

Data sheet

ENGLISH

# VACUPOR® MS-LD

## Vacuum-Insulation-Panel (VIP) with double middle seam - low density core.

### Description

VACUPOR® MS-LD is a microporous insulation material with an extremely low coefficient of thermal conductivity, i.e. with very good insulating properties.

VACUPOR® MS-LD consists basically of inorganic oxides. The main constituent is fumed silica, the other components are opacifiers for minimizing infrared radiation, and silicates.

The barrier film wrapping of VACUPOR® MS-LD is processed in form of a double middle seam. This results in a particularly good surface quality. Due to the missing side flaps, the panels can almost be form-fit stuck together butt joint. In foaming processes the foam flow is significantly less constrained, and the formation of cavities is significantly reduced.

VACUPOR® MS-LD (core material) is not flammable and is classified A1 according to DIN ISO EN 13501-1. VACUPOR® MS-LD is heat sealed in a metallized, multilayer plastic film under vacuum. The very low internal pressure and the microporous panel core is responsible for the extremely low thermal conductivity values.

### Application

VACUPOR® MS-LD was specifically developed for vacuum insulation applications in the appliance/refrigeration industry, where demands on the surface characteristics (e.g. side walls) and dimensional stability are not of a high priority.

The surface of the vacuumpanel can show wrinkles, deepenings, grooves or other imperfections. These characteristics do not have any negative impact on the technical performance of the product.

### Typical applications

VACUPOR® MS-LD is also successfully used as insulation material in the following areas:

- Refrigerators and freezers
- Cryogenic freezers
- Temperature controlled packaging

### Form of delivery

#### Standard sizes:

- 1200 mm x 1000 mm
- 1200 mm x 500 mm
- 1000 mm x 600 mm
- 1000 mm x 300 mm
- 600 mm x 500 mm
- 600 mm x 250 mm

#### Standard thicknesses:

- 10<sup>(1)</sup>, 15, 20, 25, and 30 mm
- Further thicknesses on request.

<sup>(1)</sup> panels of a thickness ≤ 15mm can be supplied without edge folding only.

### Customized formats available on request.

### Restrictions on applications

The metallized, multilayer plastic film of the VACUPOR® MS-LD must not be damaged by drilling, cutting, milling, nailing or the like, since the interior pressure of the panel will rise and the special properties of the panel, in particular its excellent insulation characteristics, will be lost.

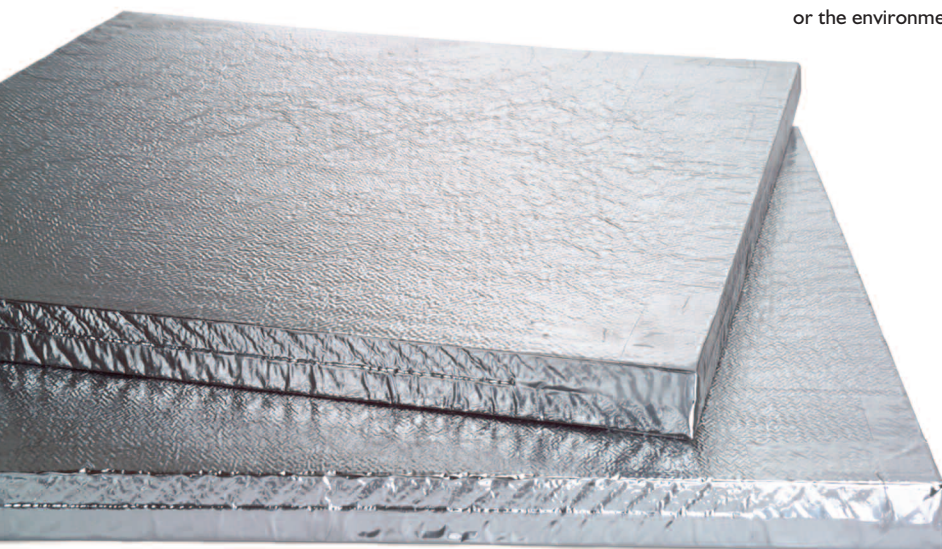
### Shelf life

VACUPOR® MS-LD has a very long shelf life. Please also observe our pressure rise table: Thermal conductivity as a function of internal pressure.

### Safety directions

VACUPOR® MS-LD is not a hazardous material as defined in EU directive 2006/1907/EEC. Please also observe our material safety data sheet.

VACUPOR® MS-LD does not liberate hazardous decomposition products and, as far as is known at present, does not cause any problems to human health or the environment.



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Physical properties (applicable to standard format)		
Colour (Caused by film)		Silver
Density (kg/m <sup>3</sup> )		140 - 180
Thermal conductivity (W/m·K) DIN 52612 Measured at 10°C (50°F) mean temperature	@ 1 mbar <sup>(2)</sup> @ ambient pressure	0.0037 0.019
Heat resistance <sup>(1)</sup> (Caused by film weld seam) (°C)		-50 < T < 120
Maximum film projection (mm)		150
Interior pressure (As delivered) (mbar)		≤ 5
Theoretical pressure rise <sup>(2)</sup> at 23°C/50% r.H. and panel thickness 20 mm (mbar/a)		~ 1.0
Maximum panel dimensions (mm)	Length mm Width mm Thickness mm	300 - 1300 300 - 1000 10 - 50
Length tolerances (mm)	300 to 500 mm 501 to 1000 mm 1001 to 1200 mm 1200 to 1800 mm	+ 5.0 / -5.0 + 6.0 / -6.0 + 8.0 / -8.0 + 10.0 / -10.0
Width tolerances (mm)	300 to 500 mm 501 to 1000 mm	+ 5.0 / -5.0 + 6.0 / -6.0
Thickness tolerances (mm)	≤ 20 mm > 20 mm	± 1.5 + 2.0 / - 2.0
Thermal shock resistance	The core material of VACUPOR® MS-LD is insensitive to high and low temperature thermal shocks.	

