

# Novelis OHLER® Flexible Tubes

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More than just flexible – we move things on



# Novelis

# Automotive

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## Our customers build on our flexibility

### **Our products are leading state-of-the-art technologies in the field of heat protection tubing, ventilation and exhaust systems**

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Novelis supplies international automotive manufacturers and their first tier component suppliers with a wide range of highly efficient and cost effective products. Due to our fast response to orders for materials and products we stand out as a preferred supplier. With the application of our sophisticated distribution logistics system we are able to significantly minimize the time-to-delivery.

**Just-in-time is not just a phrase – it is our philosophy.**

### **Our core products:**

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- Heat protection tubes, sleeves and shields, resistant to both convection and radiant heat
- Ventilation tubes for fresh and warm air circulation to the passenger area
- Flexible exhaust tubes, for auxiliary heating systems also insulated
- Inlet and exhaust sound absorbing systems

The high diversity of applications requires an excellent level of expertise and reflects our abilities for development and innovation. These competences result in smart, customer-tailored solutions. Our development teams carry out each project with discipline, passion and enthusiasm. Partnering closely with our customers allows us to produce ideal solutions and provide optimum support.

The overall synergy between an efficient production and the selection of the ideal solution is our key competitive differentiator. Additionally, our global strategic market positioning secures significant cost advantages for our customers.





# Heat Protection

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## Our solution for the protection against radiant and convective heat

### **OHLER® Heat Protection Tubes**

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OHLER® Heat Protection Tubes are flexible tubes made of several layers of different foils wound with corrugations. They consist of up to five different layers of combined materials such as aluminium, glass cloth, thermal insulation material and plastic.

Thanks to the excellent reflective characteristics of the aluminium alloy used on the external surface layer of pipes, OHLER® heat protection tubes ensure ideal protection against radiant heat. The insulation layer on the inside provides additional protection of the component to be protected against the transfer of heat.

Its other features, such as high flexibility and dimensional stability of the diameter as well as its resistance to heat and vibration make the OHLER® heat protection tube a first-class product for the thermal protection of any kind of hose, pipe, conduit and ducting as well as cable and wiring system.

Moreover, the tubes can be compressed or extended as required and may be fastened and mounted easily by means of, for example, crimping on the end fittings of the hose system, thus providing highly convenient assembly and installation characteristics.

For the purpose of easier assembly, as well as reduced logistics costs, we recommend our heat protection tubes in pre-compressed version.

