

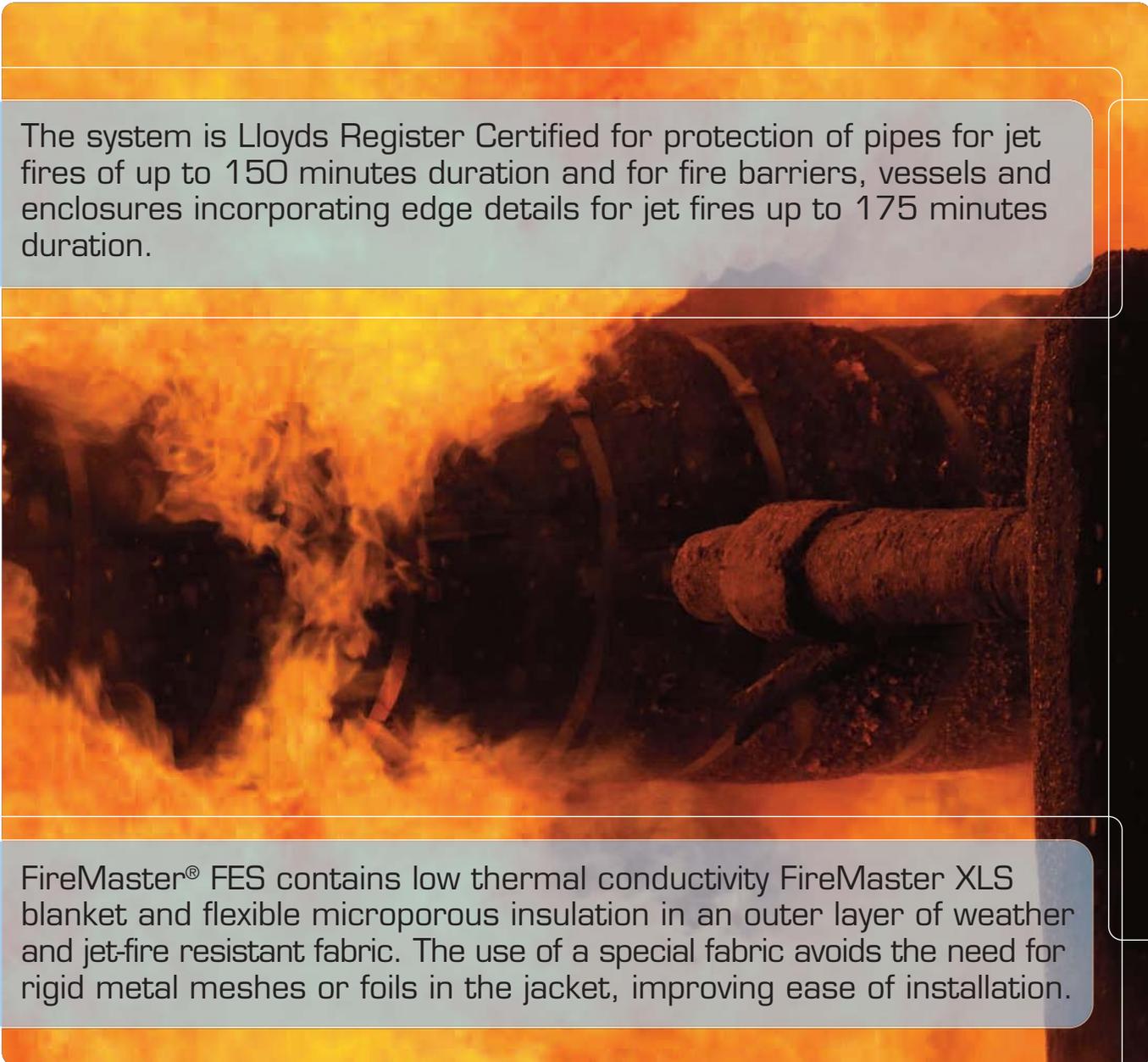
FireMaster® Flexible Enclosure System (FES)

Jet fire protection - for vulnerable equipment with low critical temperature limits

The FireMaster® Enclosure system is specifically designed to provide high performance jet fire protection, especially for vulnerable equipment with low critical temperature limits.

Flexible systems are lighter in weight than rigid enclosures and typically used where regulations do not require metallic enclosures to be fitted but an easily removable system is still desired.





