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BEELE ENGINEERING JET FIRE TEST 2009

MAXIMUM SIMPLICITY OF USE
OPTIMUM FLEXIBILITY
OUTSTANDING PERFORMANCE

Websites: http://www.actifoam.com, www.beele.com, www.firsto.com, www.nofirno.com, www.rise-systems.com, www.rise-nofirno.com, www.riswat.com and www.slipsil.com

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brochure code : RISE/NOFIRNO-JET FIRE TEST

JET FIRE TEST ACCORDING TO ISO 22899-1:2007 AND ISO/CD 22899-2

Article 5 of the ISO/CD 22899-2 mentions:

The method provides an indication of how passive fire protection materials perform in a jet fire that may occur for example, in petrochemical installations. It aims to simulate the thermal and mechanical loads imparted to passive fire protection material by large scale jet fires resulting from high-pressure releases of flammable gas, pressure liquefied gas or flashing liquid fuels. Jet fire give rise to high convective and radiative heat fluxes as well as high erosive forces. To generate both types of heat flux in sufficient quantity, a 0.3 kg/second sonic release of gas is aimed into a hollow chamber, producing a fire ball with an extended tail. The flame thickness is thereby increased and hence so is the heat radiated to the test specimen. Propane is used as the fuel since it has a greater propensity to form soot than does natural gas and can therefore produce a flame of higher luminosity. High erosive forces are generated by release of the sonic velocity gas jet 1 meter from specimen (bulkhead) surface. The jet velocity is ca. 100 meter/second at 0.25 meter from the back of the recirculation chamber (e.g. the front of the web of a structural steel specimen) and ca. 60 meter/second at the back of the chamber. The average heat flux is approximately 240 kW/m² and the maximum heat flux 300 kW/m². The heat fluxes are highest in the upper part of the chamber and lowest in the corners and at the jet impact zone.

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Article 6.5 of the ISO/CD 22899-2 mentions:
There are concerns regarding the application and performance of passive fire protection materials and products when subjected to extreme fire events. Limited information is available how passive fire protection materials and products (developed for buildings only to withstand relatively slow build up fire tests such as ISO 834) perform if subjected to a fire exposure significantly more severe. A fire protection material or system intended to withstand a conventional building fire for a specified period may not perform adequately in an extreme event scenario. Products that have demonstrated the ability to withstand a jet fire can be used to protect buildings more sensitive to extreme fires.

Article 9.1 of the ISO/CD 22899-2 mentions:
Whilst hydrocarbon furnace tests are designed to represent a particular type of fire, they do not reproduce the actual fire conditions. Parameters such as: the balance between radiative and convective heat transfer, pressure fluctuations due to turbulence, erosive forces from high gas velocities, thermal shock and differential heating are not reproduced.

Jet fire tests simulate a hydrocarbon fueled fire on an offshore oil rig or a missile strike on a military warship.

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The Jet Fire test is carried out at the Health and Safety Laboratories at Buxton, England. Below the test area showing:

a) windscreens
b) the brick wall in which the hollow, recirculation chamber is incorporated
c) the environmental protection chamber at the back of the wall
d) protective wall with a hole allowing video taping the status inside the environmental protection chamber

The fuel is released from a nozzle. The tapered, converging nozzle has a length of 200 mm with in inlet diameter of 52 mm and an outlet diameter of 17.8 mm.
The recirculation chamber measures internally 500x500 mm with a depth of 500 mm; the environmental protection chamber measures 1500x1500 mm with a depth of 1000 mm.
The nozzle is 1000 mm away from the bulkhead and the jet is projected just between the cable and pipe penetration to be tested.

In contrast to the fire test procedures according to IMO Resolution A.754(18), the cables and the pipe project only 250 mm beyond the panel at the exposed side and 500 resp. 1000 mm at the unexposed side.

