



CERTIFICATE OF APPROVAL
No CF 723

This is to certify that, in accordance with
TS00 General Requirements for Certification of Fire Protection Products
The undermentioned products of

PROMAT UK LTD

The Sterling Centre, Eastern Road, Bracknell, Berkshire, RG12 2TD
Tel: 01344 381 300 Fax: 01344 381 301

Have been assessed against the requirements of the Technical Schedule(s)
denoted below and are approved for use subject to the conditions
appended hereto:

CERTIFIED PRODUCT

Promat UK Ltd
Cafco FENDOLITE® MII Fire
Protection System for Tunnel
Linings

TECHNICAL SCHEDULE

TS58 Fire Protection Systems for
Tunnel Linings

Signed and sealed for and on behalf of CERTIFIRE

Sir Ken Knight
Chairman - Management Council

Issued: 16th December 2009
Revised: 26th January 2011
Valid: 15th December 2014

Page 1 of 7



Only valid when authentic
CERTIFIRE Seal is in place



CERTIFICATE No CF 723

PROMAT UK LTD

PROMAT UK LTD – Cafco FENDOLITE® MII Fire Protection System for Tunnel Linings

1. This approval relates to the use of the above protection systems for tunnel linings such that they will maintain their performance in terms of Integrity and Insulation, as defined by the RWS Standard. Subject to the undermentioned conditions, the protection systems for tunnel linings will meet the relevant requirements of Efectis Nederland report No. 2008-Efectis-R0695: Fire testing procedure for concrete tunnel linings, for periods of up to 120 minutes (dependant upon design limitations) when used in accordance with the provisions therein.
2. This certification is designed to demonstrate compliance of the product or system for the intended use of providing fire protection to tunnels. The system is intended to provide the fire protection to the tunnel over a reasonable working life and for this reason the requirements for evaluating the durability of the primary material is also included. If compliance is required to other regulatory or guidance documents there may be additional considerations or conflict to be taken into account.'
3. The protection systems for tunnel linings are approved on the basis of:
 - i) Initial type testing
 - ii) Audit testing at the frequency specified in TS58
 - iii) A design appraisal against TS58
 - iv) Inspection and surveillance of factory production control
 - iv) Certification of quality management system to ISO 9001:2008
4. The protection system comprises mesh reinforced Cafco FENDOLITE® MII spray applied fire protection material installed on the inside of the concrete tunnel linings.
5. This approval is applicable to horizontal (ceiling), vertical (wall) and sloping reinforced concrete tunnel linings as described within this Certificate.
6. The concrete tunnel lining shall have a minimum strength category of C25 and have been professionally designed to meet the structural and other design requirements. The minimum depth of cover to the first steel reinforcement behind the protection shall be 25mm.
7. The approval relates to on going production. Product and/or its immediate packaging is identified with the manufacturers' name, the product name or number, the CERTIFIRE name or name and mark, together with the CERTIFIRE certificate number and application where appropriate.



CERTIFICATE No CF 723

PROMAT UK LTD

Promat UK Ltd – Cafco FENDOLITE[®] MII Fire Protection System for Tunnel Linings

This approval relates to the ability of mesh reinforced Cafco FENDOLITE[®] MII spray applied fire protection systems for reinforced concrete tunnel linings to maintain their performance in terms of Integrity and Insulation as defined in Efectis Nederland report No. 2008-Efectis-R0695: Fire testing procedure for concrete tunnel linings, for periods of up to 120 minutes, when subjected to the RWS temperature/time furnace heating conditions.

The performance criteria described within the test procedure are as follows:

- During the 120-minute heating period the protection material must not fall away as a result of failure of the fixing system.
- During the 120-minute heating period the following temperatures shall not be exceeded:
 - a) 380°C for each measuring point at the interface of the concrete and the protection material.
 - b) 250°C for each measuring point located 25mm above the bottom of the concrete slab (thermocouples fixed to the underside of the reinforcement).

Fixing method

For wall and ceiling applications the Cafco FENDOLITE[®] MII sprayed fire protection material may be installed after the concrete tunnel walls and roofs have been constructed. The protection material is reinforced with steel mesh, either CAFCO[®] Stainless Steel Profiled Mesh, nominally 50mm x 50mm x 1.5mm thick, or CAFCO[®] Plastic Coated Galvanised Mesh, nominally 50mm x 50mm x 1.0/1.5mm thick. See Figure 1 and data sheets. The mesh is fastened to the concrete with CAFCO[®] Stainless Steel Mesh Retaining Anchors, or equivalent, at 400mm nominal centres in rows 400mm apart. The all-steel expanding anchors are 22mm long x M8 diameter with a 22.5mm diameter head and are fitted into pre-drilled holes in the concrete. The anchor positions are staggered by 200mm between rows. The mesh is spaced off the face of the concrete so that it is in the middle third of the Cafco FENDOLITE[®] MII. Joints in the mesh are overlapped by at least 50mm and coincide with a row of fixing anchors.

The Cafco FENDOLITE[®] MII fire protection material, minimum 23mm thick, is sprayed onto the concrete and over the mesh in one or two layers.