The system is Lloyds Register Certified for protection of pipes for jet fires of up to 150 minutes duration and for fire barriers, vessels and enclosures incorporating edge details for jet fires up to 175 minutes duration.

FireMaster® FES contains low thermal conductivity FireMaster XLS blanket and flexible microporous insulation in an outer layer of weather and jet-fire resistant fabric. The use of a special fabric avoids the need for rigid metal meshes or foils in the jacket, improving ease of installation.



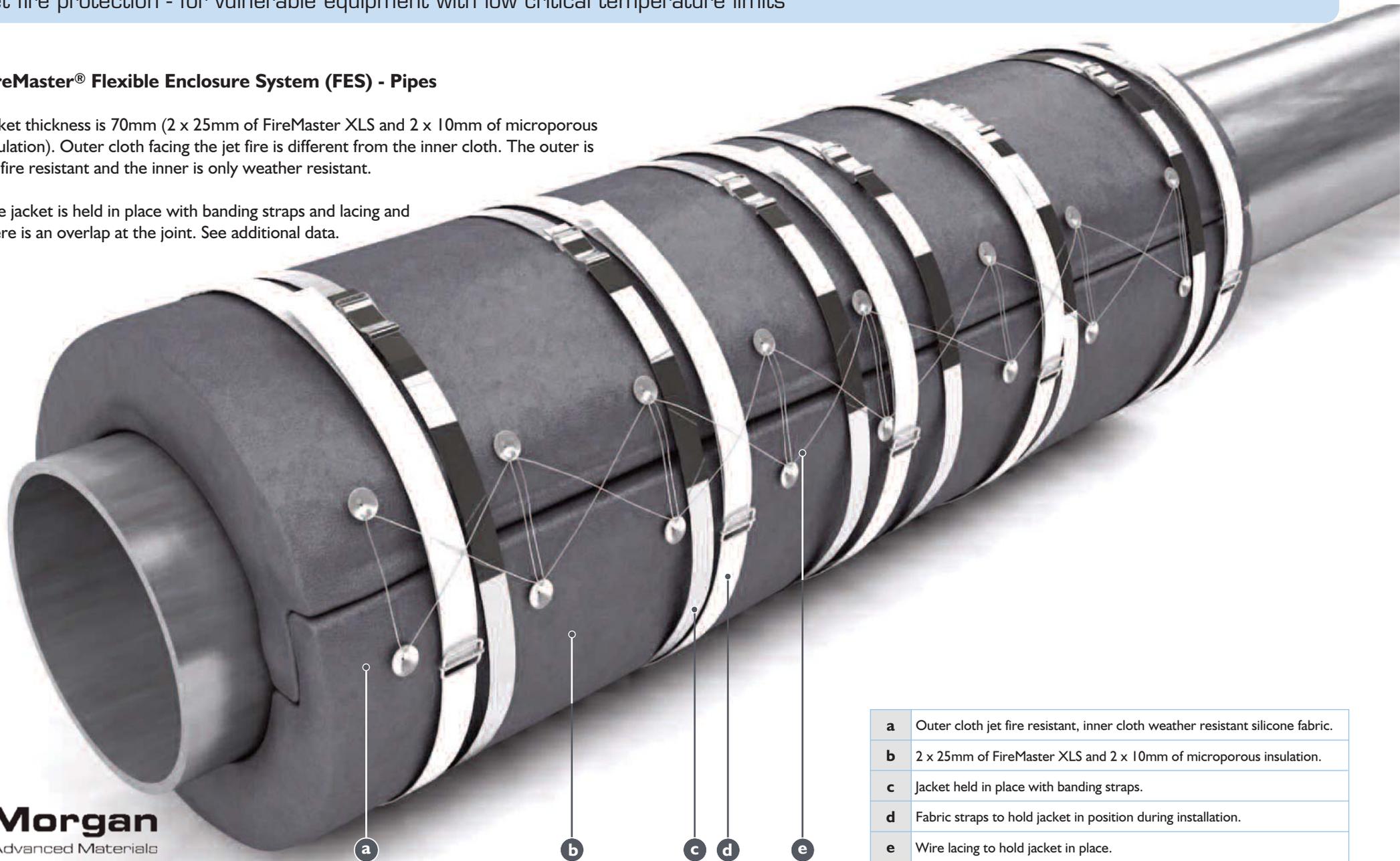
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FireMaster® Flexible Enclosure System (FES) - Pipes

Jacket thickness is 70mm (2 x 25mm of FireMaster XLS and 2 x 10mm of microporous insulation). Outer cloth facing the jet fire is different from the inner cloth. The outer is jet fire resistant and the inner is only weather resistant.

