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Global 2018

**Sales locations:**

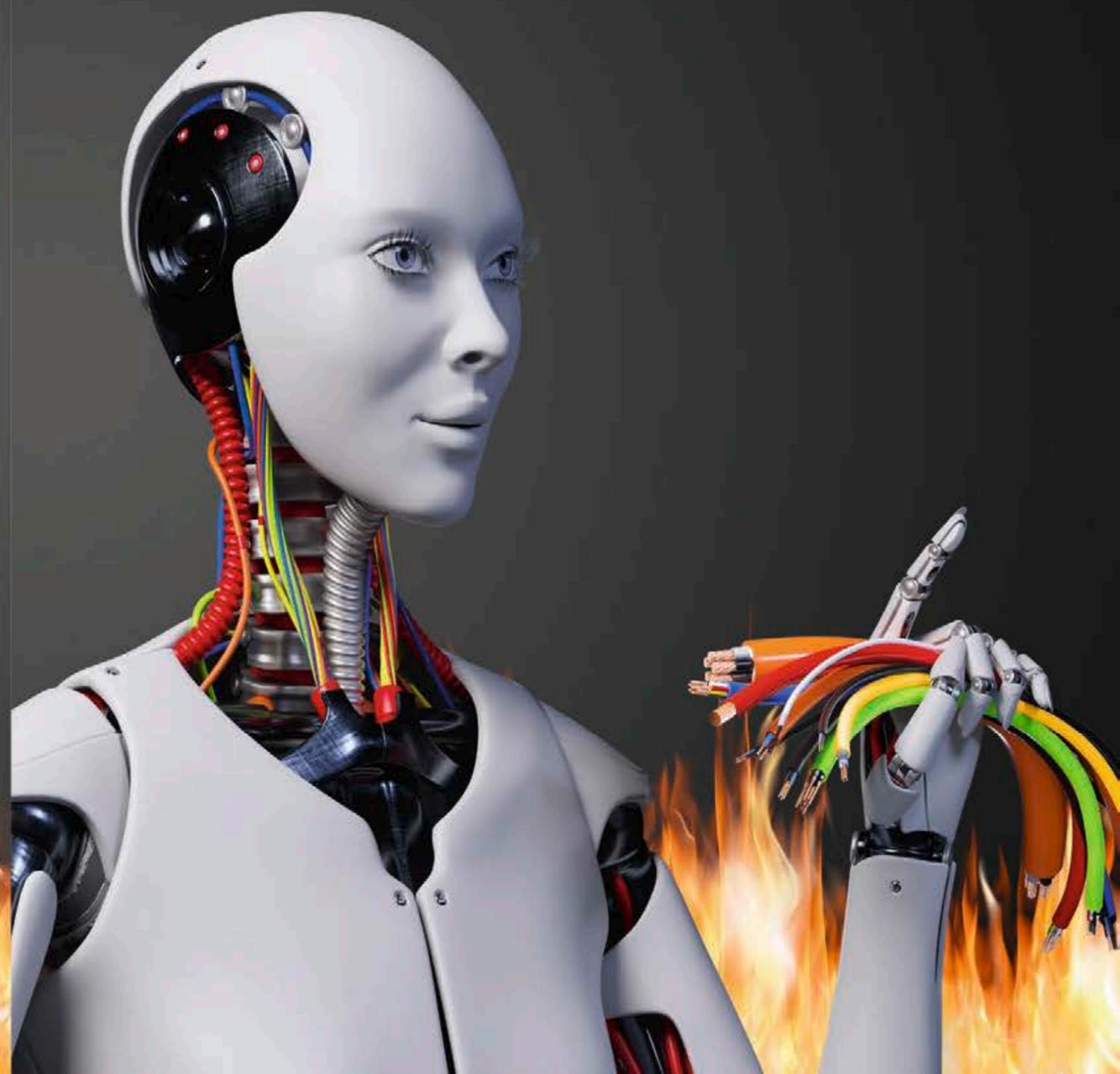
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## Specialty IROGRAN® FR TPUs for the Wire & Cable Industry

Setting a new standard for flame retardant cable protection



# Specialty FR TPU grades...

IROGRAN® FR thermoplastic polyurethane (TPU) is a unique family of halogen-free, flame retardant (HFFR) TPU products for the Wire & Cable industry.

