

## Technical data sheet

### va-Q-plus (Appliances & Food)



## Product Description

va-Q-plus, the second generation of vacuum insulation panels, is a microporous insulation material based on fumed silica. The high-tech panel is produced at most recent and in-house developed production lines. The powdered core material and the specifically engineered foil technology ensure the outstanding insulation ability for the entire service life of the product. The typical fields of application are refrigerators and freezers with high lifetime. The maximum energy consumption prescribed by the energy labelling of the manufacturers is supported by the usage of the va-Q-plus for the entire operating life of the products.

## Features

- **Best insulation value over the entire lifetime for insulation panels based on fumed silica**
- **Very good cost-performance ratio**
- **Extremely high flexibility and ductility**
- Long lifetime because of optimized panel designs
- 100 % quality control with the patented gas pressure measurement system (va-Q-check)
- Sustainable product (recyclable core material)
- Non-flammable core material after DIN EN 13501-1 A1
- Optimized adhesion during lathering with polyurethane

## Properties

|  |  |
|--|--|
| Thermal conductivity $\lambda(10\text{ °C})^*$             | < 0.0035 W/(m·K) (at delivery)<br>following DIN EN 12667                     |
| Thermal conductivity, ventilated $\lambda(10\text{ °C})^*$ | < 0.020 W/(m·K) following DIN EN 12667                                       |
| Thermal transmittances (thickness = 20 mm*, 10 °C)         | 0.18 W/(m <sup>2</sup> ·K)   |
| Internal gas pressure @ 20 °C                              | < 7 mbar (at delivery)   |
| Density  | 160 – 230 kg/m <sup>3</sup> following DIN EN 1602                            |
| Area density   | 3.2 – 4.6 kg/m <sup>2</sup> (thickness = 20 mm)                              |
| Temperature resistance                                     | -75 – 70 °C (temporary up to 130 °C possible)                                |
| Moisture resistance  | 0 – 70 % rel. humidity (until 50 °C)   |
| Storage stability  | Optimal storable @ 23 °C, 50 % rel. humidity                                 |
| Thermal shock resistance                                   | -75 – 80 °C following DIN EN 60068-2-14<br>0 – 110 °C nach DIN EN 60068-2-14 |
| Specific heat capacity                                     | 0.8 kJ/kgK (at room temperature)   |
| Compressive strength at 10 % compression                   | ca. 120 kPa following DIN EN 826   |
| Lifetime   | Depending on usage, up to 60 years   |

\*Please note terms of service § 6 “Deviation range of the insulation value” in “Special Terms and Conditions of Sale and Delivery, Product: Vacuum Insulation Panels (VIPs)” corresponding to the valid version respectively.

## Testing Standards

Our va-Q-plus panels are subjected to the following internal test methods to confirm their exceptional properties:

- Long-time performance tests up to 160 °C
- Accelerated aging tests at 50 °C, 70 % relative humidity and 80 °C (dry)
- Long-time monitoring at room conditions (p(t) and  $\lambda(t)$ )
- Thermal conductivity measurements  $\lambda(T)$ ,  $\lambda(p)$  following DIN EN 12667
- Thermal shock resistance following DIN EN 60068-2-14