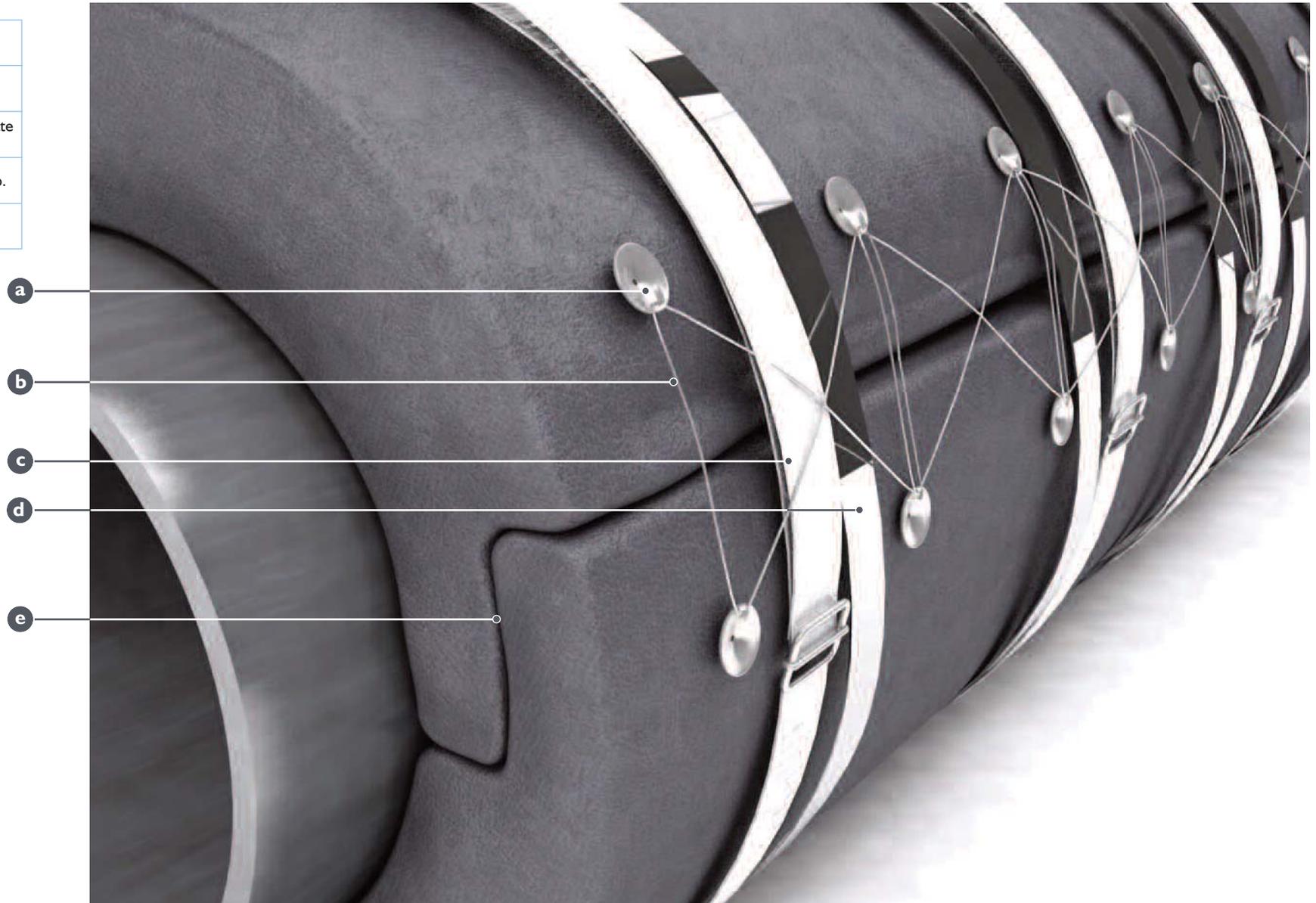
The jacket is held in place with banding straps and lacing and there is an overlap at the joint. See additional data.



a	Outer cloth jet fire resistant, inner cloth weather resistant silicone fabric.
b	2 x 25mm of FireMaster XLS and 2 x 10mm of microporous insulation.
c	Jacket held in place with banding straps.
d	Fabric straps to hold jacket in position during installation.
e	Wire lacing to hold jacket in place.