Delivering a major breakthrough in the physico-mechanical performance of flame retardant cable jacket materials, this innovative FR TPU range provides substantially improved reaction to fire properties compared to benchmark HFFR solutions plus unprecedented strength and fatigue resistance in both flexion and torsion.

Made using novel formulation and production processes, our IROGRAN® FR TPU materials set a new standard for flame retardant cable jacket materials – raising the bar for the protection of connections in an increasingly automated world, which demands more from wire and cable products.



## Three innovative products

Designed for use in challenging environments, where connections are regularly pushed to their limits, our IROGRAN® FR TPU products have been rigorously tested and validated by independent, third parties to ensure full compliance with all major fire safety and material standards.

Currently, there are three products in the IROGRAN® FR TPU range:

### IROGRAN® A 90 P 5014 FR

Our baseline material for the most common flame retardant (FR) applications.

### IROGRAN® A 91 P 5015 FR

For more demanding FR applications.

### IROGRAN® A 92 P 5016 FR

Our flagship grade for the most demanding FR applications.

# ...for mission critical applications

Day-to-day we are more dependent on wires and cables than ever before. At home, at work, and on the move, they provide a vital lifeline – delivering power and information to keep us connected and mobile, and helping us find smarter, more efficient ways of working.

Our IROGRAN® FR TPU grades are the ideal solution for mission critical power and data transmission applications, where flame retardancy is essential and the physical failure of wire and cable jacketing systems is not an option.



## Automation:

**Keeping factories of the future functioning**

Industry 4.0 is advancing the development of smart factories where cyber-physical systems, automated tools and mechanized production techniques are converging. Our IROGRAN® FR TPU wire and cable grades are a flexible jacketing solution for connected manufacturing environments – linking sensors, readers and constantly moving machines, and carrying data over intricate information networks.



## Transportation:

**Keeping people and products moving safely**

Our IROGRAN® FR TPU materials have been developed to help drive new cabling standards across all modes of transportation. Resilient to abrasion, oil and heat, they have powerful properties that perform well in harsh powertrain systems. In connected cars they can deliver vital engine management and navigation information. They can enable exciting entertainment possibilities for passengers travelling by road, rail, air and sea. They can also be used in charging stations for electric and hybrid vehicles.



## Energy:

**Keeping power supplies flowing**

Around the world, the energy industry relies on wires and cables to keep power pumping to homes, schools, hospitals, offices and factories. In energy exploration and extraction, our IROGRAN® FR TPU products can be used in unforgiving environments such as oil rigs and mines. They can also be used at power stations - helping to harness and transfer energy from renewable and non-renewable sources, both on- and offshore.



## Consumer electronics:

**Keeping people connected**

We live in a digital world that is increasingly dependent on communication devices that enable us to keep in touch and access information and entertainment around the clock. Flexible, and with a pleasant finish and good coiling characteristics, our IROGRAN® FR TPU materials can be used to create robust, reliable charging cables and accessories for consumer electronics devices including smart phones, tablets, laptops and computers.



# Delivering something different...

Adding flame-retardants to wire and cable materials will typically influence elongation at break and strength, as well as abrasion and fatigue resistance. IROGRAN® FR wire and cable products are different. While offering a state-of-the-art reaction to fire, these special TPU grades will retain their strength and flexibility, and remain easy to process.

## Key characteristics

- Non-halogenated and plasticizer-free
- Advanced abrasion, fatigue and stain resistance
- Excellent environmental resilience to chemicals, water, oil, solvents and heat
- A wide processing window
- Consistent dimensional stability
- Fully recyclable
- Pleasant haptics with a matt finish for easy uncoiling.