### **Highest quality standards according to ISO 9001**

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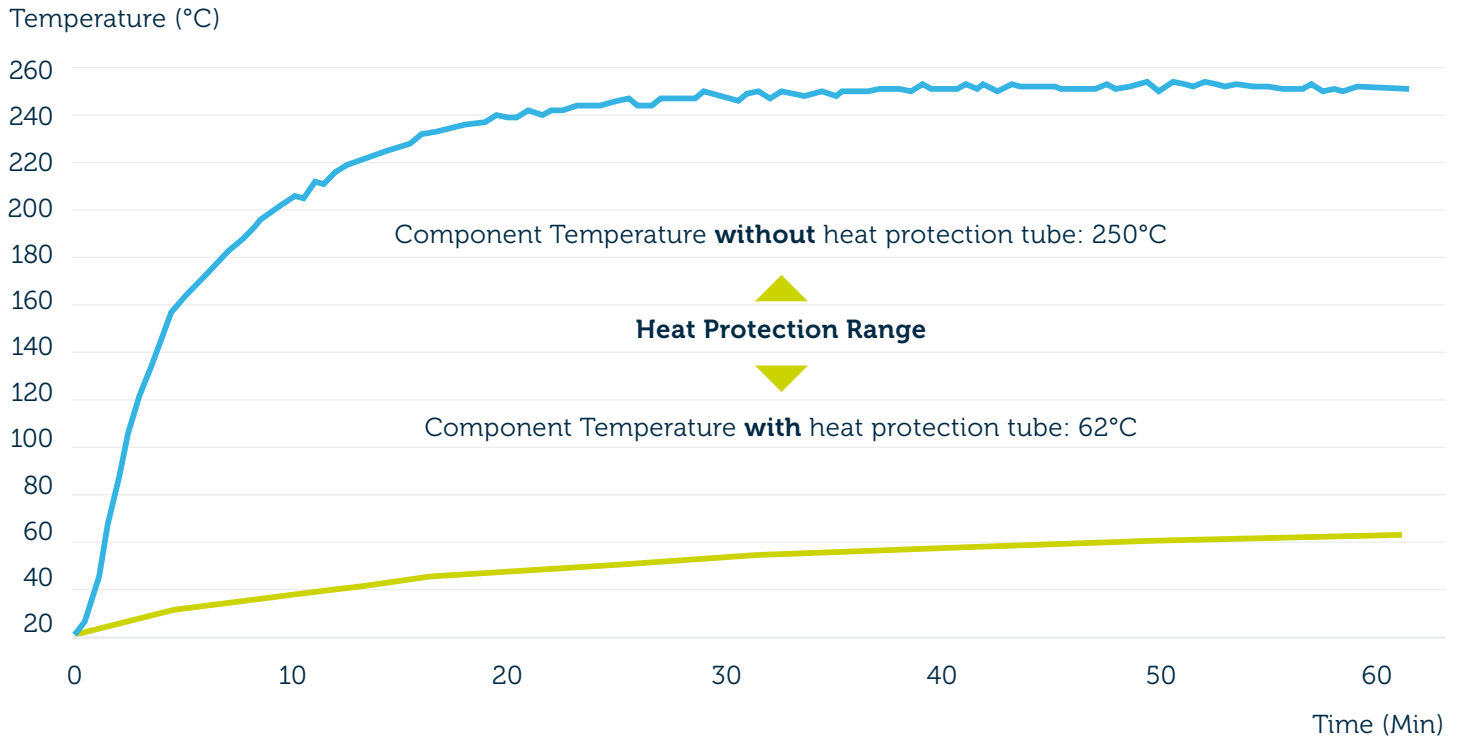
OHLER® heat protection products are subject to the highest quality standards according to ISO 9001. Due to ever shorter development times, often only a few days pass between the time when a new product is needed, its initial sample, and the subsequent serial production following immediately thereafter, during which all entities involved are required to perform at a high level of process quality. Our short response times demonstrate our high commitment to quality management and result from our 50 years of know how in the production of tubes.

As development partners for our OEM and TIER1 customers we make use of extensive testing methods to prove the heat protection range of our products. In addition to the metallurgical examination of the aluminium foils utilized by us and our comprehensive checks of the mechanical tube characteristics, in our laboratory facilities we are also able to simulate the expected thermal stress in line with your requirements.



## The thermal insulation range of OHLER® Heat Protection Tubes

- Heat protection tube, type GA2-A ID 20
- Component to be protected: Ceramic Rod Ø 19 mm, black
- Distance from lateral heat source: 20 mm
- Average temperature of the radiation source: 750°C



# Heat Protection

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## Our solution for the protection against radiant and convective heat

### **OHLER® Heat Protection Sleeves and OHLER® HEATCOVER**

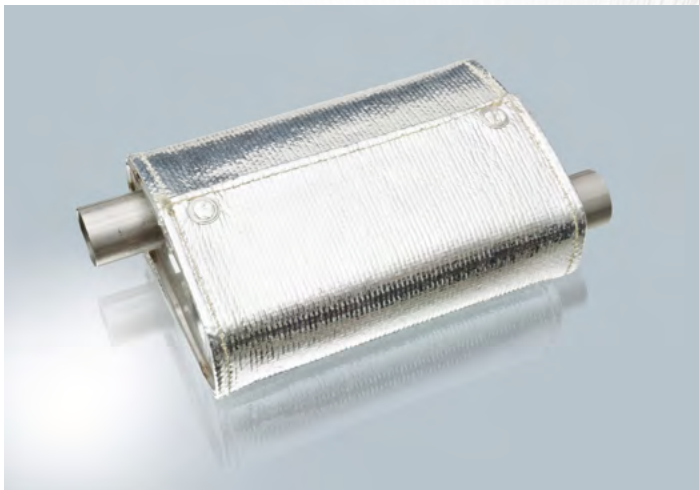
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OHLER® Heat Protection Sleeves and OHLER® HEATCOVER are based on our decades of experience in the field of flexible heat protection tubes. During their development we have been able to make effective use of our know-how in the field of processing aluminium.

