



Deep Renovation Joint Workshop
Rome, 5th October 2018

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EENSULATE highly insulating environmentally friendly bi-components foam

TCF is highly insulating polyisocyanurate (PIR) foam based insulation materials enhanced with eco-friendly lamellar inorganic fillers contributes to meet energy performance requirements, environmental challenges and cost reduction without undue compromise of the overall building fire safety.

The TCF is used to be injected and workable for the manufacturing of spandrel elements replacing cut-to-measure mineral wool panels (TCF is used within the manufacturing line).

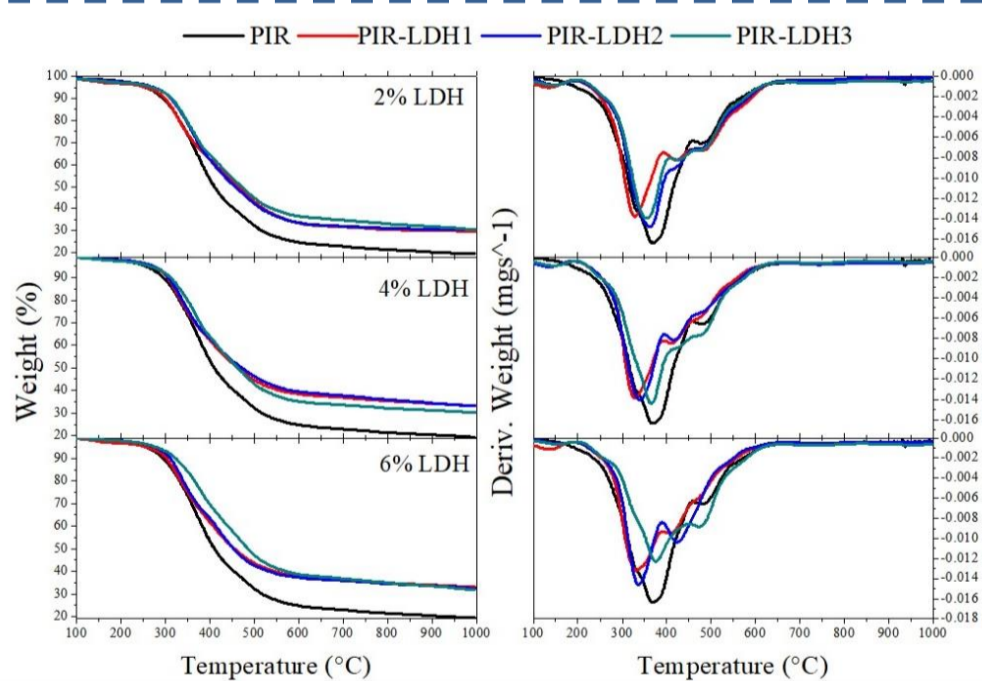
TECHNICAL DATA FOR TCF

FOAM PROPERTIES

Density in finished product [kg/m ³]	35-40
EN 1602 : 1999	
Fire class (EN 13501 – A1:2010)	B s1 d0
test method EN ISO 11925 – 2, EN 13823	
Thermal conductivity λ [mW/ m*K]	≥22
EN 12667 : 2001	
Content of closed cells [%]	≥90
ISO 4590 : 2014	