Tunnel expansion joints

Expansion joints between the concrete tunnel elements are fitted with a fire resistant compressible seal. The maximum gap size is 35mm. The Cafco FENDOLITE[®] MII fire protection material is installed over the gap. A gap is then cut in the Cafco FENDOLITE[®] MII down to the compressible seal. The width of the gap is the same as the required movement allowance.

A handwritten signature in black ink, appearing to be "K. M. ...".

CERTIFICATE No CF 723
PROMAT UK LTD

Promat UK Ltd – Cafco FENDOLITE® MII Fire Protection System for Tunnel Linings

Repair of minor damage

Minor damage to the Cafco FENDOLITE® MII fire protection material may be repaired with either spray applied Cafco FENDOLITE® MII or by hand application of Cafco FENDOLITE® TG.

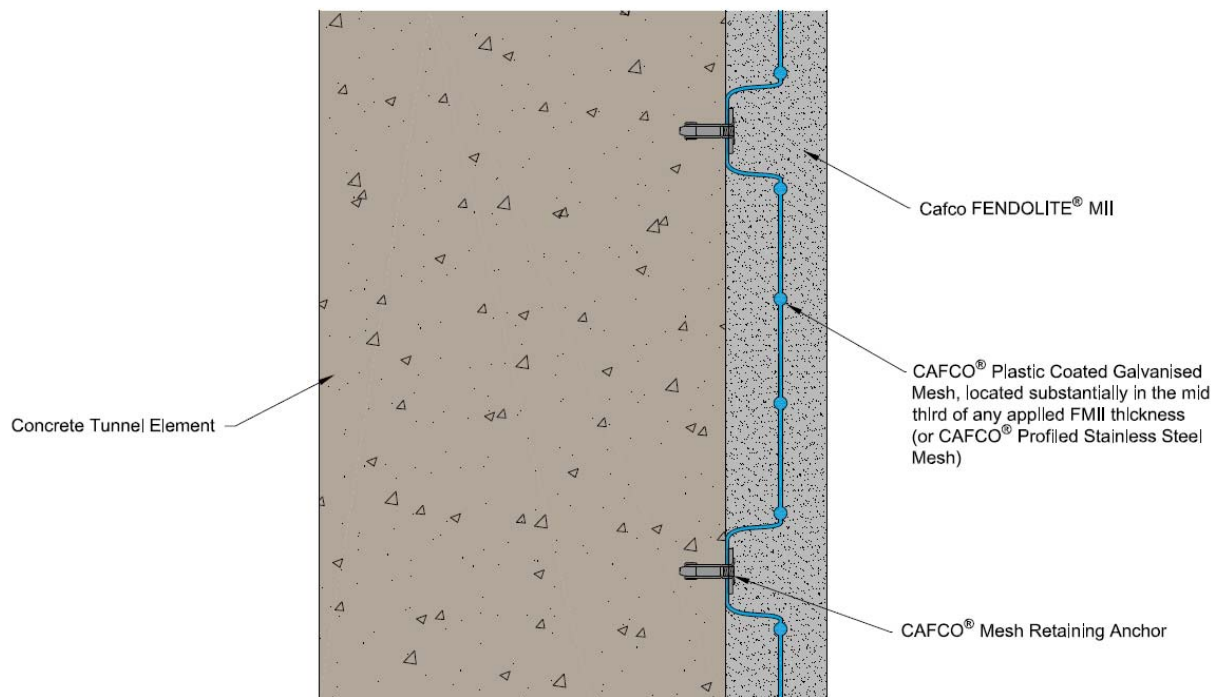
Smoke and toxicity

No claim made.

Durability

No claim made

Figure 1 Reinforcing mesh fixing details





CERTIFICATE No CF 723
PROMAT UK LTD

Promat UK Ltd – Cafco FENDOLITE® MII Fire Protection System for Tunnel Linings

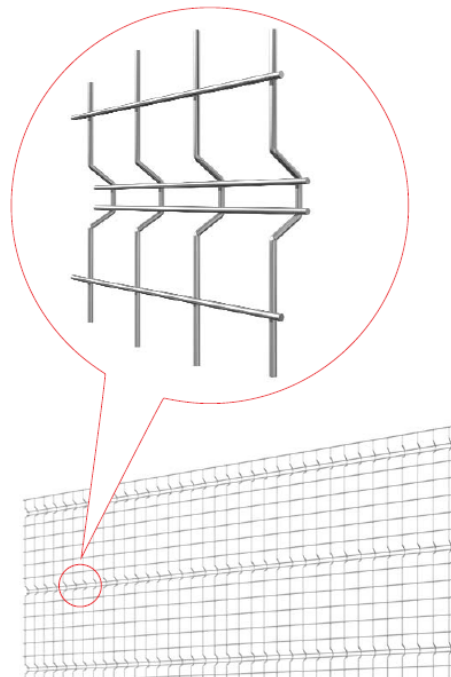
CAFCO® Profiled Stainless Steel Mesh

INTRODUCTION

CAFCO® Profiled Stainless Steel Mesh is a welded wire mesh with incorporated spacings to allow easy fixing on the tunnel lining.

