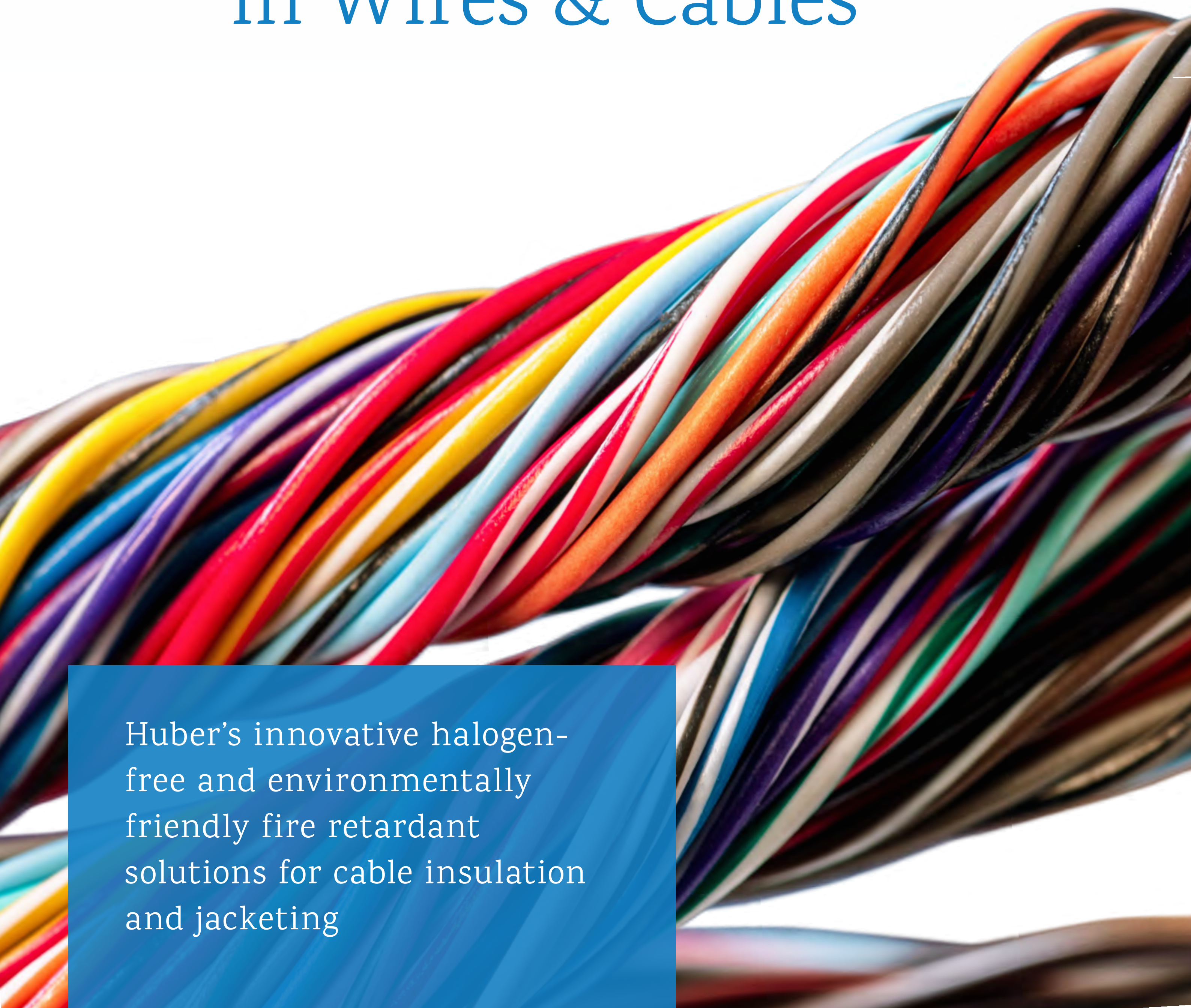
ADVANCED MATERIALS

Halogen-Free Fire Retardants for Thermoplastic in Wires & Cables



Huber's innovative halogen-free and environmentally friendly fire retardant solutions for cable insulation and jacketing

Thermoplastic cable compounds are widely used across multiple sectors due to their versatility, durability, flexibility, recyclability and ease of processing. Common cable applications include building and construction, telecommunications and transportation among others.