FireMaster Flexible Enclosure System (FES) - detail view

a	Retention clips.
b	Stainless steel wire.
c	Textile band used to facilitate fitting the FES to pipes.
d	Stainless steel banding strap.
e	FES jacket.

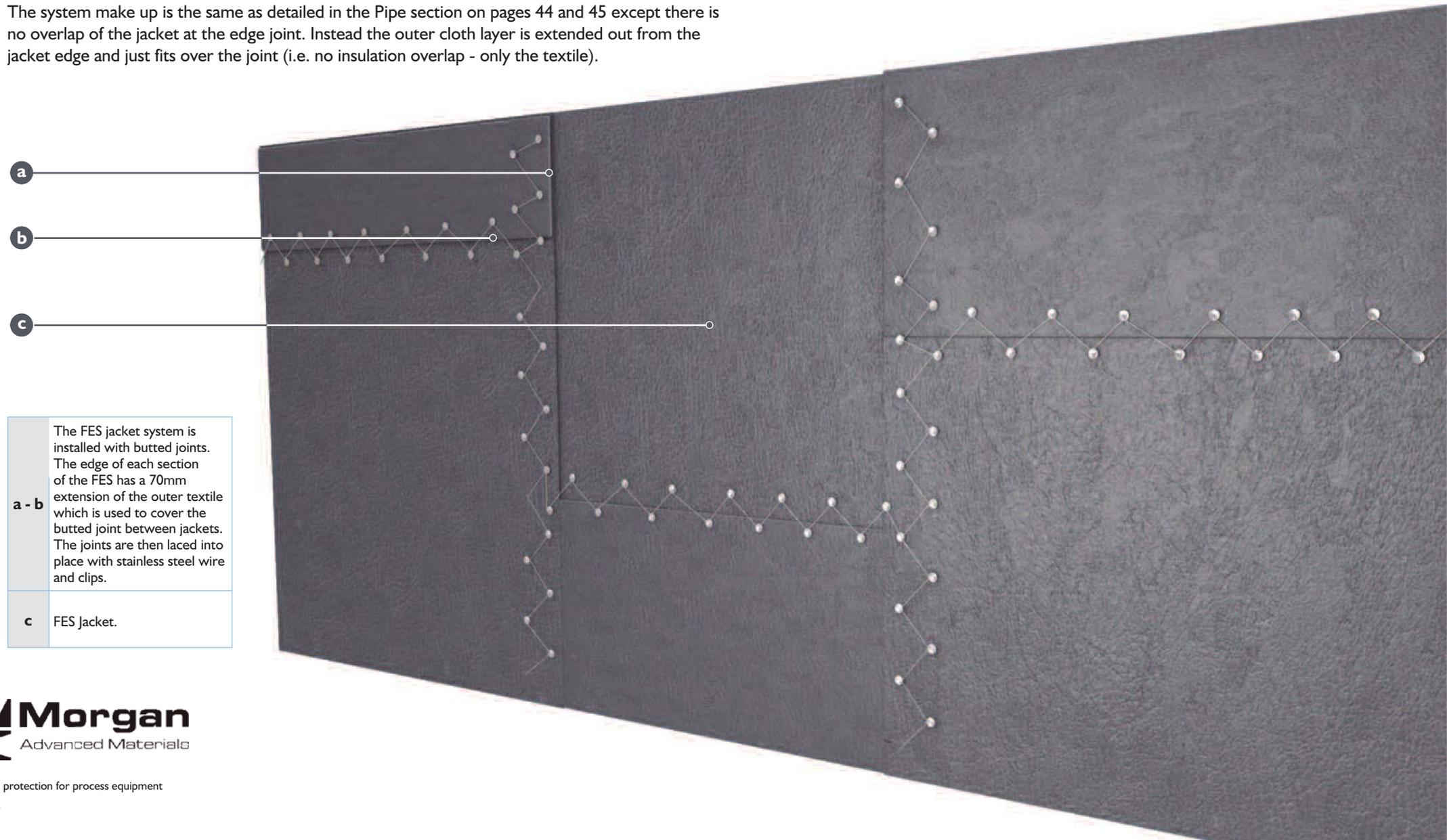


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FireMaster® Flexible Enclosure System (FES) - Firebarriers and Vessels

The system make up is the same as detailed in the Pipe section on pages 44 and 45 except there is no overlap of the jacket at the edge joint. Instead the outer cloth layer is extended out from the jacket edge and just fits over the joint (i.e. no insulation overlap - only the textile).