## Measures and tolerances

| length l<br>in [mm] | width w in [mm]        |                           |        | width w in [mm]        |                           |         | width w in [mm]        |                           |           |         |        |         |
|---------------------|------------------------|---------------------------|--------|------------------------|---------------------------|---------|------------------------|---------------------------|-----------|---------|--------|---------|
|                     | ≤ 300                  |                           |        | > 300 - 500            |                           |         | > 500                  |                           |           |         |        |         |
|                     | thickness t<br>in [mm] | tolerances: l/w/t in [mm] |        | thickness t<br>in [mm] | tolerances: l/w/t in [mm] |         | thickness t<br>in [mm] | tolerances: l/w/t in [mm] |           |         |        |         |
| ≤ 500               | ≤ 10                   | +2/-4                     | +2/-4  | +2/-1,5                | ≤ 10                      | +2/-4   | +3/-7                  | +2/-1,5                   | ≤ 10      | +2/-4   | +4/-10 | +2/-1,5 |
|                     | > 10 - 15              | +3/-4                     | +3/-5  | +2/-2                  | > 10 - 15                 | +3/-4   | +4/-8                  | +2/-2                     | > 10 - 15 | +3/-4   | +5/-10 | +2/-2   |
|                     | > 15 - 20              | +4/-5                     | +4/-8  | +2,5/-3                | > 15 - 20                 | +4/-5   | +5/-12                 | +2,5/-3                   | > 15 - 20 | +4/-5   | +6/-14 | +2,5/-3 |
|                     | > 20 - 25              | +4/-6                     | +4/-8  | +3/-3,5                | > 20 - 25                 | +4/-6   | +5/-13                 | +3/-3,5                   | > 20 - 25 | +4/-6   | +6/-15 | +3/-3,5 |
|                     | > 25 - 30              | +4/-8                     | +5/-10 | +3/-4                  | > 25 - 30                 | +4/-8   | +5/-15                 | +3/-4                     | > 25 - 30 | +4/-8   | +6/-17 | +3/-4   |
|                     | > 30                   | +4/-10                    | +5/-12 | +3/-4,5                | > 30                      | +4/-10  | +6/-15                 | +3/-4,5                   | > 30      | +4/-10  | +6/-20 | +3/-4,5 |
| > 500<br>- 1000     | ≤ 10                   | +4/-5                     | +2/-4  | +2/-1,5                | ≤ 10                      | +4/-5   | +3/-7                  | +2/-1,5                   | ≤ 10      | +4/-5   | +4/-10 | +2/-1,5 |
|                     | > 10 - 15              | +4/-7                     | +3/-5  | +2/-2                  | > 10 - 15                 | +4/-7   | +4/-8                  | +2/-2                     | > 10 - 15 | +4/-7   | +5/-10 | +2/-2   |
|                     | > 15 - 20              | +5/-12                    | +4/-8  | +2,5/-3                | > 15 - 20                 | +5/-12  | +5/-12                 | +2,5/-3                   | > 15 - 20 | +5/-12  | +6/-14 | +2,5/-3 |
|                     | > 20 - 25              | +5/-12                    | +4/-8  | +3/-3,5                | > 20 - 25                 | +5/-12  | +5/-13                 | +3/-3,5                   | > 20 - 25 | +5/-12  | +6/-15 | +3/-3,5 |
|                     | > 25 - 30              | +5/-12                    | +5/-10 | +3/-4                  | > 25 - 30                 | +5/-12  | +5/-15                 | +3/-4                     | > 25 - 30 | +5/-12  | +6/-17 | +3/-4   |
|                     | > 30                   | +5/-15                    | +5/-12 | +3/-4,5                | > 30                      | +5/-15  | +6/-15                 | +3/-4,5                   | > 30      | +5/-15  | +6/-20 | +3/-4,5 |
| > 1000<br>- 1500    | ≤ 10                   | +5/-7                     | +2/-4  | +2/-1,5                | ≤ 10                      | +5/-7   | +3/-7                  | +2/-1,5                   | ≤ 10      | +5/-7   | +4/-10 | +2/-1,5 |
|                     | > 10 - 15              | +7/-10                    | +3/-5  | +2/-2                  | > 10 - 15                 | +7/-10  | +4/-8                  | +2/-2                     | > 10 - 15 | +7/-10  | +5/-10 | +2/-2   |
|                     | > 15 - 20              | +10/-15                   | +4/-8  | +2,5/-3                | > 15 - 20                 | +10/-15 | +5/-12                 | +2,5/-3                   | > 15 - 20 | +10/-15 | +6/-14 | +2,5/-3 |
|                     | > 20 - 25              | +10/-15                   | +4/-8  | +3/-3,5                | > 20 - 25                 | +10/-15 | +5/-13                 | +3/-3,5                   | > 20 - 25 | +10/-15 | +6/-15 | +3/-3,5 |
|                     | > 25 - 30              | +10/-17                   | +5/-10 | +3/-4                  | > 25 - 30                 | +10/-17 | +5/-15                 | +3/-4                     | > 25 - 30 | +10/-17 | +6/-17 | +3/-4   |
|                     | > 30                   | +10/-18                   | +5/-12 | +3/-4,5                | > 30                      | +10/-18 | +6/-15                 | +3/-4,5                   | > 30      | +10/-18 | +6/-20 | +3/-4,5 |
| > 1500              | ≤ 10                   | +7/-10                    | +2/-4  | +2/-1,5                | ≤ 10                      | +7/-10  | +3/-7                  | +2/-1,5                   | ≤ 10      | +7/-10  | +4/-10 | +2/-1,5 |
|                     | > 10 - 15              | +10/-15                   | +3/-5  | +2/-2                  | > 10 - 15                 | +10/-15 | +4/-8                  | +2/-2                     | > 10 - 15 | +10/-15 | +5/-10 | +2/-2   |
|                     | > 15 - 20              | +20/-20                   | +4/-8  | +2,5/-3                | > 15 - 20                 | +20/-20 | +5/-12                 | +2,5/-3                   | > 15 - 20 | +20/-20 | +6/-14 | +2,5/-3 |
|                     | > 20 - 25              | +20/-20                   | +4/-8  | +3/-3,5                | > 20 - 25                 | +20/-20 | +5/-13                 | +3/-3,5                   | > 20 - 25 | +20/-20 | +6/-15 | +3/-3,5 |
|                     | > 25 - 30              | +20/-20                   | +5/-10 | +3/-4                  | > 25 - 30                 | +20/-20 | +5/-15                 | +3/-4                     | > 25 - 30 | +20/-20 | +6/-17 | +3/-4   |
|                     | > 30                   | +20/-20                   | +5/-12 | +3/-4,5                | > 30                      | +20/-20 | +6/-15                 | +3/-4,5                   | > 30      | +20/-20 | +6/-20 | +3/-4,5 |

**Remark:** Based on the unique production method, the panels are less thick at the edges and corners than in the center. The measures, tolerances and insulation values refer to the insulated area of the panel from one corner to another. Circulating the panel there is a 10 mm to 20 mm wide sealing seam. A typical panel measures 8 mm up to 30 mm. The smaller the panel the slighter is the maximal thickness of the panel due to production limits. **Please ask for your wished dimensions.**

| Flaps          | Measure | Tolerance |
|----------------|---------|-----------|
| Width of flaps | 20 mm   | +0/-10 mm |

**Remark:** The laying and fixing of the flaps plus other refinements, e.g. laminations, are possible on request.

## Legal Notes/Disclaimer

The data presented in this technical data sheet are in accordance with the present state of our knowledge.

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