The above data are only intended as a guide and should not be used in preparing specifications.

**Please note:**

Vacupor® MS-LD is not approved by the German building and construction authorities for building applications. Vacupor® MS-LD may just be applied in areas where a Vacuum Insulation Panel is treated as an unregulated construction product, if an admission on a single case exists or will be obtained. The thermal conductivity value just describes the value of the Vacuum Insulation Panel under the mentioned conditions, measured in the center of the panel. The measured value does explicitly not correspond with the rated value, determined by the DIBt and may not be used in Germany for the implementation of thermal calculations for buildings.

- (1) The limits are fixed by the barrier film (sealing material) used; constant load: ≤ 80°C (176°F); short load time with 120°C (248°F): roughly 30 minutes.
- (2) According to EMPA test report No. 437'840/1 dated 21st December 2006. For sample size 1000x600 mm.

**Thermal conductivity**

Thermal Conductivity as a function of internal pressure.

Gas Pressure (hPa)	U value (W/m <sup>2</sup> K)	λ (10 <sup>-3</sup> W/m·K)
< 10 <sup>-3</sup>	0.187	3.63
0.1	0.188	3.66
1.0	0.193	3.75
10	0.219	4.25
150	0.448	8.70
1000	0.943	18.30

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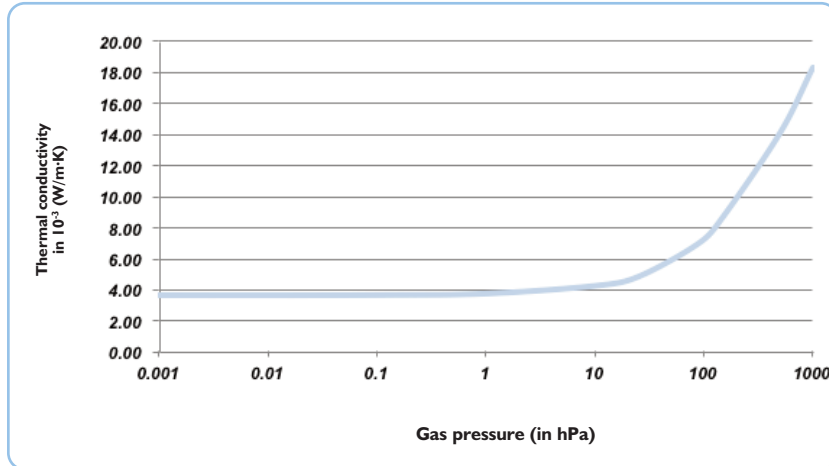
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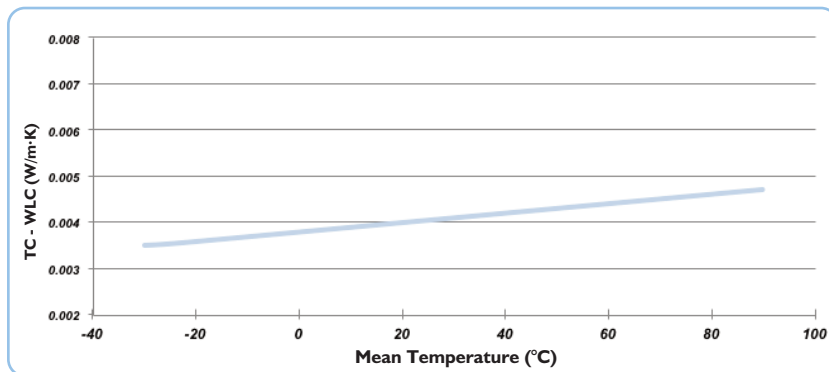
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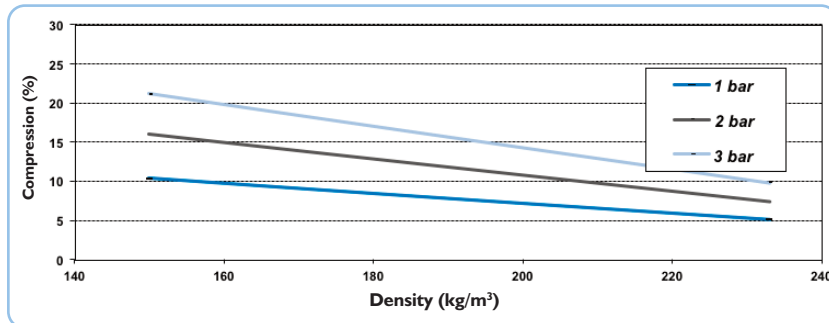
Thermal Conductivity as a function of internal pressure (DIN 52612)



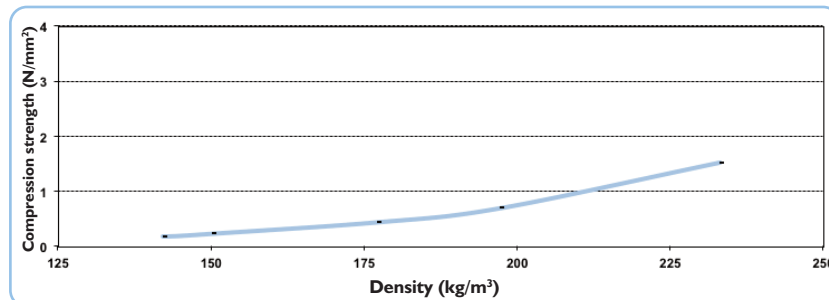
Thermal Conductivity (Panel Core) DIN 52612



Compression Behaviour (Panel Core)



Low-temp. Compression Strength



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