

Thermal Interface Materials from TOSEDA for Space Industry

Thermal interface materials (TIM) help to dissipate the parasitic heat generated by the electronic units. Parasitic heat can cause electronic units to overheat. However, heat dissipation is limited by uneven surfaces (**Fig. 1**).

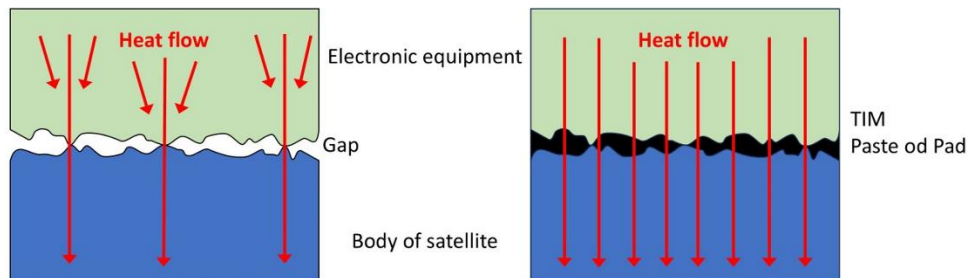


Fig. 1: Idealized scheme of parasitic heat removal without TIM and with TIM

TIM systems are necessary to increase the efficiency of parasitic heat removal. TOSEDA has developed an electrically non-conductive Pad (4SPACE tosesta 149-3) and Paste (4SPACE tosesta 169-2) for the space industry. Both systems were certified for space using. Appearance pad 4SPACE tosesta 169-2 ready for application is in **Fig. 2**.

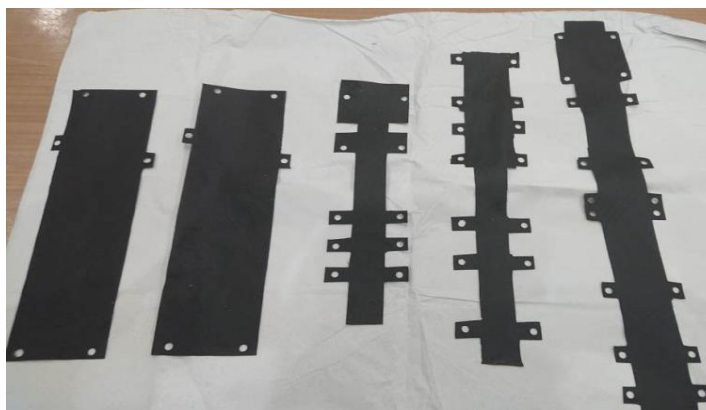


Fig. 2: Appearance pad 4SPACE tosesta 169-2 ready for application.

Appearance past 4SPACE tosesta 149-3 is in **Fig. 3**.



Fig. 3: Appearance past 4SPACE tosesta 149-3.

Material sheets for both systems are attached.

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Material Data Sheet

4SPACE TOSEDA® Paste 149-3

Thermally conductive and electrically non-conductive paste

DESCRIPTION

Dark grey polymeric paste with exceptional thermal conductivity formulated as an electrically non-conductive system.

Meets the outgassing requirements defined by the ESA standard ECSS-Q-ST-70-02C.

APPLICATION

Thermal interface material for power electronics applications.

Designed for applications requiring high thermal conductivity, electrical resistance, low outgassing, excellent tack and relaxation behavior, and no macro phase separation under extreme operating conditions.

For applications requiring resistance to hydrothermal aging and thermal-vacuum cycling in the temperature range from -50 to +120 °C.