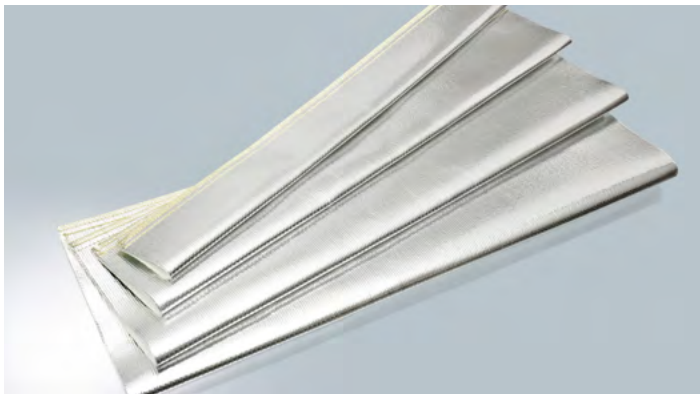
Due to their adaptability to virtually any installation scenario the newly-developed and highly efficient protection products complement our standard tube range perfectly.

The specific material composition of the fibre glass laminated aluminium foil utilised provides protection from even extreme temperatures of up to 750 C°.

Alternatively the products can be sewn together with Kevlar threads and/or fitted with stainless steel press buttons for subsequent closures. Due to precise punching technologies a wide variety of geometrical shapes can be produced to offer optimal protection for your temperature-sensitive components.



Product Overview Heat Protection	Heat Protection Tubes				Heat protection sleeve G/PET/A	HEATCOVER G/PET/A
	GA2-A	GA3-A	TA2-A	TA2-M/M-A		
Description	3-layered grooved heat protection tube	3-layered grooved heat protection tube	3-layered grooved heat protection tube	5-layered grooved heat protection tube	3-layered sewn heat protection sleeve	3-layered material compound
Tube or sleeve construction (layered structure from the inside to the outside)	<ul style="list-style-type: none"> <li>• glass fabric</li> <li>• aluminium</li> <li>• aluminium alloy</li> </ul>	<ul style="list-style-type: none"> <li>• glass fabric PU coated</li> <li>• aluminium</li> <li>• aluminium alloy</li> </ul>	<ul style="list-style-type: none"> <li>• polyester fleece</li> <li>• aluminium</li> <li>• aluminium alloy</li> </ul>	<ul style="list-style-type: none"> <li>• polyester fleece</li> <li>• aluminium</li> <li>• 2-layered highly-flexible foil</li> <li>• aluminium alloy</li> </ul>	<ul style="list-style-type: none"> <li>• glass fabric mat with PU coating</li> <li>• PET foil</li> <li>• aluminium alloy</li> </ul>	<ul style="list-style-type: none"> <li>• glass fabric mat with PU coating</li> <li>• PET foil</li> <li>• aluminium alloy</li> </ul>
Delivery mode inside Ø ID (mm)	6 – 56	8 – 56	8 – 56	10 – 56	10 – 100	Available as assembled punched parts acc. to customer specification
Lengths	In fixed lengths of up to 3 m coils of up to 20 m					
Permitted continuous operating temperature at a constant inside and outside temperature	-40°C to +250°C	-40°C to +250°C	-40°C to +200°C	-40°C to +160°C	-40°C to +180°C	-40°C to +180°C
	Due to the high reflectivity of their bright aluminium surfaces the heat protection products are much more resistant to radiation exposure. Depending on the installation conditions the temperature of the radiation source can be multiple times higher than the above-mentioned temperatures e.g. 700°C - 800°C.					
Bending radius relating to the neutral fibre	ca. 1.5 x ID	ca. 1.5 x ID	ca. 1.5 x ID	ca. 1.5 x ID	./.	./.
Vibration resistance +++ high ++ medium + limited	++	++	++	+++	+++	+++
Remarks / Customised Models	<ul style="list-style-type: none"> <li>• tubes in a compressed condition to simplify the assembly process or for more stringent demands</li> <li>• deformed tubes for the attachment with clips</li> <li>• slotted tubes for subsequent assembly</li> <li>• with punched sections to improve the assembly process at the end fittings</li> <li>• double tubes to protect against convective heat</li> <li>• product-specific GA3-A: Heat-resistant polyurethane coating for embedding glass fibers into glass fabric layer</li> </ul>				<ul style="list-style-type: none"> <li>• with punched sections</li> <li>• with seam-securing clip</li> </ul>	<ul style="list-style-type: none"> <li>• with punched sections</li> <li>• with stainless steel buttons</li> <li>• with Kevlar suture</li> <li>• with stainless steel clip</li> <li>• with Velcro closure</li> </ul>



