

Thermal Resistance of Textile Materials by Togmeter

The fabrics of clothing act as buffers or barriers to the free exchange of heat between the wearer and the environment. The measure of the insulation of a material is its thermal resistance. It is defined as the temperature difference between the two faces divided by the heat flux. It can be expressed in Tog value (British unit), Clo value (American unit) or m^2K/W (SI unit). These units are inter-convertible ($1 \text{ tog} = 0.1 \text{ m}^2K/W = 0.645 \text{ clo}$).

Testing on Thermal Resistance with BS 4745

For thermal conductors in series with respect to the direction of heat flow, the ratio of temperature drop across the conductors is equal to the ratio of their thermal resistance. Provided that there are two materials in series, and one of the material has a known thermal resistance (standard resistance), thermal resistance of the other material (test specimen) can be determined.



Unit of Thermal Resistance -Tog Value

Tog value is commonly used in the British textile industry, and the warmth of clothing fabrics, quilts, and other textile products is measured in Tog. One Tog is the thermal resistance of fabric for a conventional man's suiting or a blanket of a medium quality. The higher the Tog value, the greater is the thermal insulation provided. Typical Tog values for a range of fabrics are shown in below table.

Fabric or Article	Thermal Resistance Value (Tog)
Shirting	0.1
Sweater	1
Carpets	2
Curtain	0.2
Blanket	1
Continental Quilts	10

The equivalent method in the USA: ASTM D1518; Standard Test Method for Thermal Transmittance of Textile Materials, gives similar results (in clo) but as the test conditions are different e.g. the pressure on the tested sample is greater (70 Pa instead of 6.9 in the BS method), the results are not directly comparable. Please contact us if you need further information.

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