

YOUR GUIDE TO CRYOGENIC INSULATION



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REVOLUTIONISING THE WAY YOU WORK



Occasionally in our industry a development occurs which significantly moves the game on. That's exactly what's happened with cryogenic insulation as advances in materials and technologies offer the potential to transform the use and transportation of cryogenic gases. It means we're able to offer high quality, pioneering products that save our customers time and money.

Insulating cryogenic vessels is a tried and tested process. Cryogenic paper and foil is used as the insulating material on double-walled cryogenic vessels. The insulation reduces heat transfer and minimises liquid and gas losses by having each reflective foil sheet insulated with glass fibre paper, which is low in thermal conductivity. Several layers of paper and

foil are used to line the exterior of an inner vessel and once the space between the inner and outer vessel is sealed, it is evacuated by a vacuum pump to the required pressure.

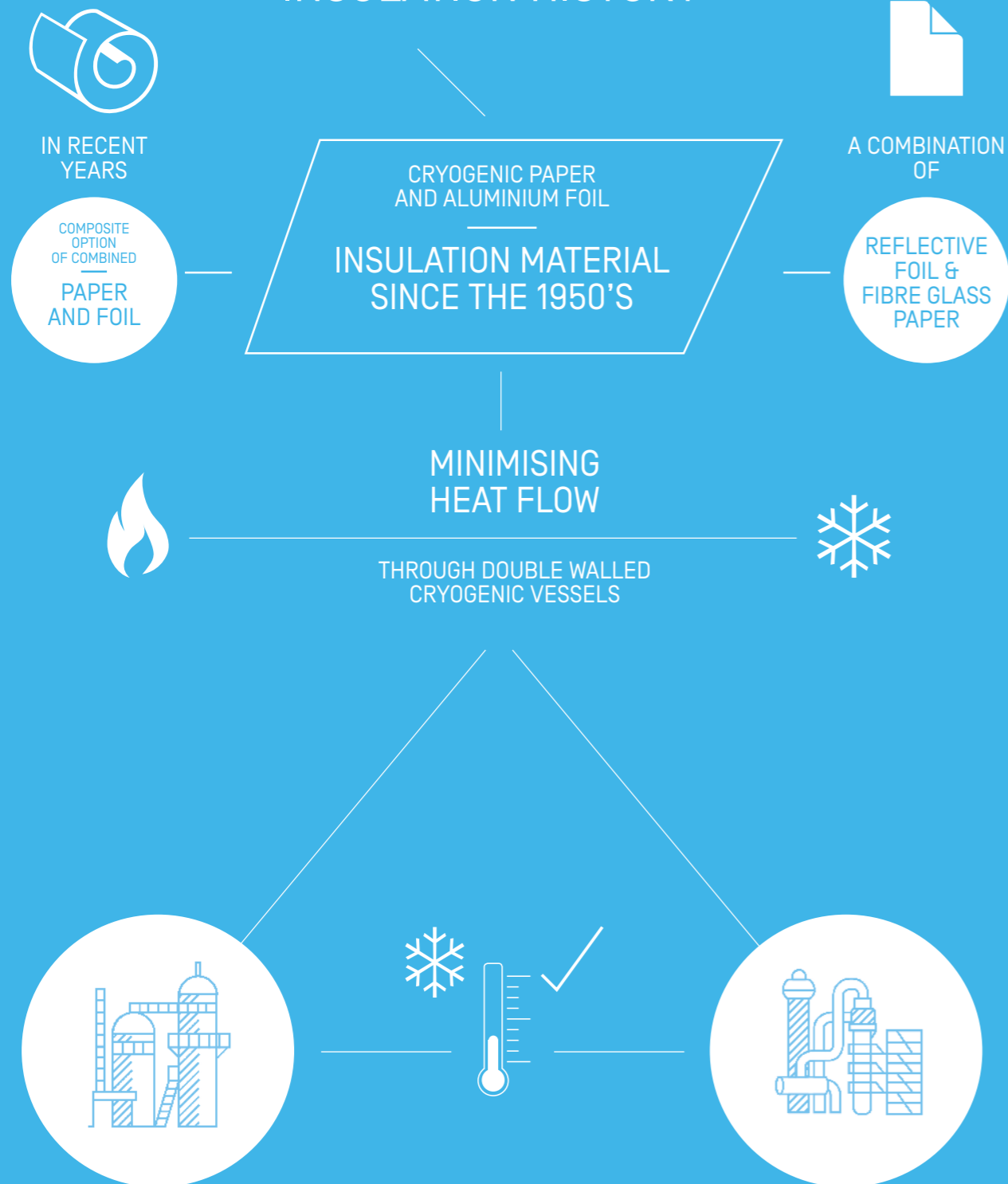
This process has seen very few developments for well over half a century, that is until now. Here at Herose, the team have sourced the best new products from around the globe with significant benefits to our customers. Better quality paper with multi-layer composite options combining paper and foil, vastly improve installation times, reduce gas losses and minimise wastage. Similarly, our cryogenic blanket is lightweight, low in density and incredibly easy to handle while giving maximum thermal protection.