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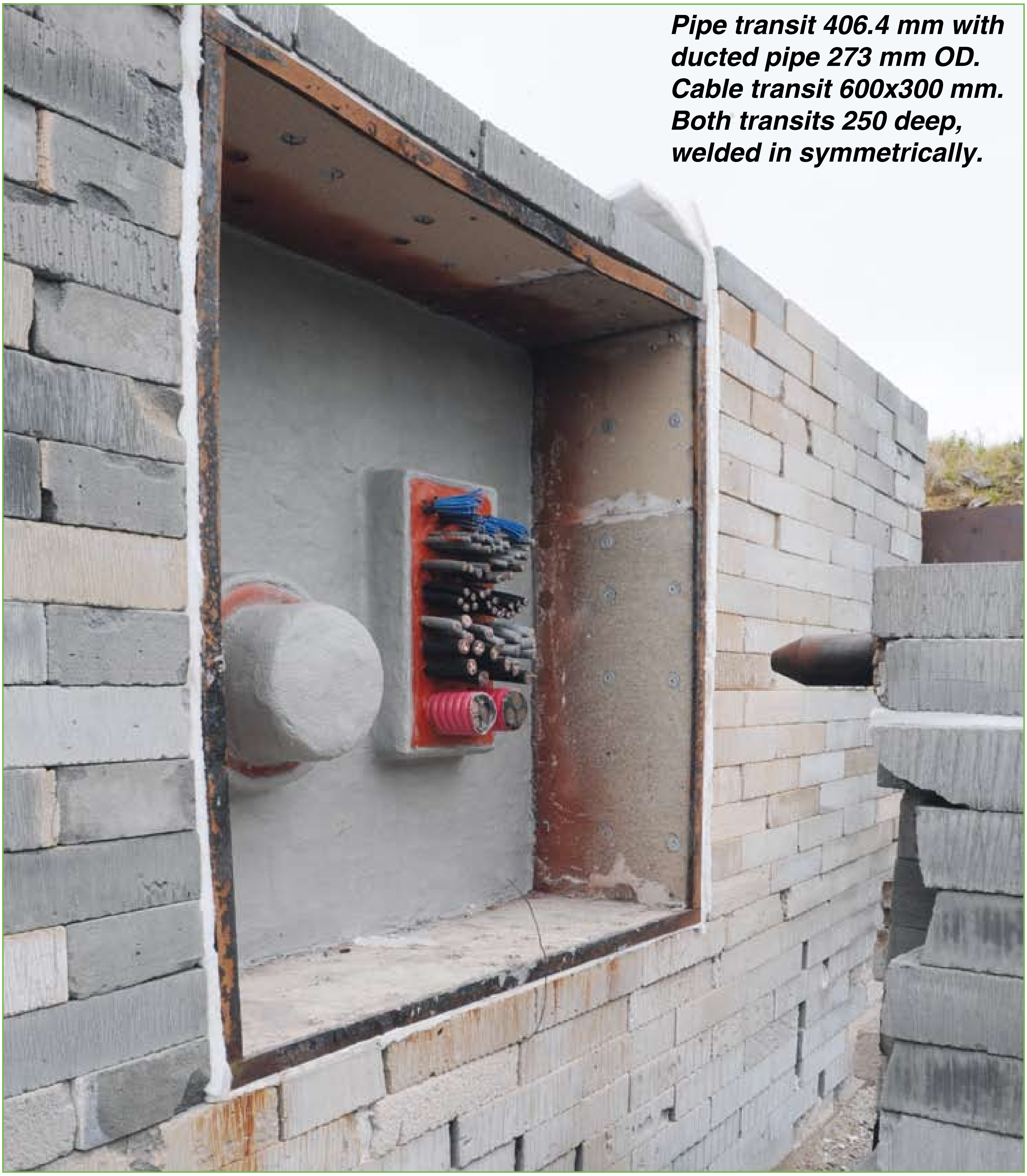
The hollow, recirculation chamber with the RISE-NOFIRNO pipe and multi/cable penetration



Pipe transit 406.4 mm with ducted pipe 273 mm OD. Cable transit 600x300 mm. Both transits 250 deep, welded in symmetrically.

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Cable configuration of the RISE/NOFIRNO multi-cable penetration similar as tested for A-class

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The environmental protection chamber, being the unexposed side. TC´s fixed the test specimen.