Low Smoke, Zero Halogen (LSZH) fire retardants, also known as HFFR or LSFH, are specialized materials specifically used for cable insulation and jacketing that are engineered to emit very limited smoke and halogen-free gases when thermoplastic cable compounds are exposed to fire and/or high temperatures.

Huber Advanced Materials offers a variety of trusted products for optimum fire safety in these compounds including Martinal®, Hydral®, Hymod® and Micral® Aluminum hydroxides (ATH): Magnifin® and Zerogen® Magnesium hydroxide (MDH). These technologies are well known throughout the industries serving flame retardant, low smoke and non-halogen properties to LSZH compound and their respective applications.

Within the European Building & Construction sector, ATH and MDH are preferred solutions. Huber's products are well-suited for sheathing, bedding, and insulation formulations. The criteria for compliance with the CPR/FIPEC burning test are detailed below.

CPR (Construction Products Regulation) classifies cables according to their reaction to fire.

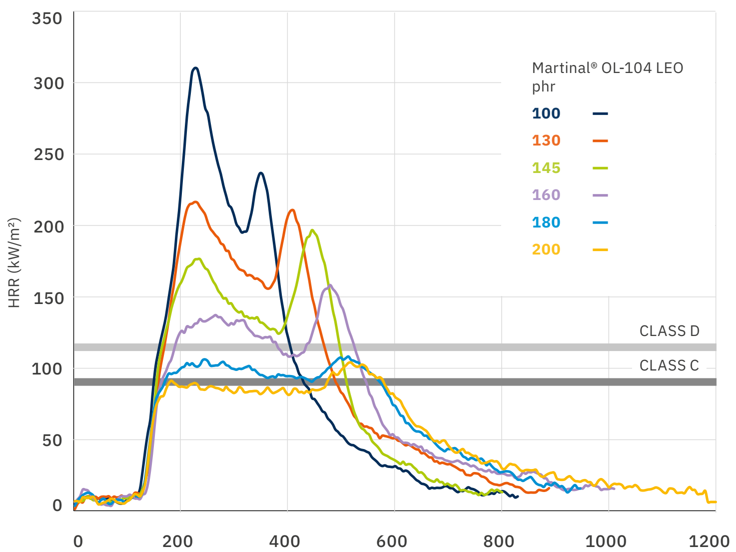
Class	Method	Criteria	Additional Criteria
Aca	EN ISO 1716 (Bomb calorimeter)	PCS ≤ 2,0 MJ/kg	
B1ca	EN 50399 (30 kW ignition source)	FS ≤ 1,75 m and THR1200s ≤ 10 MJ and PHRR ≤ 20 kW and FIGRA ≤ 120 W/s	**s1** (**s1a** or **s1b**), **s2** or **s3** **d0**, **d1** or **d3** **a1**, **a2**, **a3** or no declaration
	EN 60332-1-2	H ≤ 425 mm	
B2ca	EN 50399 (20,5 kW ignition source)	FS ≤ 1,5 m and THR1200s ≤ 15 MJ and PHRR ≤ 30 kW and FIGRA ≤ 120 W/s	**s1** (**s1a** or **s1b**), **s2** or **s3** **d0**, **d1** or **d3** **a1**, **a2**, **a3** or no declaration
	EN 60332-1-2	H ≤ 425 mm	
Cca	EN 50399 (20,5 kW ignition source)	FS ≤ 2,0 m and THR1200s ≤ 30 MJ and PHRR ≤ 60 kW and FIGRA ≤ 300 W/s	**s1** (**s1a** or **s1b**), **s2** or **s3** **d0**, **d1** or **d3** **a1**, **a2**, **a3** or no declaration
	EN 60332-1-2	H ≤ 425 mm	
Dca	EN 50399 (20,5 kW ignition source)	THR1200s ≤ 70 MJ and PHRR ≤ 400 kW and FIGRA ≤ 1300 W/s	**s1** (**s1a** or **s1b**), **s2** or **s3** **d0**, **d1** or **d3** **a1**, **a2**, **a3** or no declaration
	EN 60332-1-2	H ≤ 425 mm	
Eca	EN 60332-1-2	H ≤ 425 mm	
Fca	No performance determined		