## Key benefits

- Compliant with international cable fire safety norms depending on cable style and material selection
- UL94 certified by the Underwriters Laboratories
- Tested in real world wire and cable production and application environments
- Proven to bring greater manufacturing flexibility.

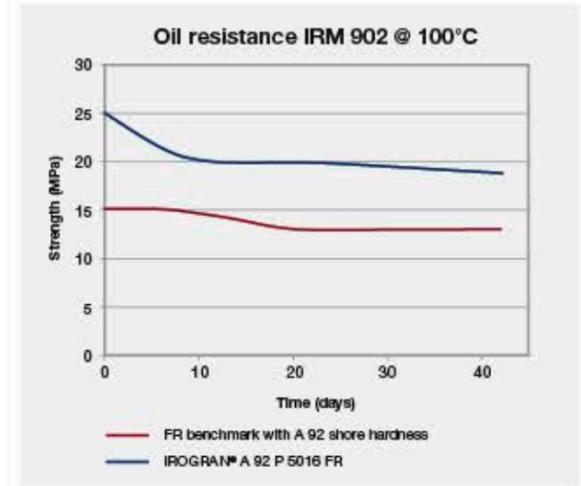
All grades fulfill European and international norms – including RoHS and REACH requirements.

# ...proven to perform

Our IROGRAN® FR TPU grades are proven to outperform benchmark HFFR jacketing materials when it comes to strength, durability, heat and oil resistance. Thoroughly assessed, these specialty materials have passed rigorous industry and in-house tests and have been trialled by leading wire and cable producers.

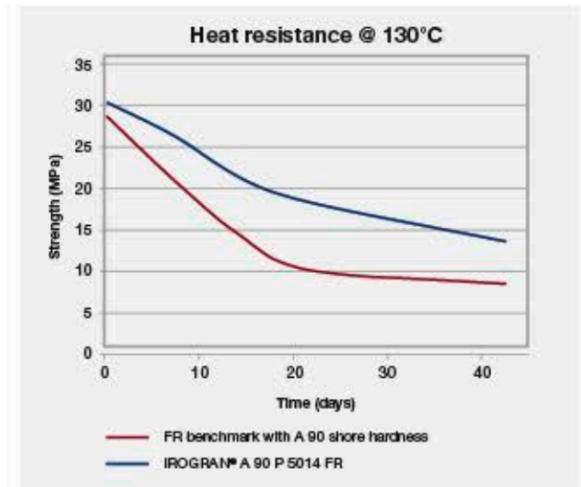
## Oil resistance (see graph)

Test results show that the initial tensile strength of IROGRAN® A 92 P 5016 FR is significantly greater than benchmark cable jacketing materials and that the material performs better over time when it comes to oil resistance. When exposed to oil at 100°C over 42 days, IROGRAN® A 92 P 5016 FR samples were up to 45% stronger than comparable products that went through the same process.



## Heat resistance (see graph)

Test results show that IROGRAN® A 90 P 5014 FR TPU performs better over time than benchmark products. After seven days of heat exposure this novel HFFR material will typically retain 87% of its original tensile strength. That's up to 14% better than competitive materials tested under identical conditions.