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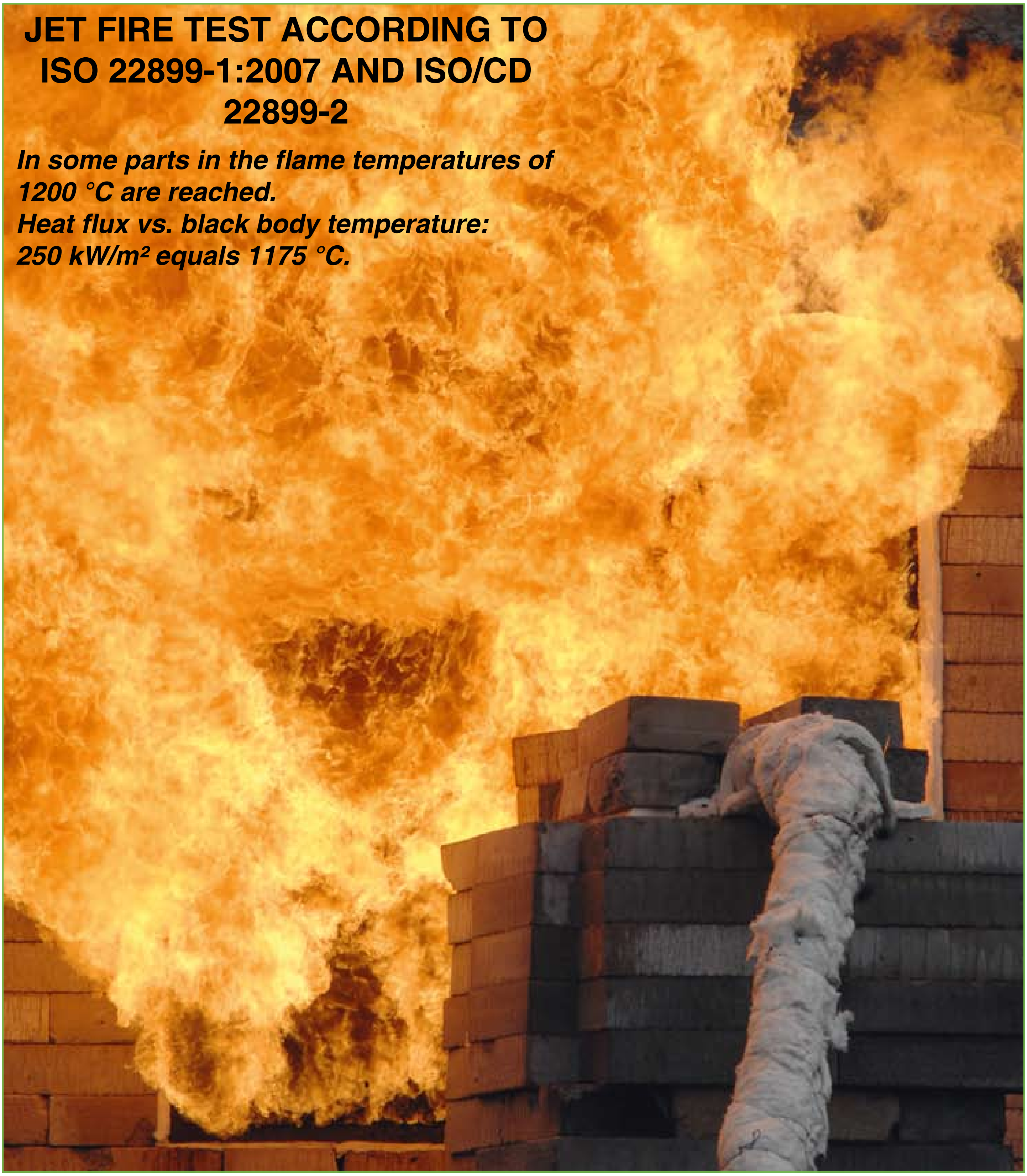
Flame intensity during the full 125 minutes testing.



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Flame intensity during the full 125 minutes testing.


In the upper right corner the insulation is red glowing. Note also the red glow between the bricks and the recirculation chamber.