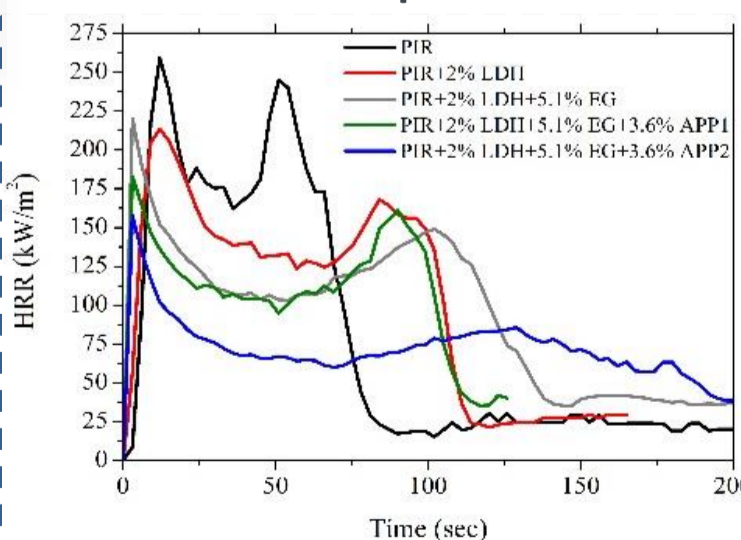
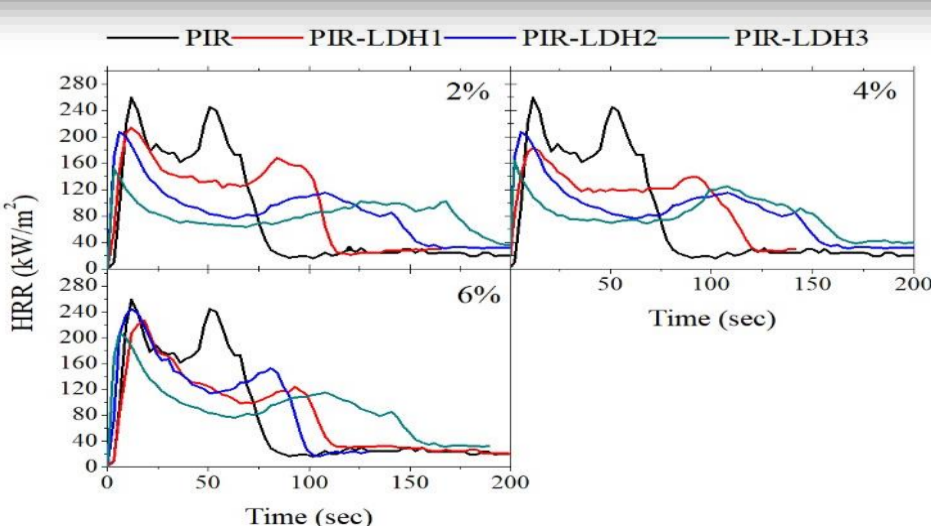
INNOVATION & ADVANTAGES



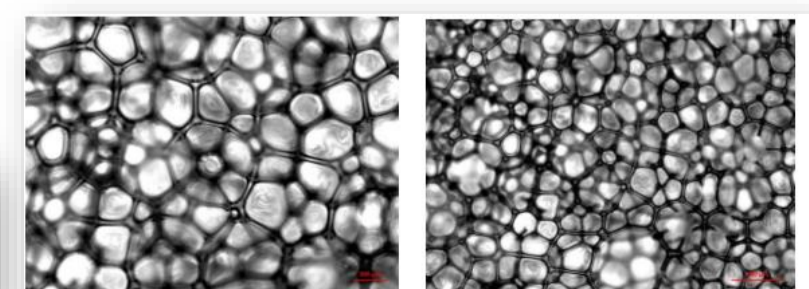
The advantages of the TCF system during the production process are the increased efficiency 35kg/m³ and the ease of processing.

PIR system with layer fillers provides fire reaction properties because favor the formation of a reinforced top layer, providing an effective barrier against heat and oxygen, release non-flammable gases, and at the same time effectively suppress smoke and gases during the combustion process.

ESFSS 2018
ESFSS 2018 : European Symposium on Fire Safety Science
12-14 Sep 2018 Nancy (France)



Sample	THR	p-HRR	Av-HRR	Smoke yield	CO yield
	MJ/m ²	kW/m ²	kW/m ²	-	-
PIR	17.85	259.1	135.2	0.0980	0.1130
PIR+2%LDH	17.15	213.4	164.9	0.0690	0.0400
PIR+2%LDH+5.1%EG	16.76	207.5	109.5	0.0734	0.0305
PIR+2%LDH+5.1%EG+3.6%APP1	13.66	183.0	108.4	0.0907	0.0553
PIR+2%LDH+5.1%EG+3.6%APP2	15.03	157.9	071.2	0.0484	0.0383



Acknowledgments



Development of innovative lightweight and highly insulating energy efficient components and associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades



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EENSULATE one components foam for windows application

The OCF will be used as an effective thermal sealant at the interface between curtain wall and sub-structures, comprising a bittering agent that will prevent small animals and insects from eating and destroying the foam in the cavities. The polyurethane foam is packaged in a pressurized can and can be easily used in construction sites.



