Flexitallic®

PRODUCT DATASHEET

THERMICULITE® 870

Thermiculite® 870 is a high temperature sealing material designed for low stress sealing in solid oxide fuel cells. It is based on the mineral vermiculite and contains no organic components.

Thermiculite®
innovative. versatile. complete.

Service:

Thermiculite® 870 is specifically designed for use in solid oxide fuel cells (SOFC) and solid oxide electrolysers (SOE) and has a high degree of compression combined with good sealing under low applied surface stresses.

Thermiculite® 870 contains only two minerals, vermiculite and steatite. There are no organic materials or other elements (such as phosphorous or sulphur) that would contaminate SOFC or SOE cell chemistry.

Gasket Test Data:

For some SOFC designs a softer, more compressible sealing material is required. TH870 is significantly more compressible under low loads, e.g. 1MPa. TH870 is around ten times more compressible than TH866. **Figure 1** (below) shows load vs defection for TH870 compared to TH866.

At a stress of 1 MPa TH870 compresses 0.22mm whereas TH866 gasket only compresses 0.02mm under the same load.

Availability:

Thermiculite® 870 is available in sheet form:

Standard sheet size: 450mm x 350mm

Standard thicknesses:
0.5mm, 0.7mm and 1.0mm*

**Please note that these nominal thicknesses are provided as a guide. As the material is very soft the measured thicknesses may differ slightly due to compression during measurement.*

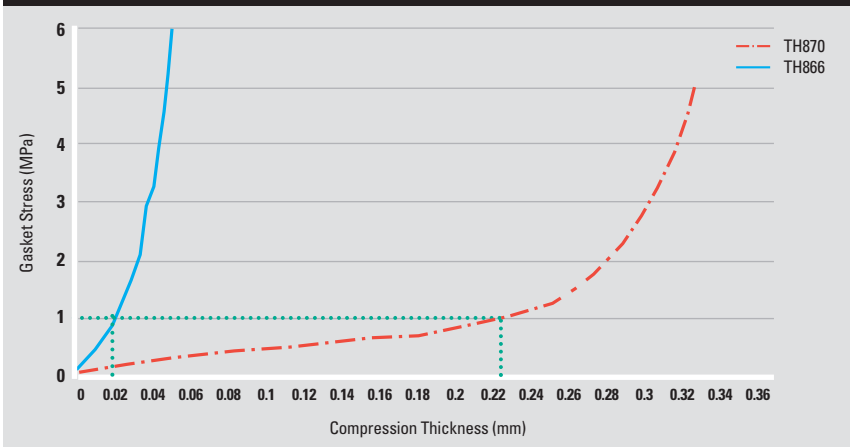
Special thicknesses between 0.3mm and 1.0mm are available on request.

Flexitallic can provide a gasket cutting service, ideally a .dxf file of the gasket shape would be provided by the customer.

Flexitallic will review the dimensions and design and advise if cutting is feasible and provide a quote.

Sample material available on request.

1 COMPRESSION OF TH870 AND TH866 GASKETS



Health & Safety

For further Health and Safety information please see the relevant Material Safety Datasheets or contact Flexitallic UK Ltd.

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Thermiculite® 870 also seals at least as effectively as TH866, but at much lower applied loads. This is the case at ambient and elevated temperatures. **Figure 2** (below) shows an 80 hour leakage test at ambient temperature.