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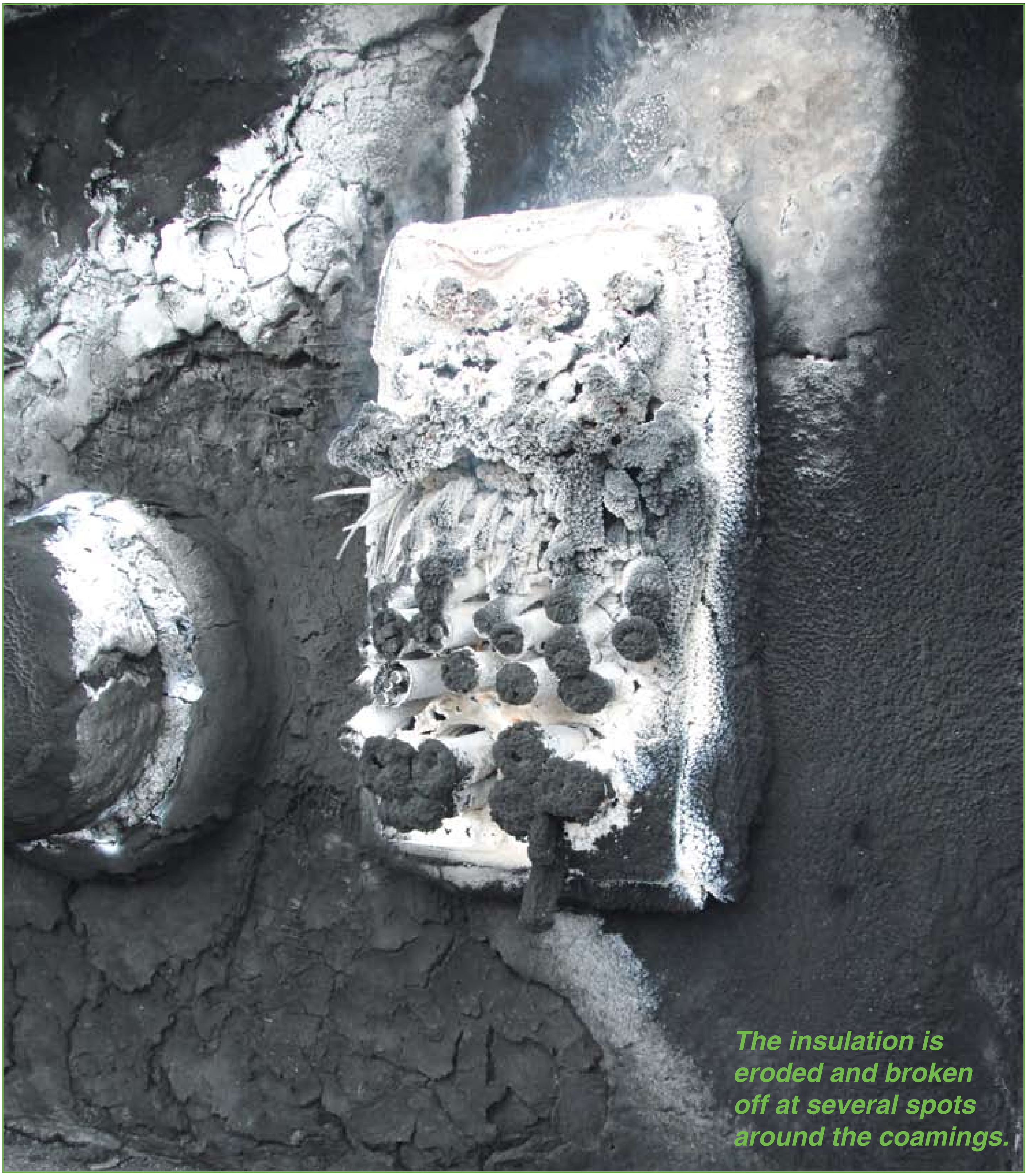
All these “leaks” allowing heat transmission have influenced the temperature rises at the unexposed side. No temperatures however measured on the bulkhead.

JET FIRE TEST ACCORDING TO ISO 22899-1:2007 AND ISO/CD 22899-2

The exposed side of the pipe and cable penetration directly after the 125 minutes Jet Fire test.