PROPERTIES

Parameter	Average result	Standard
Appearance	Dark grey paste	-
Density	1910 – 2000 kg/m ³	ČSN EN ISO 1183
Complex viscosity after conditioning for 12 h in vacuum 5 mbar and RT	8 – 40 kPa.s	
Glass Transition Temperature	-48 – -40 °C	ASTM D3418
Volume Resistivity	2 – 25 GΩm	ASTM F1529
Thermal Conductivity	1,59 – 1,80 W/mK	ASTM D7984
Thermal Conductance calculated for 200 μm thickness	≥ 7950 W/m ² .K	ASTM D7984
Collected Volatile Condensable Material (CVCM)	≤ 0,04 %	ECSS-Q-ST-70-02C
Recovery Mass Loss (RML)	≤ 0,04 %	ECSS-Q-ST-70-02C

STORAGE AND TRANSPORT

Transport and keep stored in sealed storage glass or plastic containers at room temperature.

HANDLING INSTRUCTIONS

Keep stored at room temperature.

If the application requires a lower material viscosity, the material can be tempered to a temperature not exceeding 60 °C before application.

Apply by hand application, spreading, or using specially designed equipment in horizontal and vertical position.

Easily reworkable and removable from various surfaces.

Cleaning surfaces with isopropanol without limits, acetone cleaning only for short time expositions.

WARANTY

TOSEDA provides a 12-month warranty for the material from the manufacturing date if the material is stored at 23 °C in unopened original packaging.

PRODUCT SAFETY

The safety data sheet is available from the manufacturer or an approved material distributor.

TOSEDA may not know all possible material applications.

The user is responsible for deciding on the suitability and safety of use of the material.

TOSEDA expressly disclaims any liability for incidental or consequential damages caused by improper use of the material.

Produced by: TOSEDA s.r.o.

Date: 15/04/2024

Prepared by: Jiri Zelenka, Executive director

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Material Data Sheet

4SPACE TOSEDA® Pad 169-2

Thermally conductive and electrically non-conductive pad

DESCRIPTION

Fabric reinforced elastomeric pad with exceptional thermal conductivity formulated as an electrically non-conductive system.

Meets the outgassing requirements defined by the ESA standard ECSS-Q-ST-70-02C.

APPLICATION

Thermal interface material for power electronics applications.

Designed for applications requiring high thermal conductivity, electrical resistance, low outgassing, excellent tack and relaxation behavior under extreme operating conditions.

For applications requiring resistance to hydrothermal aging and thermal-vacuum cycling in the temperature range from -50 to +120 °C.

PROPERTIES

Parameter	Average result	Standard
Appearance	Black sheet	-
Thickness	250 – 290 μm	ASTM D6988
Density	2015 – 2090 kg/m ³	ČSN EN ISO 1183
Glass Transition Temperature	-57 °C	ASTM D3418
Volume Resistivity	1,1 – 4,1 GΩm	ASTM F1529
Thermal Conductivity	1,3 – 1,44 W/mK	ASTM D7984
Thermal Conductance calculated for 200 μm thickness	≥ 6500 W/m ² .K	ASTM D7984
Tensile Strength	≥ 40 MPa	ISO 527-3
Collected Volatile Condensable Material (CVCm)	≤ 0,04 %	ECSS-Q-ST-70-02C
Recovery Mass Loss (RML)	≤ 0,04 %	ECSS-Q-ST-70-02C

STORAGE AND TRANSPORT

Transport and keep stored in sealed storage plastic bags at room temperature.

HANDLING INSTRUCTIONS

Keep stored at room temperature.

Apply by hand application, in horizontal and vertical position.

No particle formation during machining and handling.

Easily reworkable and removable from various surfaces.

Cleaning surfaces with isopropanol without limits, acetone cleaning only for short time expositions.

WARANTY

TOSEDA provides a 12-month warranty on the material from the manufacturing date if the material is stored between 18 and 25 °C in unopened original packaging.

PRODUCT SAFETY

The safety data sheet is not requested as the pad is a fully cured polymeric material.

TOSEDA may not know all possible material applications.

The user is responsible for deciding on the suitability and safety of use of the material.

TOSEDA expressly disclaims any liability for incidental or consequential damages caused by improper use of the material.

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