# Air Flow Routing

## For the distribution of warm air and the combustion air system

### OHLE<sup>R</sup>® Flexible Tubes

OHLE<sup>R</sup>® Flexible Tubes are grooved and wrapped tubes consisting of multiple layers. Owing to the various materials that may be used, the tubes can be designed and adjusted to meet the specific requirements of their respective applications. In addition to different types of aluminium and high-strength aluminium alloys, a variety of paper and plastic types or composite materials can be used.

Traditionally, in air flow routing a distinction is made between the routing into the protected inside area, where specific insulating types of paper are used and the routing into the outside area where the external part of the pipe is made of splash water resistant foils.

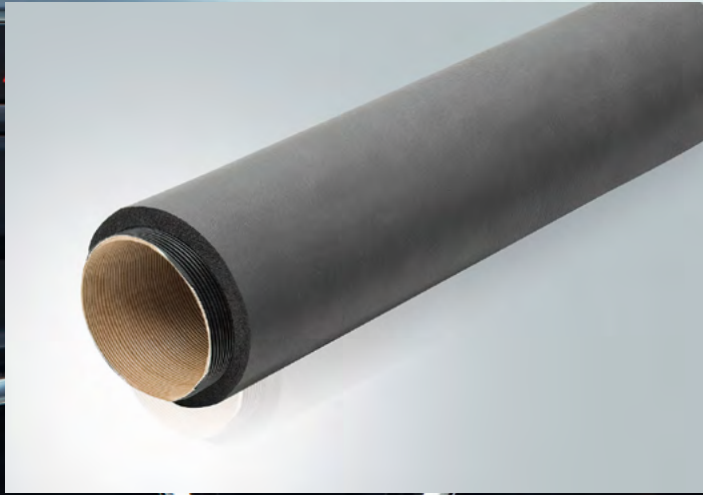
The following tubes have become established as standard products in their respective fields:

- Interior area → P-A-P, CARADUCT®
- Exterior area → A-P-K, P-A-K, K-H-K, K-A-K

### For many years OHLE<sup>R</sup>® Flexible Tubes have been used, amongst other areas:

- for air conduction purposes in the engine and passenger compartments,
- as part of the fresh air supply systems for heating units in passenger cars and utility vehicles,
- as hot air ducts in caravans as well as other transport and special-purpose vehicles.

Product Overview Airflow Routing	A-P-K	P-A-K	K-H-K	CARADUCT®
Description	3-layered grooved flexible tube	3-layered grooved flexible tube	3-layered grooved flexible tube	3-layered grooved flexible tube
Tube or hose construction (layered structure from the inside to the outside)	<ul style="list-style-type: none"> <li>• Aluminium</li> <li>• Paper</li> <li>• Plastic</li> </ul>	<ul style="list-style-type: none"> <li>• Paper</li> <li>• Aluminium</li> <li>• Plastic</li> </ul>	<ul style="list-style-type: none"> <li>• Plastic</li> <li>• High-strength aluminium alloy</li> <li>• Plastic</li> </ul>	<ul style="list-style-type: none"> <li>• Aluminium</li> <li>• Paper</li> <li>• Paper</li> </ul>
Delivery mode inner diameter Ø ID (mm)	20 – 112	175 – 112	20 – 112	31/60,5/67,2 70,5/75
Lengths	In fixed lengths of up to 3 m or as coils of up to 20 m			
Permitted temperature whilst air is flowing and the ambient temperature is 20°C	150°C	150°C	120°C	150°C
Permitted continuous operating temperature (3000h) at a constant inside and outside temperature	-40°C to +110°C	-40°C to +100°C	-40°C to +100°C	-40°C to +110°C
Bending radius relating to the neutral fibre	ca. 2 x ID	ca. 2 x ID	ca. 2 x ID	ca. 1 x ID
Vibration resistance <small>+++ high ++ medium + limited</small>	++	++	++	++
Remarks / Customised Models	<ul style="list-style-type: none"> <li>• sound absorbing to reduce sound created by the intake air</li> <li>• thermally insulated for external installations</li> <li>• back moulded and punched for specific installation situations</li> </ul>			<ul style="list-style-type: none"> <li>• hole-punched for a more effective distribution of warm air</li> </ul>