In short, our range of cryogenic insulation products provide a smoother, faster and smarter way to improve your bottom line.

The range available includes:

- **CRYOGENIC PAPER**
in widths from 40mm to 1800mm
- **ALUMINIUM FOIL**
in widths from 40mm to 1800mm
- **COMPOSITE INSULATION**
in up to 5 sets from 60mm to 1800mm
- **CRYOGENIC BLANKET**
in widths from 900mm to 1800mm that is 8 times lighter than perlite
- **ANCILLARIES**
that include foil, fabric and tape

CRYOGENIC INSULATION HISTORY



WHAT ARE THE KEY BENEFITS?

HEROSE GREAT SERVICE.
TOP QUALITY LONG-RANGE
PRODUCTS.



We bring extensive knowledge, great service and proven performance levels to the cryogenic insulation market.

When it comes to our products, we make it our business to stay ahead of our game, so that our clients can stay ahead of theirs.

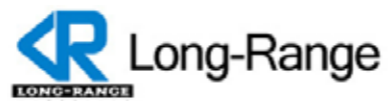
Our trusted partners at Long-Range share a common goal – to offer you quality products with a long service life and a perfect safety record. All this while enhancing your bottom line.

We offer the flexibility to buy in small quantities or in bulk. What's more we keep as much stock in as possible – it means choice, availability and quick turnaround on all your orders. We're here to work with you to find the right solution.

We have listed the major benefits opposite for cryogenic paper, composite insulation and the cryogenic blanket. These benefits all offer you the user a quicker, more simple and enhanced installation helping you have a better product with reduced costs. Try us today.



IN PARTNERSHIP WITH



CUSTOMER BENEFITS

No.1
MINIMISE BULK PURCHASES

EX-STOCK IN EUROPE AND BEYOND.

No.2
ONE TYPE OF INSULATION

SUITABLE FOR ALL APPLICATIONS INCLUDING OXYGEN.

No.3
ENHANCE YOUR INSTALLATION

PRODUCTS DESIGNED FOR MAXIMUM EFFICIENCY IMPROVE YOUR BOTTOM LINE.

CRYOGENIC PAPER

No.4
LOW THERMAL CONDUCTIVITY

THIN AND LIGHT WITH A STRONG UNIFORM STRUCTURE.

COMPOSITE INSULATION

No.7
REDUCES INSTALLATION TIMES

UP TO FIVE TIMES QUICKER INSTALL TIMES.

CRYOGENIC BLANKET

No.10
SIMPLIFIES INSTALLATIONS

AND ENSURES MAXIMUM THERMAL PROTECTION.

No.5
ZERO ORGANIC CONTENT

ALKALI-FREE WITH NO OUTGASSING PROPERTIES.

No.8
IMPROVES INSTALLATION STABILITY

THIS STRENGTHENED OPTION SIMPLIFIES INSTALLATION.

No.11
EASILY HANDLED

WITH REDUCED WEIGHT.