## Performance properties

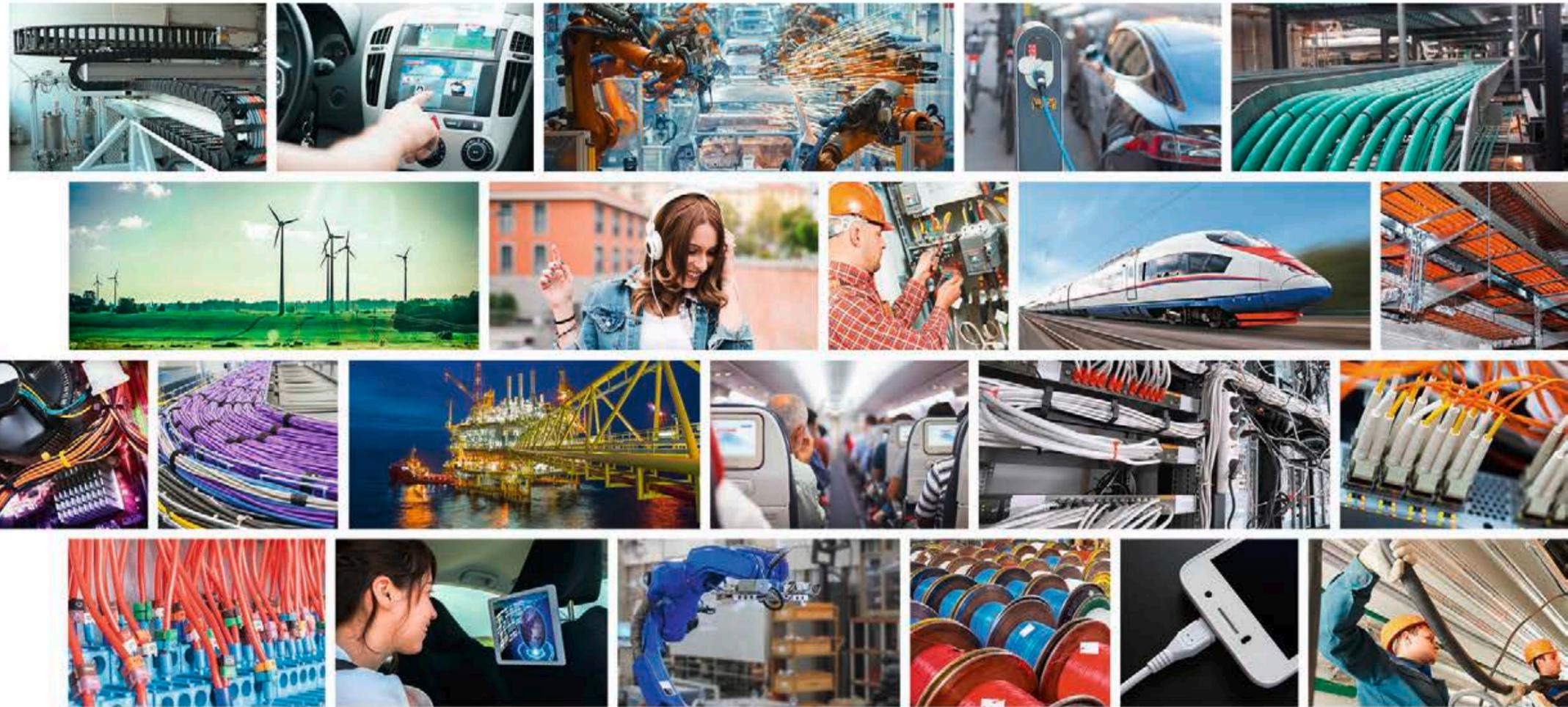
Test results show the typical physical and mechanical performance properties of the three flame retardant IROGRAN® FR TPU products currently available in our product portfolio for the wire and cable industry.

Material			A 90 P 5014 FR	A 91 P 5015 FR	A 92 P 5016 FR
Hardness (3 s)	[Shore A]	ISO 7619	91	92	93
Hardness (3 s)	[Shore D]	ISO 7619	40	42	44
Density	[g/cm³]	ISO 1183-1	1.25	1.27	1.30
Abrasion	[mm³]	ISO 4649	30	33	35
Tensile strength	[MPa]	DIN 53504	35	30	25
Tensile elongation	[%]	DIN 53504	500	500	500
Tear strength	[N/mm]	ISO 34-1	65	70	70

# Reliable, flexible and consistent

We are a long-standing partner to the global wire and cable industry with more than 30 years' experience in the sector. Trusted by wire and cable producers worldwide, our international team of TPU experts are reliable, flexible and consistent - just like the wire and cable jacket materials we make.

Investing in innovation, in line with industry requirements and in close collaboration with our customers, is one of our main priorities. Continuously stretching our skills and embarking on new development projects, we are committed to creating wire and cable materials that set new standards and support the needs of wire and cable manufacturers worldwide.



IROGRAN® FR – protecting connections, now and in the future.