# Exhaust Gas Routing

## For parking heaters and auxiliary heating systems

### CORMIFLEX®

CORMIFLEX® tubes are flexible single and double-layered manufactured folded spiral-seam pipes made of high-grade steel precision strip.

Due to a high temperature resistance, they are predominantly used for exhaust gas routing in passenger car, utility vehicle, caravan and marine heating units.

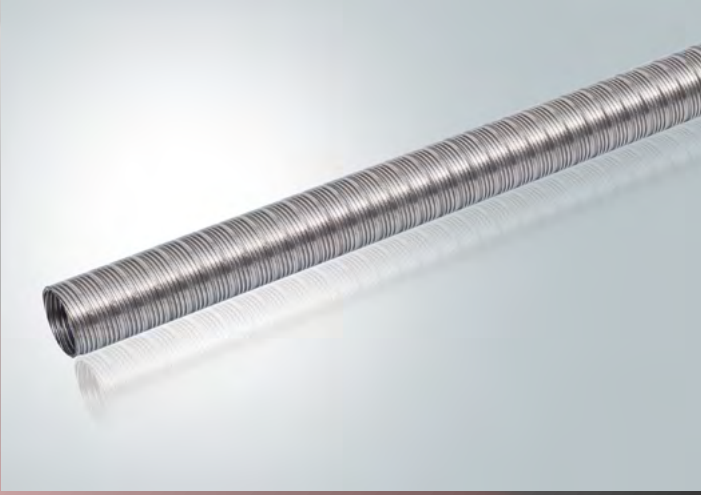
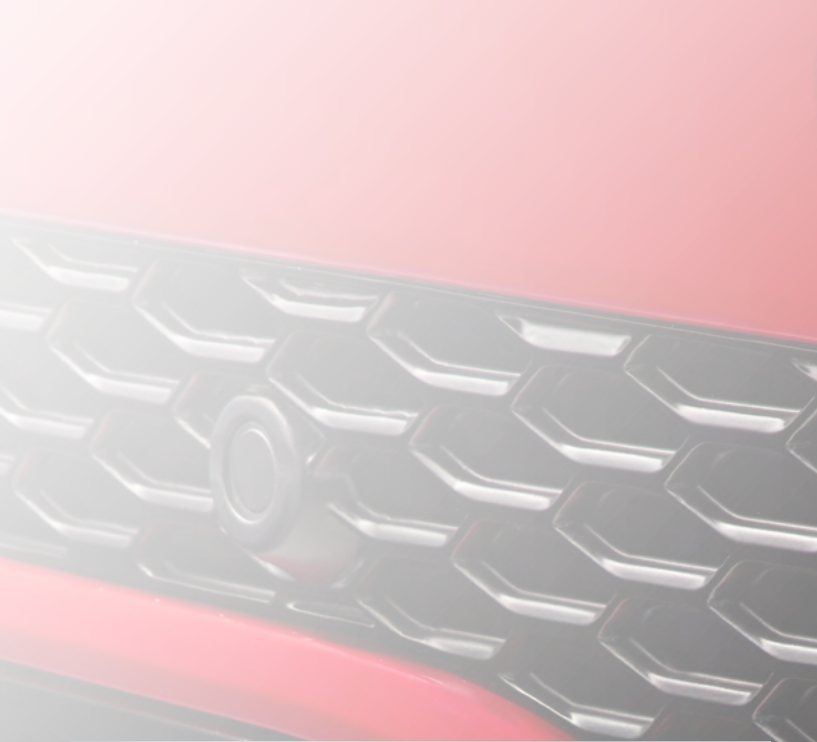
By force of elevated requirements, particularly regarding density and flexural behaviour, our tubes are subject to strict quality inspections.