FIPEC Burning Test

Key benefits of Huber solutions for Thermoplastic cables meeting CPR:

- **Excellent compounding performance and cost efficiency:** Martinal® OL-104 LEO and Martinal® OL-107 LEO deliver unique high thermal stability, improved powder flow, optimized throughput, reduced extrusion costs and wide the processing window.
- **Higher heat resistance:** for elevated processing temperatures, Magnifin® product range is recommended
- **Versatile in Cables formulations:** Huber's product can be used in insulation and sheathing compounds
- **CPR class Cca targeting:** by adjusting loading level with Martinal®, formulations can be tuned to achieve up to class Cca
- **Advancing to B2ca with MDH:** With Magnifin®, reaching class B2ca is achievable is achievable in appropriately designed formulations.
- **Smoke, acidity, and char performance:** The decomposition mechanism of Martinal® or Magnifin® reduces smoke rates/density and acidity while promoting char formation – supporting additional CPR criteria and enabeling targets such as Cca **a1, s1** with Martinal®.

Performance of Martinal® OL-104 LEO at various Loading Levels Reaching CPR class C and D

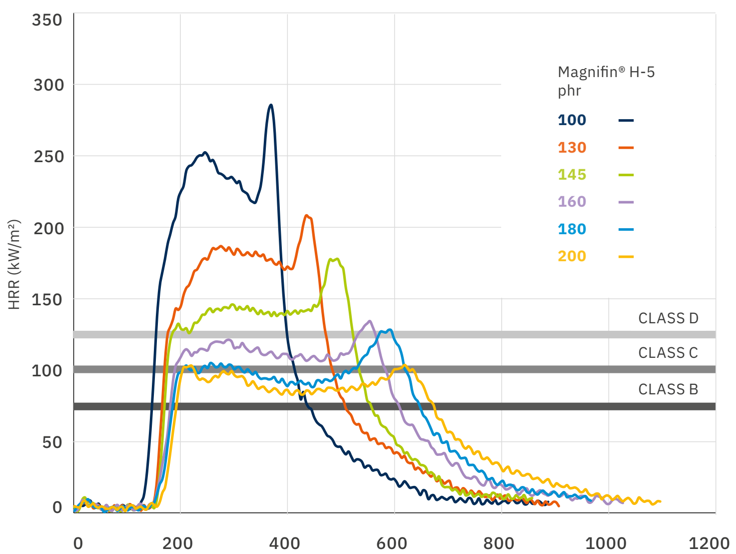


Graph 1

Formulation (phr)	
EVA	70
LLDPE 1001 XV	20
MAH grafting	10
Stabilizer	0.75
Martinal® OL-104 LEO	100–200

Example graph 1: FR performance of Martinal® OL-104 LEO is improving with increased filler level allowing to reach Cca.

Performance of Magnifin® H-5 at various Loading Levels Reaching CPR class B



Graph 2

Formulation (phr)	
EVA	70
LLDPE 1001 XV	20
MAH grafting	10
Stabilizer	0.75
Magnifin® H-5	100–200

Example graph2: FR performance of Magnifin® H-5 is improving witht increased filler level allowing to reach B2ca.

Our global **footprint**

Huber Advanced Materials is a global leader in halogen-free fire retardants and smoke suppressants, thermal management solutions, specialty aluminum oxides and organic matting agents.

We deliver ideal application solutions to enhance the performance, appeal and processing of a broad range of industrial, agricultural and consumer products.

Our innovation, advanced technologies, unique expertise, unsurpassed customer focus and technical know-how give us the edge to continue meeting the dynamic needs of tomorrow.

For more information about our complete line of innovative and sustainable material solutions for wire and cable formulations, contact us today.

