



Case Study:

Installation of FireBarrier® 135
in the Lecco Tunnel, Italy

FIREMASTER®

The challenge

The town of Lecco in northern Italy is in an area of strategic economic importance; consequently aspects of the local infrastructure have been substantially upgraded in recent decades.

The original Lecco tunnel project began in 1980, with plans for three separate tunnels. The primary tunnel is 5.8 km long, and both ventilation ducting and the escape passage are above the concrete roof.

Fire protection was needed for the Lecco tunnel, but the specifications for this varied by location within the tunnel structure. For example, the ventilation ducts and escape passages in the central section had to ensure 120 minutes of fire resistance when exposed to the 1,300°C hydrocarbon modified (HCM) fire curve, whereas in areas where main roads join the tunnel and only ventilation ducts are present, the requirement was for 120 minutes of fire protection against a cellulosic fire in accordance with the ISO 834 fire curve. Meanwhile, the structural steel beams in the central section had to maintain their load bearing properties for 120 minutes in the face of the 1,300°C HCM fire curve.

This presented a challenge: each of these applications has a different critical temperature which must not be exceeded. Fire insulation was required to ensure this, but in the face of such varying requirements, engineering that fire protection became a complex issue.

How Morgan helped the Lecco team select the right solution

Morgan's FireBarrier® I35 was chosen as the best fire protection product for use in the Lecco tunnel. FireBarrier I35 has many relevant advantages, including ease of application (it can be applied to metal and concrete substrates using standard spraying equipment) and high adhesion strength. However, the project-specific issues surrounding the varying specifications, and the problem of producing optimal results in each area remained.

In order to determine the correct thicknesses of FireBarrier I35 for each area of the tunnel, a mixture of fire testing and finite element modelling was carried out.



Finite element modelling and fire testing was key in determining how best to use FireBarrier® I35 to achieve a range of results within the same structure substrates.

The result

For the concrete structure, it was determined that a thickness of just 12mm would be sufficient to meet fire protection requirements and maintain its temperature below 30°C during a two hour ISO 834 cellulosic fire.

The concrete roof slab required just 28mm to stop the concrete spalling and prevent collapse of the roof. The same thickness was needed to protect the escape passage above the roof slab.

Using Finite Element Modeling, 35mm of FireBarrier 135 was used to maintain the steel beam average temperature below 450°C during a HCM fire of 120 minutes duration.

For all the structure located in the tunnel roof, FireBarrier 135 was applied using a traditional spray gun machine with a wire mesh installed beforehand

Just **12mm**
of FireBarrier 135 was
required to protect
the tunnel's concrete
structure

The physical
properties of
FireBarrier® 135
allowed it to be quickly
and easily applied, in a
range of thicknesses,
in just one step



ABOUT MORGAN ADVANCED MATERIALS



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