No.6
FAST PUMP TIMES

ENSURED BY THE ENHANCED LATTICE STRUCTURE.

No.9
MINIMISES WASTE

PROVEN STABILITY ALSO INCREASES PRODUCTIVITY.

No.12
MINIMAL OUTGASSING

QUICKER INSTALL TIMES.

No.13 — IMPROVES YOUR INSTALLATION & YOUR BOTTOM LINE!

WHICH APPLICATIONS IS IT USED FOR?

OUR CRYOGENIC INSULATION AND RELATED PRODUCTS ARE USED ON DOUBLE-WALLED CRYOGENIC VESSELS ALL OVER THE WORLD.



HOW IS IT PRODUCED?

A WORLD CLASS
MANUFACTURING PLANT
PRODUCTION PROCESS.

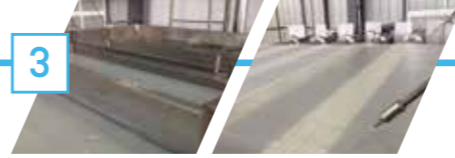
THE PRODUCTION PROCESS



1 THE RAW MATERIAL IS MADE FROM TOP QUALITY ALKALI-FREE, INORGANIC GLASS FIBRE WITH OUTSTANDING FLAME RETARDANT PROPERTIES.



2 THIS RAW MATERIAL IS DELIVERED TO THE PRODUCTION FACILITY PACKED IN SEALED CONTAINERS.



3 THE PAPER IS PRODUCED IN A "WET, VACUUM AND DRY" PROCESS WHICH ENSURES A CONSISTENT, POROUS STRUCTURE. IT IS THEN FED INTO A FORMING MACHINE WHERE IT IS ROLLED, FORMED AND CUT TO WIDTH USING WATER JETS FOR PRECISION CUTTING.



4 THE PAPER IS CONTINUALLY ROLLED, DRIED AND FED THROUGH THE MACHINE AT CONTROLLED TEMPERATURES TO ENSURE AND DEFINE ITS STRUCTURE AND THICKNESS.



5 AFTER BEING ROLLED TO ITS MAXIMUM LENGTH, THE PAPER CAN BE CUT TO YOUR REQUIRED WIDTHS FROM 40MM TO 1800MM. ALL PAPER ROLLS HAVE SECTIONS OF PAPER FULLY TESTED TO CONFIRM UNIT WEIGHT, THICKNESS, TENSILE STRENGTH, MOISTURE CONTENT AND ORGANIC CONTENT.



6 FOR THE COMPOSITE CRYOGENIC INSULATION, UP TO 5 ROLLS OF PAPER AND 5 ROLLS OF FOIL ARE ROLLED TOGETHER TO GIVE AN ACCURATELY SIZED FINAL PRODUCT. INSTALLATION AT YOUR PREMISES IS MASSIVELY SIMPLIFIED AND INSTALLATION TIME ON THE SHOP FLOOR GREATLY REDUCED.



COMPOSITE



7 AFTER FINISHING, THE CRYOGENIC PAPER OR COMPOSITE INSULATION ARE PACKED IN A VACUUM INTENSIFIED PE BAG ON AN EPE EXTERNAL PROTECTION TUBE.



8 TWO SIDE PLATES PROTECT THE CRYOGENIC PAPER OR COMPOSITE INSULATION WHICH IS SUPPLIED IN STRENGTHENED CARTON BOXES AND WOODEN PALLETS.



HEROSE LIMITED AND OUR MANUFACTURER

HEROSE LIMITED HAS DEVELOPED A RELATIONSHIP WITH LEADING CRYOGENIC INSULATION MANUFACTURER LONG-RANGE, A PARTNERSHIP CREATED TO HELP OUR CUSTOMERS ACHIEVE THEIR GLOBAL OBJECTIVES.



We already supply complete valve packages and systems to industrial gas cryogenic equipment manufacturers and its users, as well as LNG packages for process plants and shaving stations. The addition of the innovative Long Range insulation range enables us to extend an already comprehensive package of products to our growing customer base. One supplier for all your valves and accessories means a simpler procurement process and reduced total costs.

