and 2 on opposite page to ascertain the thickness of Mandolite HS3 that meets the required period of fire resistance for I section beams and H section columns.

For advice on thickness calculations for hollow sections, castellated sections, composite floors, upgrading of concrete slabs and more complex situations, please contact Cafco International.

Fire protection thickness (cont)

Establishing the correct thickness

Table 1: Mandolite HS3 thicknesses for I section beams (3 sided exposure). Critical temperature 620°C, continuous concrete topping.

Hp/A	Mandolite HS3 thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	8	8	8	9	14	19
50	8	8	9	13	20	27
70	8	8	12	16	25	33
90	8	8	13	18	28	39
110	8	9	15	20	32	43
130	8	10	16	22	34	46
150	8	10	17	23	36	49
170	8	11	18	25	38	52
190	8	11	18	26	40	54
210	8	12	19	26	41	56
230	8	12	20	27	42	58
250	8	12	20	28	43	—
270	8	13	21	29	44	—
290	8	13	21	29	45	—
310	8	13	21	30	46	—
330	8	13	22	30	47	—

Table 2: Mandolite HS3 thicknesses for I section beams and H section columns (4 sided exposure). Critical temperature 550°C.

Hp/A	Mandolite HS3 thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	8	8	9	11	17	23
50	8	8	12	16	24	32
70	8	9	14	19	29	39
90	8	11	16	22	33	45
110	8	12	18	24	36	49
130	8	12	19	26	39	52
150	8	13	20	27	41	55
170	8	14	21	28	43	58
190	8	14	22	29	44	—
210	8	14	22	30	46	—
230	8	15	23	31	47	—
250	8	15	23	31	48	—
270	8	15	24	32	49	—
290	8	16	24	33	49	—
310	8	16	24	33	50	—
330	8	16	25	33	51	—

Note:

UK maximum steel temperatures are normally accepted at 550°C (for columns) and 620°C (for 3 sided beams) for fully loaded steel members.

Preparation

Typical substrates

Unprimed and primed steel, concrete structural frames, metal decks and return air plenums.

Substrate preparation

The substrate shall be clean, dry and free from dust, loose millscale, loose rust, oil and any other condition preventing good adhesion.

Mandolite HS3 can be applied to unprimed and primed steelwork.

Prior to the application of Mandolite HS3, primed steel should be prepared by the application of **SC 125** or **SBR Bonding Latex** used as a keycoat if required.

Mesh reinforcement

Most fire tests conducted have been carried out without mesh reinforcement, to demonstrate the ability of Mandolite HS3 to stay in place under the most severe fire conditions. However, for maximum long term in-service durability, the use of lightweight mesh reinforcement is recommended for exterior work and for interior use where vibration or mechanical damage and the possibility of subsequent de-bonding exist.

Application

Initial steps

Application of Mandolite HS3 must be carried out by an applicator recognised by Cafco International and applied in accordance with the Installation Guide available from Cafco International.

Methods

Mix Mandolite HS3 with potable water in a suitable mixer and apply by a spraying machine approved by Cafco International.

Mandolite HS3 may be float finished using conventional hand tools or spray textured.

Limitations

Mandolite HS3 may be applied when the substrate and air temperatures are at least 2°C and rising, but should not be applied if the substrate or air temperatures are less than 4°C and falling. Maximum air and substrate temperature is 45°C.

Substrate temperature should be at least 2°C above dewpoint temperature.

Topcoating

General considerations

Under certain circumstances, **Topcoat 200** may be used as protection from frequent wash down, long term chemical spills, or for improved resistance to fungal, algal and bacterial growth.

Packaging, storage, shelf life

Packaging

20kg bags.

Storage

Off the ground and kept dry until ready for use.

Shelf life

12 months maximum.

Environmental

Not readily biodegradable.

Not expected to bioaccumulate.

Not expected to be toxic to aquatic life except at high concentrations.

Do not discharge into drains and watercourses.

Health and safety

Cafco International's activities are conducted with due regard to all statutory requirements with appropriate safeguards against exposing employees and the public to health and safety risks.

A full copy of Cafco International's Health, Safety and Environment Policy document is available on request.

See Safety Data Sheet (including COSHH Regulations) Code Reference **Saf-8**.

Quality assurance

Cafco International operates a quality system in accordance with BS EN ISO 9002: 1994, and has received full accreditation by BSI to these standards.

Operating to these standards means that all activities, which have a bearing upon quality, are set out in written procedures. Systematic and thorough checks are made on all materials and their usage. Test equipment is subjected to regular checks and is referred back to national standards.

The information given in this data sheet is based on actual tests and is believed to be typical of the product. No guarantee of results is implied however, since conditions of use are beyond our control.

Further information



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