See category “thermal insulation” for products to protect surrounding component parts against radiant heat.

### CORMIFLEX® PLUS

In the event of elevated anti-corrosion requirements triggered by aggressive mediums such as de-icing salt or green fuel, we highly recommend employment of our optimised CORMIFLEX® PLUS tubes.

Product Overview Exhaust Gas Routing	CF 1-layer	CF 2-layer	CF PLUS 2-layer 4301	CF PLUS 2-layer 4521
Description	1-layered folded spiralseam pipe with profiled surface	2-layered folded spiralseam pipe with profiled surface	2-layered folded spiralseam pipe with profiled surface with a knurled seam	2-layered folded spiralseam pipe with profiled surface with a knurled seam
Tube or hose construction (layered structure from the inside to the outside)	• high-grade steel precision strip made of 1.4301	• high-grade steel precision strip made of 1.4301	• high-grade steel precision strip made of 1.4301	• high-grade steel precision strip made of 1.4521, coated
Delivery mode inner diameter Ø ID (mm)	24 – 100	20 – 100	20 – 40	20 – 40
Lengths	In fixed lengths or as coils of up to 20 m (ID 20 - ID 69) or as coils of up to 10 m (ID 70 - ID 100)			
Permitted temperature whilst air is flowing and the ambient temperature is 20°C	350°C	350°C	350°C	350°C
Permitted continuous operating temperature (3000h) at a constant inside and outside temperature	-40°C to +300°C	-40°C to +300°C	-40°C to +300°C	-40°C to +300°C
Bending radius relating to the neutral fibre	ca. 1,5 - 2 x ID	ca. 1,5 - 2 x ID	ca. 1,5 - 2 x ID	ca. 1,5 - 2 x ID
Vibration resistance <small>+++ high ++ medium + limited</small>	+	++	++	++
Corrosion resistance <small>++++ very high +++ high ++ medium + limited</small>	+	++	+++	++++
Remarks / Customised Models	<ul style="list-style-type: none"> <li>• sound absorbing to reduce sound created by the intake air</li> <li>• thermally insulated for external installations</li> <li>• deburred pipe ends</li> <li>• printed</li> </ul>			



# Thermal Insulation

## For the protection of heat carrying ducts

### OHLER® High-Temperature Insulation Hose

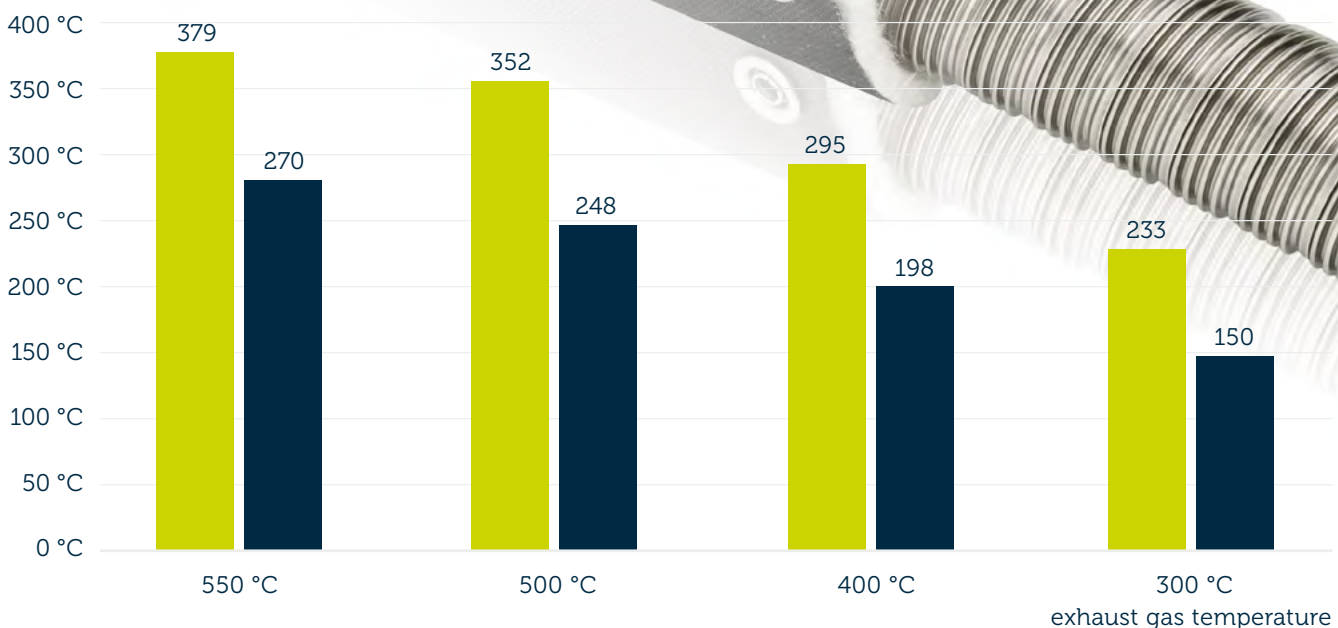
The OHLER® High-Temperature Insulation Hose (HT hose) consists of a glass fibre insulating layer and a silicon coated top layer. According to application, the products are available as a self-contained or reclosable hose or as a custom made shield.