Long-Range specialise in insulation solutions for cryogenic equipment and piping systems. Their production facility focuses on the manufacture of cryogenic paper and their unique composite range. By specialising in this area, they are able to make pioneering developments with significant new benefits to our customers - such as reducing installation time, wastage and money.

THE ADDITION OF THE INNOVATIVE LONG-RANGE INSULATION RANGE ENABLES US TO EXTEND AN ALREADY COMPREHENSIVE PACKAGE OF PRODUCTS TO OUR GROWING CUSTOMER BASE.

Our relationship helps Long-Range take their range globally and allows Herose Limited to develop further its range of specialist products. For you it means a smarter way to improve your bottom line.



KEITH STEWART
MANAGING DIRECTOR,
HEROSE LIMITED

OUR CRYOGENIC INSULATION PRODUCT RANGE

LONG-RANGE CRYOGENIC INSULATION PAPER

The paper is a non-outgassing, inorganic non-woven material manufactured from super fine glass fibre. With a surface that does not absorb gas molecules easily, it minimises vacuuming times. Furthermore, its enhanced lattice structure ensures that the thermal conductivity coefficient and specific heat flux of the interlay are extremely low when working in cryogenic environments.

The super fine glass fibre paper is made from alkali-free inorganic glass fibre with diameters of between 0.1 to 0.6 μm and glass fibre filaments with diameters between 1 to 3 μm . The exceptional high quality raw material used as the base material ensures the paper has outstanding flame retardant properties.

The Long-Range manufacturing process ensures the finished paper offers an exceptionally efficient thermal barrier against heat transfer in any form of insulated storage containers. Designed to give your equipment a longer operating life at the lowest working cryogenic temperatures, its exceptional stability minimises vacuum losses on storage or transportation equipment even at liquid hydrogen temperatures.

LONG-RANGE CRYOGENIC COMPOSITE INSULATION

Long-Range manufacture this high quality multi-layer composite option by rolling the aluminium foil together with the inorganic paper in combined layers from one to five pairs. This option is normally used in the 5 times paper and 5 times foil option by most users globally.

The super-fine alkali-free, inorganic glass fibre paper is supplied together with the aluminium foil in thicknesses of 0.0065mm and 0.0070mm as standard. Options of 0.0080mm and 0.0090mm are available.

Made from exceptionally high-quality raw material, it has outstanding flame retardant properties and when combined with the foil, it makes installation up to five times quicker. Suitable for all your cryogenic vessel medium applications this option greatly helps to reduce manufacturing times, clear factory floor space and enhances your bottom line. The multi-layer composite paper and foil will transform the way you install cryogenic insulation.

LONG-RANGE CRYOGENIC INSULATION BLANKET

The Long-Range cryogenic insulation blanket is designed to meet the specific insulation needs of the cryogenic equipment manufacturers and their applications. Made from high quality, super-fine glass fibre bonded together with a melamine resin, it's lightweight, low in density and gives maximum thermal protection with minimal weight.

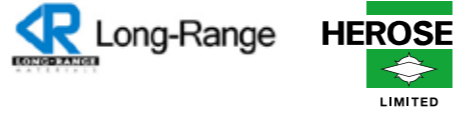
The product is easy to handle and to cut and shape into internal support struts and legs on vessels. It comes in 25mm depths, from 900 to 1800mm widths (width of 1500mm width as standard) and 8 to 25 metre lengths.

With virtually no outgassing under cryogenic vacuum pressure and cryogenic temperature conditions this material gives faster pump-down times, making your production processes more efficient.

LONG-RANGE CRYOGENIC INSULATION ACCESSORIES

We supply Long-Range accessory products for cryogenic storage and transport equipment manufacturers, such as aluminium foil, aluminium foil tape, fibre glass fabric and fibre glass tape.

