



**Pentanes – The smart choice  
for energy-efficient innovation**



# Tailor-made Pentanes

## Discover excellence in Pentane solutions

Experience tailor-made solutions with Haltermann Carless, the global leader in Cyclopentane manufacturing and the exclusive European producer of all three Pentane isomers – *n*-, *iso*- and Cyclopentane. With a commitment to quality and customers focus, we take pride in offering a broad range of Pentane blends tailored to meet your individual requirements.

## Unmatched versatility: High quality Pentane blends for every need

At Haltermann Carless, we understand that every customer has distinct requirements. Our extensive portfolio of Pentane blends, customisable in any mixing ratio, ensures that you receive the ideal product to match your requirement profile, which can be characterised by performance, quality or cost efficiency of the final product. Manufactured at our production site in Speyer, Germany, our Pentanes offer a minimum purity level of 95 %.

## Applications across industries: Where quality matters

Our Pentane formulations find application in a wide range of industries, showcasing their versatility and reliability. Whether they contribute to the insulation of buildings, cooling appliances or district heating systems, serve as solvents and process media in the chemical industry or are used as foaming gels in the cosmetics industry, our products consistently deliver compelling results.

## Delivery reliability and future-ready solutions

At Haltermann Carless, we prioritise the security of supply and the high quality of our products. Our recent investment in a state-of-the-art hydrogenation unit demonstrates our commitment to meeting the evolving needs of our customers. This expansion allows us to increase Cyclopentane production capacity by up to 70 %, addressing global market demands, expanding our market presence in key industries and regions, and promoting sustainability.

**+70%**  
Cyclopentane



# Contributing to climate balance

## Unlocking climate solutions through Pentanes in insulation

In the pursuit of a sustainable and climate-neutral future as outlined in the European Commission "Fit for 55" program – a roadmap towards climate neutrality in the EU by 2050 – Pentanes play a vital role. As blowing agents in insulating materials they enable an excellent insulating performance of modern materials, such as Polyurethane (PU) foams, and contribute significantly to efficient insulation.

## Crucial role of insulation in energy transition

As the world aligns with ambitious climate targets, the insulation industry emerges as a key player in the energy transition. Efficient insulation, whether in refrigerators, buildings, or pipe systems, is pivotal to achieving climate objectives. Pentanes stand as the backbone of modern insulation materials, ensuring their insulating performance is at its peak.

## Eco-sound Pentanes: A responsible choice

Pentanes demonstrate an excellent eco-balance, characterised by zero Ozone Depletion Potential (ODP) and a low Global Warming Potential (GWP <1). Adhering to global regulations for stratospheric ozone layer protection, Pentanes are the main sustainable alternative to the banned high GWP Chlorofluorocarbons (CFCs) and Hydrofluorocarbons (HFCs) as well as to the substances regulated under PFAS (Per- and Polyfluoroalkyl Substances).

## Mass balance Pentanes: Reducing CO<sub>2</sub> footprint

Haltermann Carless takes the commitment to sustainability further by offering mass balance Pentanes, contributing to the reduction of CO<sub>2</sub> emissions. This innovative approach aligns with the broader goal of minimising environmental impact and fostering a circular economy.



**CO<sub>2</sub>** reduction  
with Pentanes



# Highly-efficient insulating foams

## **Pentane blowing agents: Unleashing the power of insulation**

Insulation materials, such as Polyurethane (PU), Extruded Polystyrene (XPS), and Expanded Polystyrene (EPS), owe their exceptional properties to Pentane blowing agents. These agents play a crucial role during the manufacturing process, enhancing insulation performance and dimensional stability. Depending on the isomers used – *n*-/*iso*-/*Cyclopentane* or a blend – the product features can be amended to individual requirements.