CAFCO® Profiled Stainless Steel Mesh is positioned at 50% centre of the fire insulation system.

Properties	
Grade of steel	316 stainless
Wire diameter	Stainless steel wire 1.5mm
Mesh size	50.4mm x 50.4mm
Fixation mesh	12.7mm x 50.4mm
Profile depth	16mm
Panel size	1806mm x 2521mm = 4.55m ²
Panel weight	± 3kg per panel



CERTIFICATE No CF 723
PROMAT UK LTD

Promat UK Ltd – Cafco FENDOLITE® MII Fire Protection System for Tunnel Linings

CAFCO® Plastic Coated Galvanised Mesh

INTRODUCTION

CAFCO® Plastic Coated Galvanised Mesh is a hexagonal mesh wire netting "reverse twist", galvanised after weaving and coated in blue plastic.

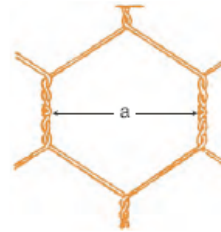
This netting is embedded in the fire protection coating.

Nominal wire diameter (d) is the diameter in mm to designate the wire.

Real wire diameter is the arithmetical mean of the minimum and maximum diameter, measured in the same section of a straight piece of wire by mean of the minimum and maximum diameter.

Nominal mesh size is the distance in mm to designate the mesh.

Real mesh size (a) is the distance in mm between the twists.



Raw material		
Chemical composition of wire rod	Element	%
	C	0.10
	Si	0.30
	Mn	0.50
	P	0.070
S	0.060	
Zinc slabs	Minimum 99.5% of pure zinc	
Plastic coating	Polyvinyl chloride (PVC), turquoise blue in accordance with RAL code 5012 or Munsell code 10 BG 6/6.	
Properties and performance		
Wire diameters and tolerances	Nominal diameter (d)	1.00mm or 1.50mm
	Core diameter	1.00mm ± 0.065mm in accordance with DIN 177
	Final diameter	1.50mm ± 0.10mm in accordance with DIN 3036 T2
Mesh sizes and tolerances	50mm ± 6mm in accordance with DIN 1200. The actual mesh size is the average value of 10 successive mesh openings in the transverse direction of the netting. Actual mesh size in mm = L/10 - 2d "L" being the length in mm of 10 successive meshes in the transverse direction. "d" being the wire diameter in mm.	
Tensile strength (Rm) of the wires	350-500N/mm²	
Mass of zinc	Minimum mass of zinc is 35g/m² in accordance with DIN 1200. To be determined by double weighing on a piece of netting of 150mm x 150mm without salvage and to be expressed in g/m² of the wire surface.	
PVC coating	Homogeneous coating free from uncoated spots.	



CERTIFICATE No CF 723
PROMAT UK LTD

Promat UK Ltd – Cafoo FENDOLITE® MII Fire Protection System for Tunnel Linings

CAFCO® Mesh Retaining Anchors

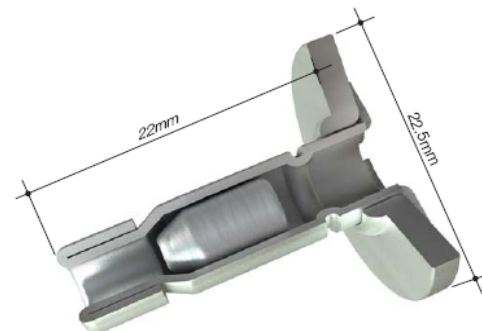
INTRODUCTION

CAFCO® Mesh Retaining Anchor is a tested assembled item used to install CAFCO® Profiled Stainless Steel Mesh or CAFCO® Plastic Coated Galvanised Mesh for use with the Cafoo FENDOLITE® MII system.

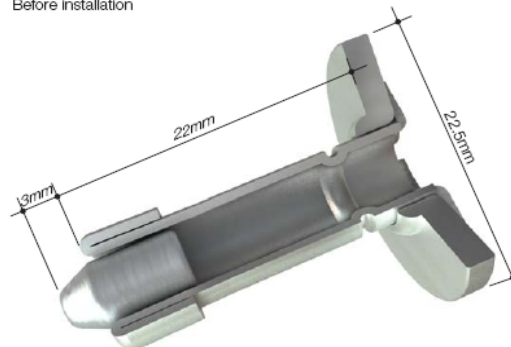
CAFCO® Mesh Retaining Anchor features a unique shouldered design to self align the anchor and mesh in order to avoid the mesh being pinched or cut during installation.

The anchors can be installed manually as shown below or in conjunction with an automatic feed system.

Properties and performance	
Dimensions and materials	Stainless steel 22.5mm with a 22mm leg
Installation	
Typical substrates	Concrete or blockwork
Methods	CAFCO® Mesh Retaining Anchor is easily installed by placing the anchor in a drilled or precast 8mm hole of a minimum depth of 24mm and using a 4mm setting pin. This is used to displace the internal captive plug by up to 3mm, which will produce a pull out load in excess of 1.2KN in most concretes with consistent failure in base material. Supported by UKAS testing of pull out test in accordance with BS 1881-207: 1992.



Before installation



After installation