LONG-RANGE CRYOGENIC INSULATION PAPER



THE PAPER IS A NON-OUTGASSING, INORGANIC NON-WOVEN MATERIAL MANUFACTURED FROM SUPER FINE GLASS FIBRE. WITH A SURFACE THAT DOES NOT ABSORB GAS MOLECULES EASILY, IT MINIMISES VACUUMING TIMES. FURTHERMORE, ITS ENHANCED LATTICE STRUCTURE ENSURES THAT THE THERMAL CONDUCTIVITY COEFFICIENT AND SPECIFIC HEAT FLUX OF THE INTERLAY ARE EXTREMELY LOW WHEN WORKING IN CRYOGENIC ENVIRONMENTS.



TECHNICAL INFORMATION

Width Range:
40mm to 1800mm to your specification (minimum quantities may be required)
Standard Widths:
90mm, 910mm, 1310mm, 1710mm, 1800mm
Temperature Range:
-452°F to 932°F (-269°C to 500°C)

KEY BENEFITS

The Long-Range paper is thin and light. Its highly uniform structure ensures low thermal conductivity:

- Ex-Stock in Europe and beyond minimising your bulk purchases.
- Zero organic content with no outgassing.
- Enhanced lattice structure ensures fast pump-down time.
- Proven stability minimises waste and increases productivity.
- Suitable for all your equipment including oxygen vessels.
- Enhances installation efficiency and improves your bottom line.

APPLICATIONS

Cryogenic Vessels, Cryogenic Tanks, Microbulks, Dewars, Cryogenic Railcars, ISO Tanks, Vacuum Jacketed Pipe, etc.

TECHNICAL REPORTS

The following technical reports are available to give additional detail to support your selection:

- **Test report 20142252:** Oxygen Compatibility Test
- **Installation Guide**

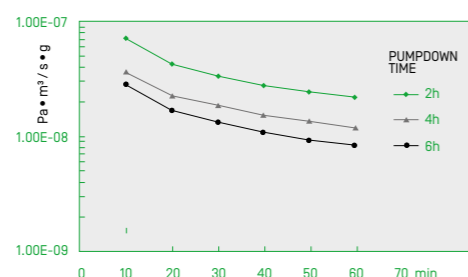
SPECIFICATION

Items	Index (unit)
Thickness	0.06±0.01mm
Weight	13.5±1 g/m ²
Tensile Strength	≥0.03 KN/m
Moisture Content	≤0.5%
Organic Content	≤0.5%
Thermal Conductivity (w/m·k)	≤0.037 w/m·k
Cryogenic Outgassing (Static State 1h)	<1.0x10 ⁻⁸ Pa·m ³ /s·g
Temperature Range	-269°C – 500°C

FIBRE GLASS OUTGASSING

The 2 graphs show the outgassing at ambient and higher temperatures. The raw materials used together with the manufacturing processes ensure these standards are met.

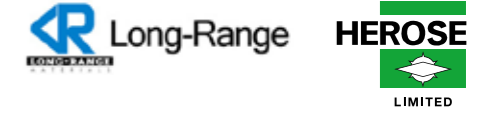
FIBRE GLASS OUTGASSING [TEMPERATURE 23°C]



FIBRE GLASS OUTGASSING [TEMPERATURE 120°C]



LONG-RANGE CRYOGENIC COMPOSITE INSULATION



LONG-RANGE MANUFACTURE THIS HIGH QUALITY MULTI-LAYER COMPOSITE OPTION BY ROLLING THE ALUMINIUM FOIL TOGETHER WITH THE INORGANIC PAPER IN COMBINED LAYERS FROM ONE TO FIVE PAIRS. THIS OPTION IS NORMALLY USED IN THE 5 TIMES PAPER AND 5 TIMES FOIL OPTION BY MOST USERS GLOBALLY.



TECHNICAL INFORMATION

Width Range:
60mm to 1800mm to your specification (minimum quantities may be required)
Standard Widths:
90mm, 910mm, 1310mm, 1710mm, 1800mm
Composite Layers:
(A*+B*) x 1, (A+B) x 2, (A+B) x 3, (A+B) x 5
Temperature Range:
-452°F to 932°F (-269°C to 500°C)

KEY BENEFITS

5x quicker install time:

- Ex-stock in Europe and beyond minimising your bulk purchases.
- The multi-layer, combined option strengthens the insulation materials.
- Drastically reduces the install time and increases your productivity.
- Reduces paper and foil waste.
- Suitable for all your equipment including oxygen vessels.
- Enhances installation efficiency and improves your bottom line.