BENCHMARK B1 EENSULATE OCF

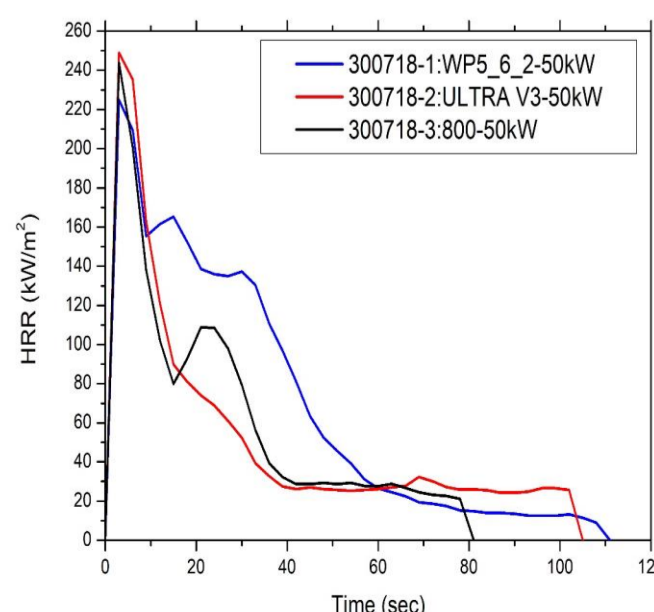


EENSULATE OCF

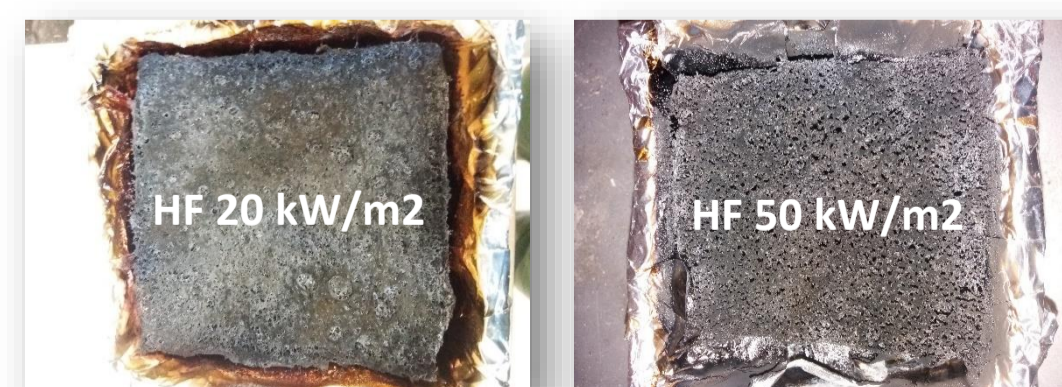
INNOVATION & ADVANTAGES

	BENCHMARK	NEW OCF
TOXIC COMPOUNDS	CONTAINING	NOT CONTAINING
NET CONTENT [g]	385	385
Fire class (EN 13501 – A1:2010)	B s1 d0	comparable, class B1 was confirmed according to DIN 4102
YIELD (linear metre)	5	6
DENSITY [kg/m ³]	13	18
Thermal conductivity λ [mW/ m*K] EN 12667 : 2001	36 ÷ 40	33 ÷ 35

Improve fire behavior of OCF thanks to use nanosized inorganic fillers and expandable graphite which ensure high level of fire resistance. The experience from two component foam was transferred to increase the fire properties and removing toxic compound (e.g. halogen molecules).



Cone Calorimeter (CC)



In higher heating rates 50 kW/m² observed for samples WP5-6-2 (OCF developed in framework EP) the lowest peak HRR (at around 220 kW/m²).

Acknowledgments

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