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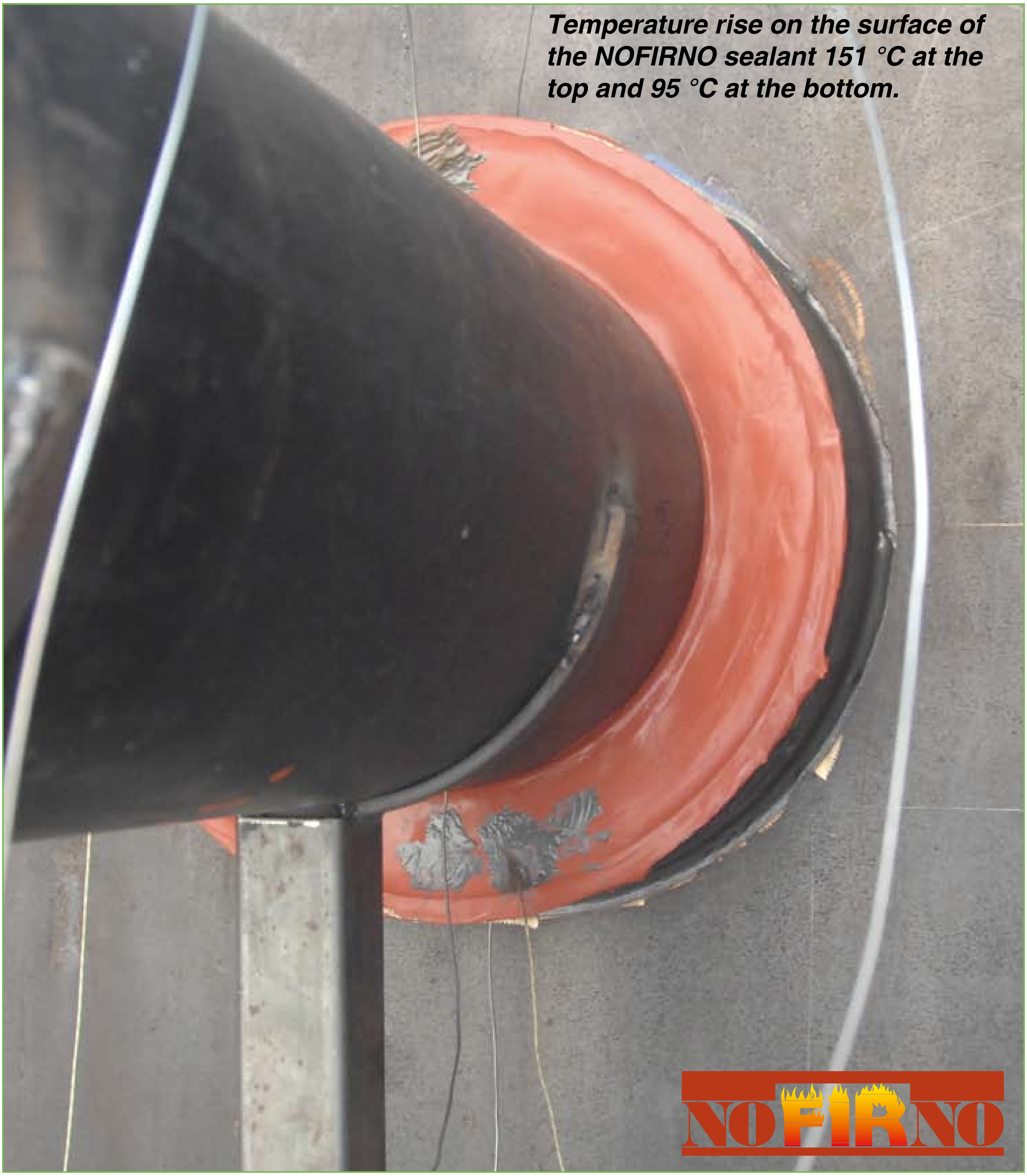
The unexposed side of the pipe penetration directly after the 125 minutes Jet Fire test.