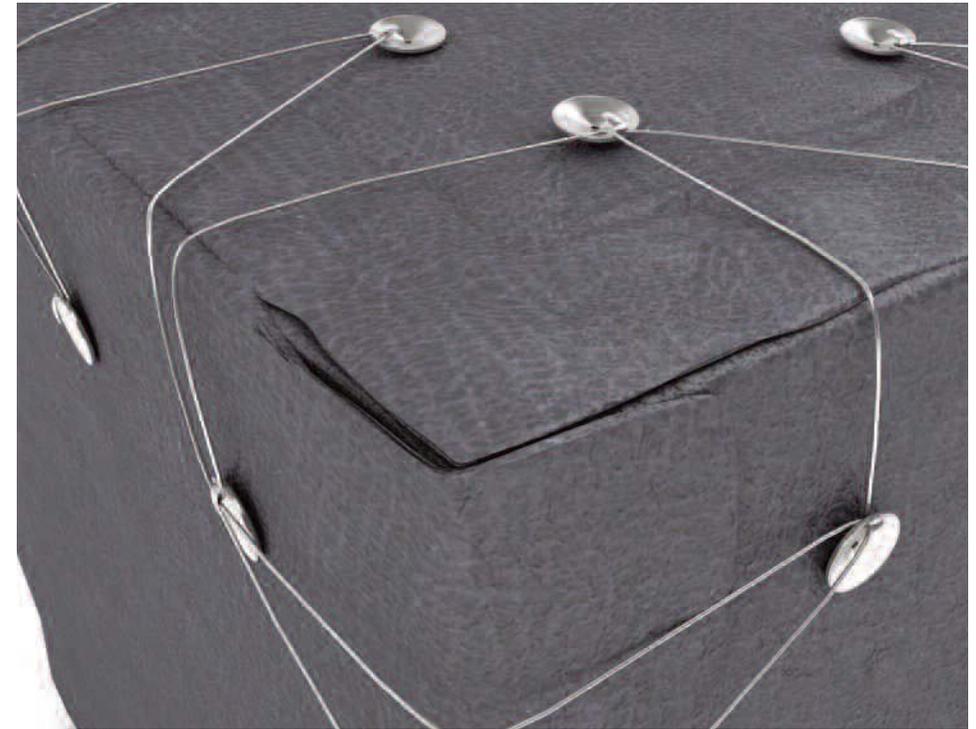
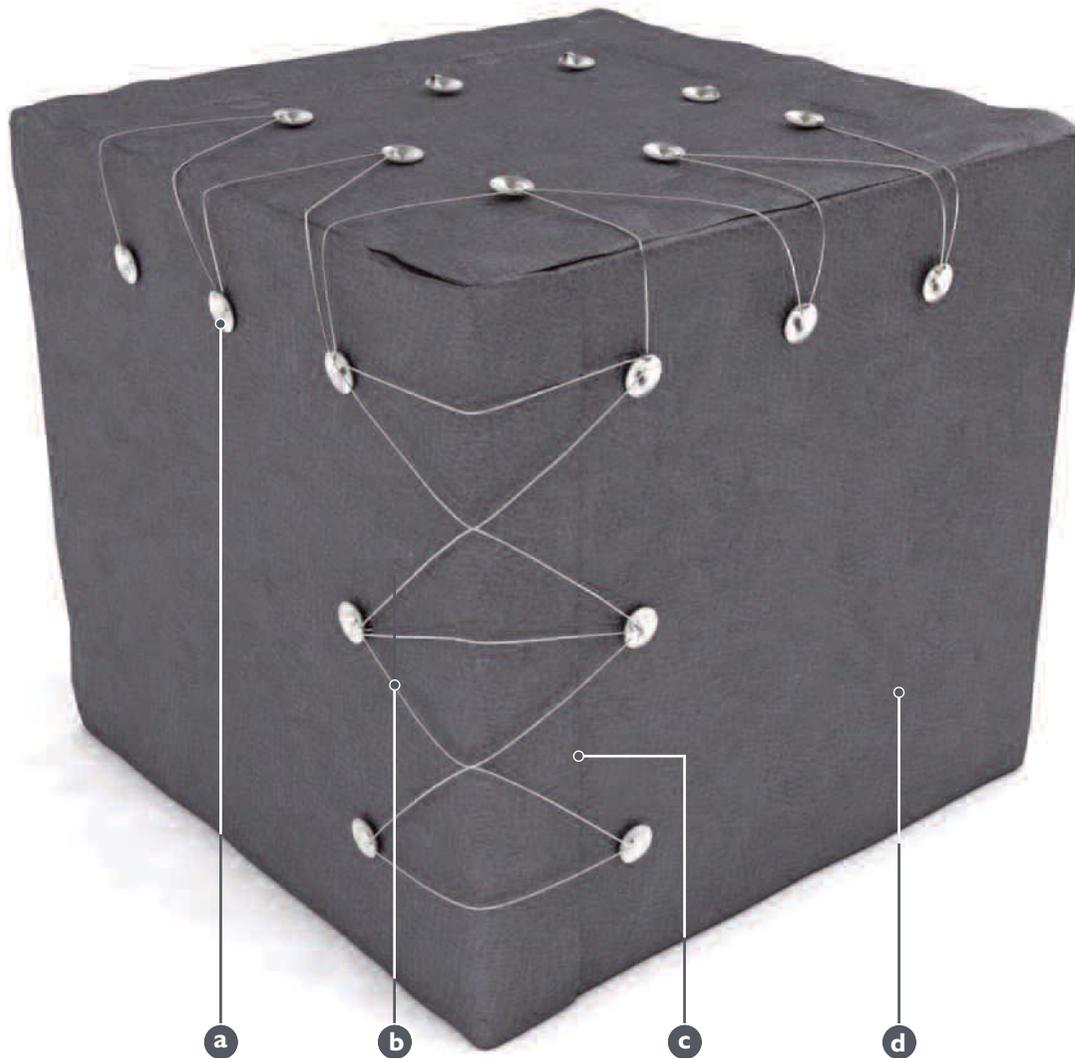