*A = Aluminium foil & *B = insulation paper

APPLICATIONS

Cryogenic Vessels, Microbulk, Dewars, Cryogenic Railcars, ISO Tanks, Vacuum Jacketed Pipe, etc.

TECHNICAL REPORTS

The following technical reports are available to give additional detail to support your selection:

- **Test report 01S03:** Effective Thermal Conductivity Coefficient Test
- **Test report 04S11:** Material Outgassing Test at High Temperature (120°C)
- **Test report 03S10:** Material Outgassing Test at Normal Atmospheric Temperature
- **Installation Guide**

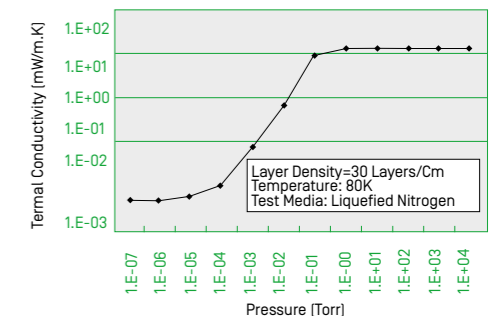
SPECIFICATION

Items	Insulation Material	Aluminium Foil
Thickness	0.06±0.01mm	0.0065mm
Weight	13.5±1 g/m ²	17±1 g/m ²
Tensile Strength	≥0.03 KN/m	≥0.4 KN/m
Moisture Content	≤0.5%	-
Organic Content	≤0.5%	-
Ensemble Thermal Conductivity	<1.5x10 ⁻⁴ w/m·k	
Cryogenic Out-gassing (Static State 1h)	<1.0x10 ⁻⁸ Pa·m ³ /s·g	
Temperature Range	-269°C – 500°C	

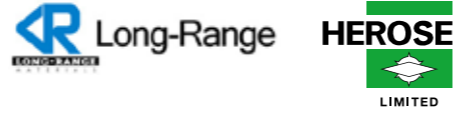
COMBINED PAPER PERFORMANCE

The graph on the right shows the conductivity performance that is achieved by the high level of quality control established throughout the business.

CONDUCTIVITY PERFORMANCE



LONG-RANGE CRYOGENIC INSULATION BLANKET



THE LONG-RANGE CRYOGENIC INSULATION BLANKET IS DESIGNED TO MEET THE SPECIFIC INSULATION NEEDS OF THE CRYOGENIC EQUIPMENT MANUFACTURERS AND THEIR APPLICATIONS. MADE FROM HIGH QUALITY, SUPER-FINE GLASS FIBRE BONDED TOGETHER WITH A MELAMINE RESIN, IT'S LIGHTWEIGHT, LOW IN DENSITY AND GIVES MAXIMUM THERMAL PROTECTION WITH MINIMAL WEIGHT.



TECHNICAL INFORMATION

Width Range:
60mm to 1800mm to your specification (minimum quantities may be required)
Standard Width:
1800mm
Temperature Range:
-450°F to 450°F (-268°C to 232°C)

KEY BENEFITS

- Gives maximum thermal protection with minimal weight.
- Easy to handle and cut into support struts and legs.
- Virtually no outgassing under vacuum pressures and cryogenic temperature conditions.
- Gives faster pump-down times.
- Makes your production processes more efficient and improves your bottom line.

APPLICATIONS

The Insulation Blanket is suitable for any application within the temperature range of -268°C to 232°C.