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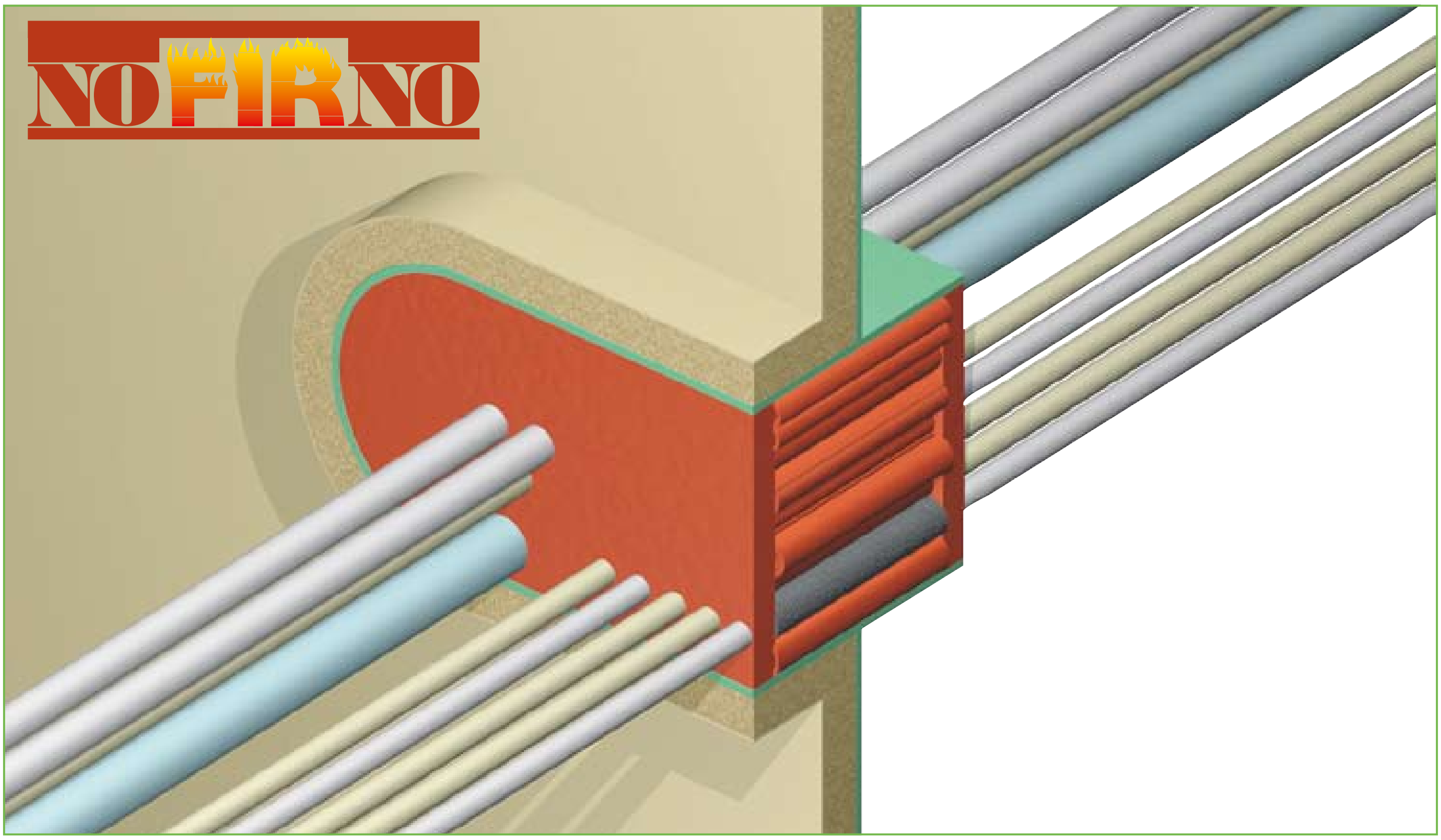