a - b	The FES jacket system is installed with butted joints. The edge of each section of the FES has a 70mm extension of the outer textile which is used to cover the butted joint between jackets. The joints are then laced into place with stainless steel wire and clips.
c	FES Jacket.

FireMaster Flexible Enclosure System (FES)

FireMaster® Flexible Enclosure System (FES) - Enclosures

The use of these type of systems for enclosures (i.e. where the RES would also be used and anything with an “edge”) requires fire test evidence to prove the edge can withstand the impact of the jet flame. The standard way of doing this is to incorporate a raised section in a wall test simulating the edges of a box. You can see the details of this in the wall test sample, page 48.



a	Stainless steel fixing clips.
b	Stainless steel wire.
c	Overlap of joints. The FES jackets is manufactured with a 70mm extension of the outer textile at the edge. The edge of each jacket is butted together to fit and the 70mm textile extension covers the joint. The joints are held in place with stainless steel tie wire.
d	FES jacket.

Fire test performance of FireMaster Flexible Enclosure System

The certification issued by Lloyds Register for the FireMaster FES allows its use for jet fire protection applications on “pipework, pressure vessels, valves with flat panels with or without corners and edges”.

The fire testing of the system was specially designed to ensure the suitability of the system for use as an enclosure system could be adequately demonstrated. When flexible jackets are installed on any item with an edge detail, there is a risk that the outer edge may not resist the erosive effect from the jet flame. In order to prove the FireMaster FES could withstand such conditions, a test specimen incorporating a raised section was exposed to a jet fire test of 175 minute duration. Additional thermocouples were installed on the corner sections and the rear panel area behind the raised section to demonstrate the thermal insulation performance of the system.



Raised corner detail used in jet fire test specimen

FireMaster FES system Classification according to ISO 22899-1 / ISO 22899-2

Tubular Sections (max. section factor 128m ⁻¹)	Fire Barriers and Pressure Vessels
JF/Tubular Section/23/15	JF/Fire Barrier or Pressure Vessels/25/15
JF/Tubular Section/64/30	JF/Fire Barrier or Pressure Vessels/53/30
JF/Tubular Section/146/60	JF/Fire Barrier or Pressure Vessels/111/60
JF/Tubular Section/224/90	JF/Fire Barrier or Pressure Vessels/165/90
JF/Tubular Section/309/120	JF/Fire Barrier or Pressure Vessels/224/120
JF/Tubular Section/400/150	JF/Fire Barrier or Pressure Vessels/262/150
	JF/Fire Barrier or Pressure Vessels/272/165
	JF/Fire Barrier or Pressure Vessels/277/175