TECHNICAL REPORTS

The following technical reports are available to give additional detail to support your selection:

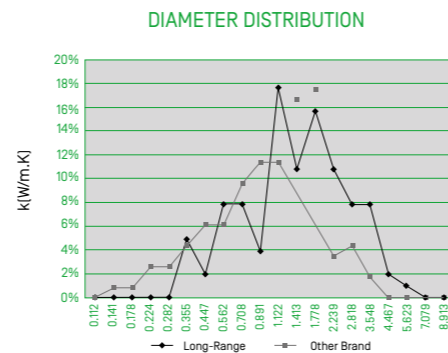
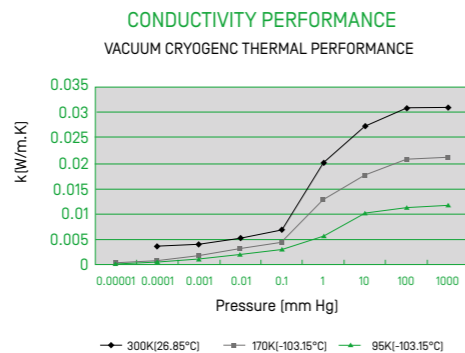
- **Test report 05S43:** Material Outgassing Test at Normal Atmospheric Temperature
- **Test report 06S44:** Effective Thermal Effective Conductivity Coefficient Test
- **Material Safety Sheet**

SPECIFICATION

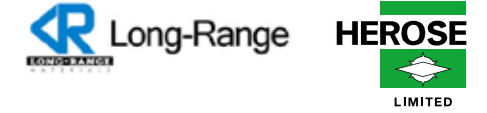
Items	Index (unit)
Thickness	25±5mm
Weight	360 – 440g/m ²
Width	900 – 1800mm
Length	8 – 25m
Moisture	≤0.5%
Thermal Conductivity (w/m•k)	Refer to chart
Fibre Diameter (mm)	Refer to chart
Temperature Range	-268°C – 232°C

BLANKET PERFORMANCE

The graphs on the right show the conductivity performance and diameter distribution achieved from the material.



LONG-RANGE CRYOGENIC INSULATION ACCESSORIES



WE STOCK AND SUPPLY THE FULL RANGE OF CRYOGENIC INSULATION ACCESSORY PRODUCTS FOR YOUR FULL RANGE OF CRYOGENIC EQUIPMENT. THESE INCLUDE ALUMINIUM FOIL, ALUMINIUM FOIL TAPE, GLASS FIBRE FABRIC, GLASS FIBRE TAPE, ETC.



CONTACT US TO ENSURE WE HAVE YOUR FULL REQUIREMENT HELD IN STOCK TO MEET YOUR DAILY NEEDS.

Call: +44 (0) 1302 773 114
Email: info@herose.co.uk

STANDARD SPECIFICATIONS

Property	Thickness (mm)	Width (mm)	Length (m)	Weight (g/m ²)
Aluminium Foil	0.0065	40 – 1800	10000	17±1 g/m ²
Aluminium Foil Tape	0.12	15 / 25 / 50	55	0.12
Glass Fibre Fabric	-	1050	200	48 / 80
Glass Fibre Tape	0.15	25	50 / 100	-

ALUMINIUM FOIL

- Status 1235-0
- Excellent reflection
- Low emissivity
- No outgassing

ALUMINIUM FOIL TAPE

- Water solubility acrylic adhesive
- Flame resistant
- Good sealant
- Long serviceable life indoors and outdoors
- Excellent reflection of both heat and light

FIBRE GLASS FABRIC

- Oxygen Compatible
- High strength
- Low thermal conductivity
- Low outgassing
- Meets the needs of fixing, protecting and finishing multi-layer insulation material wrapping

FIBRE GLASS TAPE

- Oxygen compatible
- High strength
- Low thermal conductivity
- Low outgassing
- Meets the needs of fixing and finishing multi-layer insulation material wrapping

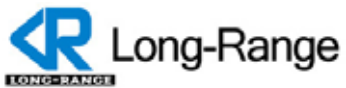


YOUR GUIDE TO CRYOGENIC INSULATION

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— IN PARTNERSHIP WITH —



www.longrange.com.cn

To view our complete cryogenic insulation range please visit —
herose.co.uk

Or to make an enquiry —
Call: [+44 \(0\) 1302 773 114](tel:+44(0)1302773114)
Email: info@herose.co.uk