2 AMBIENT SEALING PERFORMANCE. SURFACE STRESS 3MPa, HELIUM PRESSURE 100 mbar

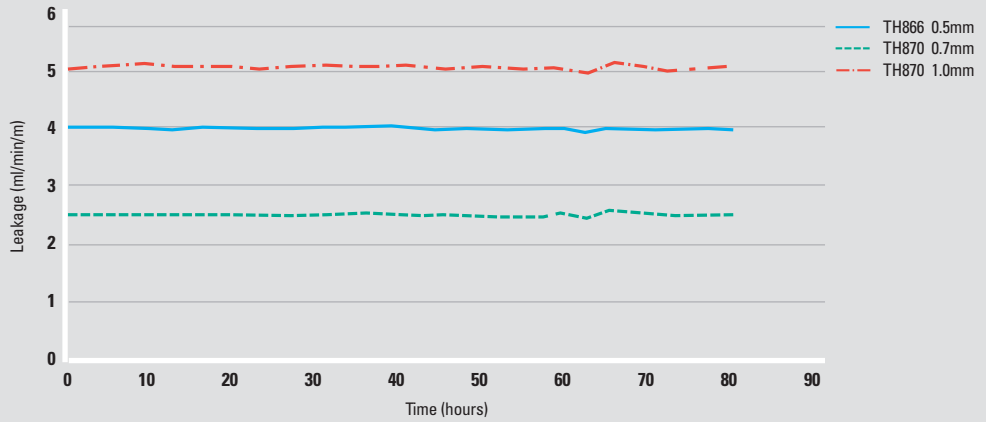

Table 1 (right) shows the effect of gasket thickness on leak rate for TH870 gaskets. It is recommended that the thinnest material is chosen after taking account of other requirements e.g. flange surface imperfections, spacing requirements between cells or for the gasket to compensate for tolerances throughout the stack.

TABLE 1. Leak Rate Variation with Gasket Thickness. *(700°C, 1 MPa Gasket Stress, He Test Pressure 100 mbar)*

TH870 Thickness (mm)	Leak rate after 100 hours (ml/min/m)
0.4	2.036
0.7	2.621
1.0	3.525

Table 2 (right) shows the leak rate of TH870 at elevated temperature at three different gasket stresses. For a given temperature the leakage rate reduces as gasket stress is increased.

A representative 120 hour leakage plot is shown in **figure 3** (on the following page).

TABLE 2. TH870 Leak Rate Variation with Gasket Stress and Temperature. *(0.7mm Gasket Thickness, He Test Pressure 100 mbar)*

	Leak Rate (ml/min/m)		
	1 MPa	**3 MPa**	**5 MPa**
600°C	1.307	0.628	0.433
700°C	2.621	2.023	0.305
800°C	3.064	1.724	1.377

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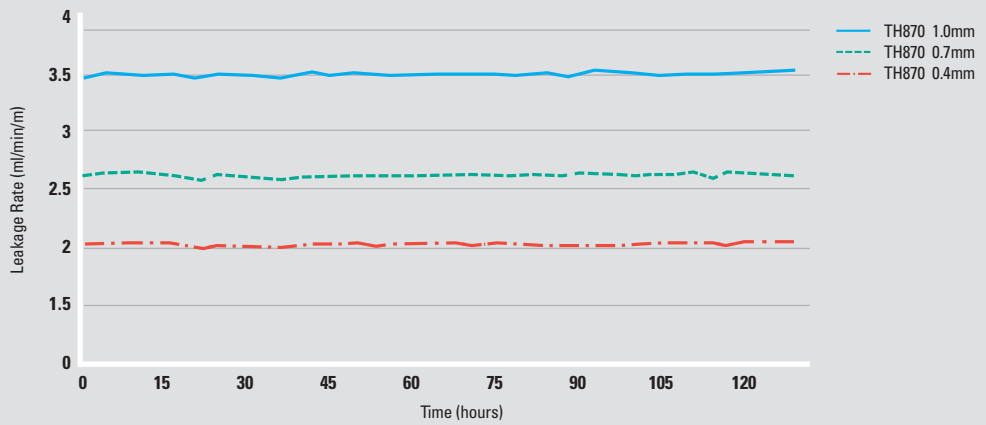
A representative 120 hour leakage plot is shown in **figure 3** (below).

3 REPRESENTATIVE 100 HOUR SEALING PLOT (700°C, 1 MPa SURFACE STRESS, He 100 mbar)



Further Information

Introduction of a Low Sealing Stress Vermiculite Based Compression Gasket for SOFCs, ECS Transactions, **83(1)**, 159-170 (2018)