## **Extruded Polystyrene (XPS) and Expanded Polystyrene (EPS): Versatility redefined**

In the manufacturing of Extruded Polystyrene (XPS) and Expanded Polystyrene (EPS) for the construction and packaging industries, our Pentane S grade offers a versatile product formulation. Tailored to meet the specific needs of your project, our Pentane S ensures optimal insulation while maintaining the required dimensional stability.

## **Polyurethane (PU) Foam: Elevating insulation performance with Cyclopentanes**

Cyclopentanes ensure excellent insulation performance with low insulation thickness in Polyurethane (PU) foam production. This is due to the fact that cell gas has a lower heat-conductivity than the ambient air and therefore remains partially in the foam cells of the PU. This provides flexibility in construction and makes PU foams with Cyclopentanes ideally suited for household appliances like refrigerators and freezers, historic buildings as well as other various construction applications such as thermal and pipe insulation.





## High-quality Pentanes with superior characteristics:

- Ideal alternative to CFCs, HFCs and substances regulated under PFAS
- Free from disturbing impurities such as aromatics, sulphur and odour
- No Ozone Depletion Potential ( $ODP = 0$ )
- Low Global Warming Potential ( $GWP < 1$ )
- High purities of 95 % and more
- Pentane blends in any mixing ratio



# High-purity Pentanes for cosmetics

## Unleashing the power of *iso*-Pentanes

Enhance your cosmetic formulations with our high purity *iso*-Pentanes, carefully manufactured to meet the exacting standards of the cosmetics industry. Our *iso*-Pentanes are a key ingredient in self-foaming shower gels and shaving foams, enhancing the user experience with its excellent qualities.

Innovative formulation: *iso*-Pentanes dissolved in the cosmetic products are activated when exposed to the heat of water and the skin. This results in fine-pored and stable foam that is particularly easy to spread.

## Compliance with cosmetic standards

We understand the critical importance of adhering to stringent cosmetic requirements. Our high-purity Pentanes are formulated with utmost care to meet and exceed industry standards, ensuring the safety and quality of your cosmetic formulations.





# Pentanes for catalytic processes

## Purity and consistency for stable production processes

The chemical industry uses Pentanes in various catalytic processes. As hydrocarbon-based solvents they play an important role in diverse applications, primarily contributing to the production of Linear Low Density Polyethylene (LLDPE).

Our Pentanes are carefully developed to meet the highest standards. They ensure low impurities and consistent quality that are essential for sustainable and stabilising production processes. As a result, Pentanes contribute to the overall quality of your end product.



# Comprehensive customer service



## Benefit from our comprehensive 360° service

At Haltermann Carless, we pride ourselves on providing a comprehensive service that goes far beyond expectations. Our commitment to excellence is evident in our bespoke, high-quality Pentanes and customised logistics solutions and everything in between. With years of expertise in the Pentanes business, we have established a close relationship with our customers, allowing us to truly understand and cater to their specific requirements.





### **Tailor-made products**

Are you looking for product or application solutions that are not off-the-shelf? Then you have come to the right place, because "custom fit" is a top priority for us. As the only manufacturer in Europe that produces *n*-, *iso*- and Cyclopentanes from our highly flexible inhouse production assets we can offer you any blend ratio according to your specific requirements.



### **Joint development work**

For generations, we have been a reliable and strong partner for our customers when it comes to developing customised solutions. Are you looking for co-thinkers, questioners, idea generators, perfectionists & problem solvers? Then you have found the right partner.



### **First class lab & technical service**

Modern equipment, extensive testing and analysis facilities, as well as highly qualified personnel ensure our consistently high product quality. Our own laboratories ensure this through our control system with raw material controls, in-process and final controls.



### **Dedicated sustainability support**

Raw materials, sustainable products, life cycle analysis or important certifications - our experts advise you with a wide range of services on the subject of sustainability and support you in achieving your climate protection goals.