Due to their outstanding performance, the OHLER® high-temperature insulations are utilised to protect heat-conveying lines.

Exhaust tubes of additional heating unit systems can be covered effectively to avoid thermal damages to other vehicle components and accordingly preheating of surrounding parts. The approximate surface temperature of the insulating duct can be up to 500°C.

Type	HT Insulation Hose
Description	2-layered hose
Hose construction (layered structure from the inside to the outside)	<ul style="list-style-type: none"> <li>• glass-based insulating material</li> <li>• glass fibres which are silicone coated on both sides</li> </ul>
Delivery mode inner diameter Ø ID (mm)	24, 26, 28, 55 and 77.7 Further nominal diameters on request
Lengths	In fixed lengths of up to 1 m
Permitted temperature on the surface of the pipe to insulated	500°C
Permitted continuous operating temperature (3000h) at a constant inside and outside temperature	-40°C to +250°C
Vibration resistance properties +++ high ++ medium + limited	+++
Remarks / Customised Models	<ul style="list-style-type: none"> <li>• with re-closable high-grade steel press buttons</li> </ul>

surface temperature



- surface temperature of the heat carrying duct (without HT hose)
- surface temperature of the HT insulation hose

# Sustainability

## Shaping a Sustainable World Together

Novelis is driven by its purpose to Shape a Sustainable World Together – from how we operate within our company to how we partner with our stakeholders across the aluminium value chain.

### Sustainability is the Heart of Novelis

Novelis leads the industry in making aluminium the sustainable material of choice for beverage packaging, automotive, aerospace, transportation, building & construction, and a wide range of other vibrant, growing industries who seek strong yet lightweight sustainable materials that support the circular economy. For us, sustainability is not a 'nice to have' concept – it is the core of who we are and what we do. As the leader in the manufacturing of sustainable aluminium products, we take our responsibility to reduce the carbon footprint of our industry seriously. We work hard to enable a more circular aluminium industry. Our extensive use of recycled aluminium is at the core of our innovative, circular business model.

Novelis has achieved Europe-wide ASI certification, reinforcing its commitment to responsible aluminium supply and sustainable manufacturing practices. This dual certification, covering both ASI Performance and Chain of Custody standards, ensures Novelis' aluminium solutions are responsibly sourced, produced, and processed.

All Novelis Europe facilities are independently certified to comply with ASI standards, demonstrating our commitment to shaping a sustainable world together.

Our ambitious carbon reduction goals include that Novelis will be a carbon neutral company by 2050 or sooner.

### Novelis' Vision 3x30

To accelerate its sustainability efforts, the company recently announced Novelis 3x30, a company-wide vision to advance aluminium as the material of choice for circular solutions and accelerate the company's decarbonization and circularity efforts. Under 3x30, Novelis aims to achieve three ambitious objectives by the end of 2030:



### Highly Circular

Achieve 75% average recycled content in our products



### Low Carbon

Be the lowest-emissions, flat-rolled aluminium products provider at less than 3 tonnes of CO<sub>2</sub>e per tonne of flat rolled product (FRP) shipped



### Industry Frontrunner

Continue to lead the industry toward circularity through first-mover investments

# Shaping a Sustainable World Together

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