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Kennesaw, GA
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Bergheim, Germany
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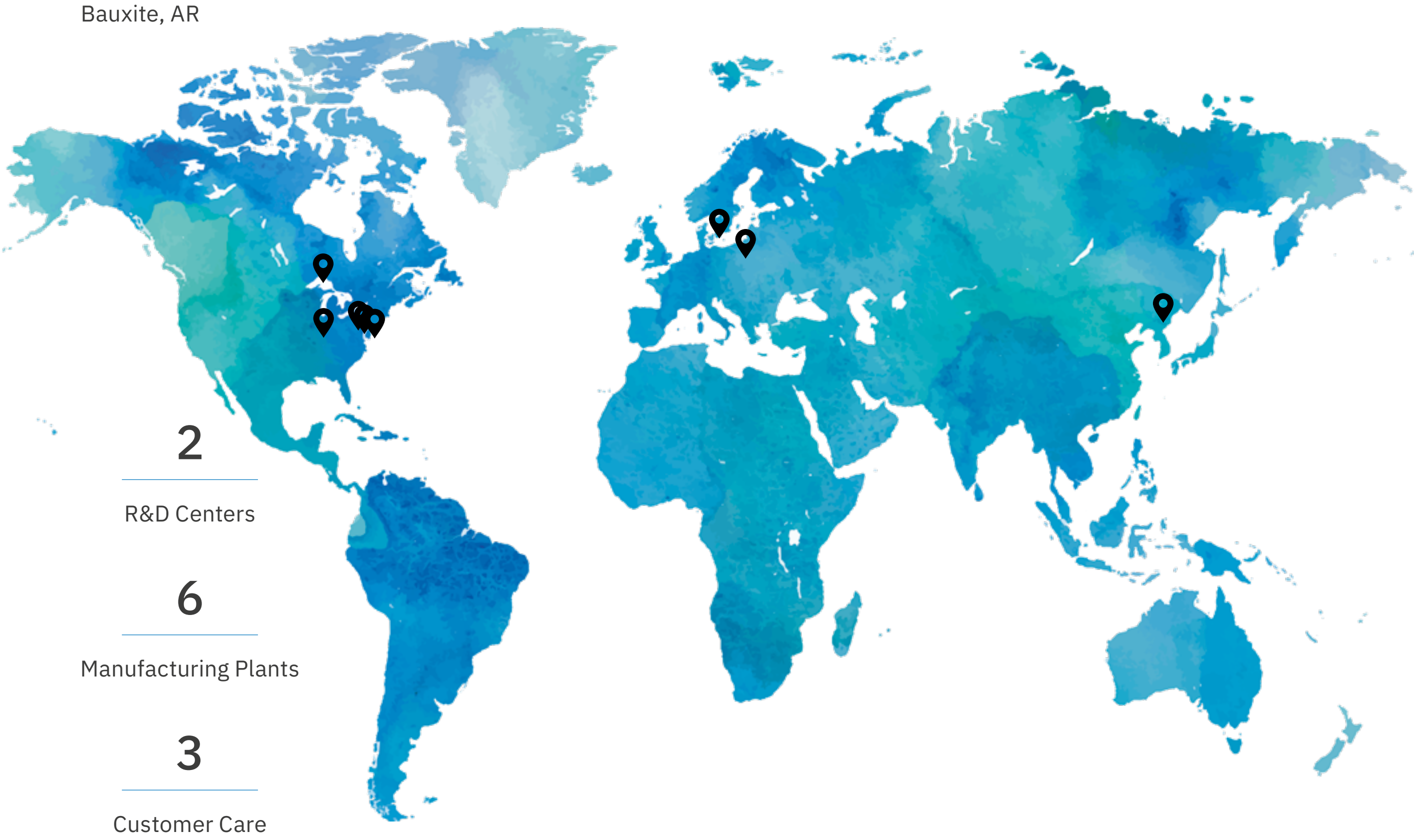
Asia Pacific

Qingdao, China



2
R&D Centers

6
Manufacturing Plants

3
Customer Care Centers

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