### **Bespoke supply chain solutions**

Promising quality also means reliable delivery. Our supply chain team will work out the best solution for your transportation needs. Our production site in Speyer, Germany, provides the ideal base for worldwide deliveries, as we are strategically located near Frankfurt Airport and the Rhine river, we have our own jetty on the plant premises, loading and unloading stations for rail tank cars, and loading points for tank trucks.

All Pentanes can be delivered in bulk via road-tankers, isotank containers and rail cars or packed in drums of 200 litres, 60 litres and 20 litres. 100 litres pressurised cylinders for testing purposes are available on request in certain regions.



### **High production flexibility**

We offer you the greatest possible individuality and flexibility - also in the area of production. This applies equally to product quantities or the production of new developments.

# Technical data



With decades of experience in the production, blending and distribution of Pentanes, Haltermann Carless is your trustful partner to meet your current and future market needs.



Grade	Application	Production	Composition			Initial boiling point ASTM D1078	
Method / Unit			<i>n</i> -Pentane wt %	<i>iso</i> -Pentane wt %	Cyclopentane wt %	°C	°F
<b><i>n</i>-Pentane 95</b>	General purpose	GER	min. 95	–	–	35	95
<b><i>iso</i>-Pentane 95</b>		GER	–	min. 95	–	25	77
<b>Cyclopentane</b>		GER	–	–	min. 95	48	118
<b>Pentane S</b>	EPS, Catalytic solvent	GER	78–82	18–22	–	29	84
<b>Pentane 75</b>		GER	70–77	22–28	–	31	89
<b>Cyclopentane IP 85</b>	PU Appliances PU Construction	GER	–	10–17	83–87	43	110
<b>Cyclopentane IP 70</b>		GER	–	24–28	70–74	38	100
<b>Cyclopentane IP 50</b>		GER	–	45–53	47–53	31	88
<b>Cyclopentane IP 30</b>		GER	–	65–73	27–33	28	82
<b><i>n</i>- / Cyclopentane 93/7</b>	General purpose	GER	86–91	–	6–9	36	95
<b><i>n</i>-Pentane 95 cosm.</b>	Cosmetic industry	GER	min. 95	–	–	35	95
<b><i>iso</i>-Pentane 95 cosm.</b>		GER	–	min. 95	–	25	77
<b><i>n</i>-Pentane 95</b>	Catalytic solvent	GER	min. 95	–	–	35	95
<b><i>iso</i>-Pentane 95</b>		GER	–	min. 95	–	25	77



Final boiling point ASTM D1078		Vapour pressure kPa		Thermal conductivity	Ozone depletion potential*	Global warming potential*	Hazardous classification
°C	°F	25 °C	50 °C				
37	99	68	159	+	0	< 1	F
32	90	91	205	+	0	< 1	F+
50	122	42	103	+++	0	< 1	F
36	97	73	168	+	0	< 1	F+
37	99	74	174	+	0	< 1	F+
50	122	50	119	+++	0	< 1	F
50	122	57	134	+++	0	< 1	F
49	120	67	154	++	0	< 1	F+
42	108	77	174	++	0	< 1	F+
50	122	67	155	+	0	< 1	F
37	99	68	159	+	0	< 1	F+
32	90	91	205	+	0	< 1	F+
37	99	68	159	+	0	< 1	F+
32	90	91	205	+	0	< 1	F+

\* According to the Scientific Assessment of Ozone Depletion 2018 (Appendix A.3) published by the World Meteorological Organization, United Nations Environment Programme, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration and European Commission all Pentane isomers and their blends have an ODP of 0 and a GWP < 1.

<https://ozone.unep.org/sites/default/files/2019-05/SAP-2018-Assessment-report.pdf>

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**More about our Pentanes:**

[www.haltermann-carless.com/pentanes](http://www.haltermann-carless.com/pentanes)

[www.haltermann-carless.com/blog](http://www.haltermann-carless.com/blog)

[www.haltermann-carless.com/study-performance-of-ternary-pentane-blends](http://www.haltermann-carless.com/study-performance-of-ternary-pentane-blends)

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