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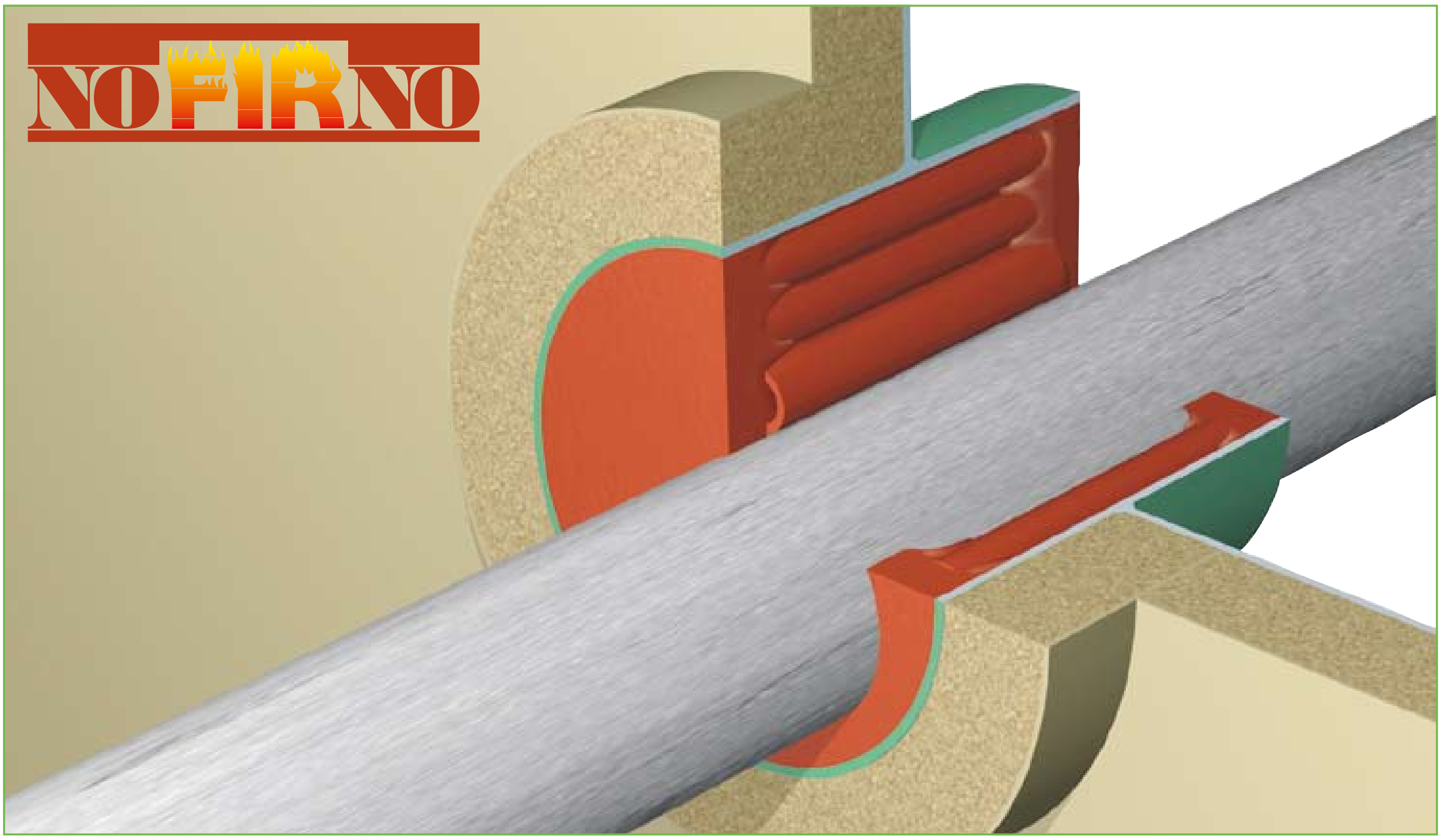

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Specification is 0.3 kg/sec propane. 125 minutes is 7500 sec. This means 2250 kg propane in this test burned. Equals a volume of almost 1300 m^3 propane.

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BEELE Engineering bv - CSD International bv
Beunkdijk 11 - 7122 NZ AALTEN - THE NETHERLANDS
Tel. +31 543 461629 - Fax +31 543 461786 - E-mail: info@beele.com
Websites: http://www.actifoam.com, www.beele.com, www.firsto.com, www.nofirno.com, www.rise-systems.com, www.rise-nofirno.com, www.riswat.com and www.slipsil.com