Science.
Applied to Life.™

3M Advanced Materials Division

3M™ Evaporation Boats 4.0

Introduction

3M is a leading manufacturer of evaporation boats for metallizing applications. 3M™ Evaporation Boats 4.0 (EB 4.0) use the proven material formulation of 3M™ EB 3.0 two-component boats, but come with an optimized trapezoidal shape for improved energy efficiency.

3M EB 4.0 are made of 3M™ Titanium Diboride (electrically conductive with high resistance to chemicals and heat) and 3M™ Boron Nitride (thermally conductive with high electrical resistivity).

EB 4.0 offer all benefits of EB 3.0:

- Robustness even under harsh process conditions
- Proven cavity design/evaporation surface for minimum spitting
- Long service life even at high evaporation rates
- Uniform and consistent quality of metallized film – truly operator friendly evaporation boats

In addition, the trapezoidal shape of EB 4.0 results in up to 20% energy savings compared to rectangular boats. And due to their optimized trapezoidal shape, 3M EB 4.0 offer up to 5% energy savings compared to other trapezoidal designs.

In summary, these high-performance evaporation boats are easy to run and provide excellent metallized film quality. Best in class energy consumption combined with a long service life result in low total cost of ownership.

Storage conditions: At or above 5°C, in original packaging

Additional products for metallizing

- 3M™ Boron Nitride Suspension WS
- 3M™ Graphite Suspension
- 3M™ Graphite Tape

Hot Resistivity Groups

(Not for specification purposes.)

2-component	Hot Resistivity (moc)	2-component	Hot Resistivity (moc)
R2	3700 ± 300	R4	2700 ± 300
R3	3200 ± 300	R5	2300 ± 200

Typical Physical Properties

(Not for specification purposes.)

Property	3M™ Evaporation Boats 4.0
Density, ρ (g/cm³)	>2.75
Porosity, P (%)	<5
Maximum water uptake (%) at 38°C, 90% RH	<0.2
Phase composition	TiB_2, BN
Color	Grey
Electrical Properties*	
Resistivity[1] at 1500°C, ρ (10^{-6} Ωcm)	1300-4800
Mechanical Properties at Room Temperature*	
Brinell hardness (HB 2.5/31.25)	60
Flexural strength, 4-point bending, σ (MPa)	95
Young's modulus, E (GPa)	54
Fracture toughness[2] K_{ic} (MPa √m)	2.3
Thermal Properties*	
Maximum thermal extension at 25–1500°C (%)	<0.8
Coefficient of thermal expansion at 25–1500°C, α (10^{-6}/K)	4.8
Specific heat at 25°C, c_p (J/g•K)	0.73
Thermal conductivity at 25°C, λ (W/m•K)	66

* These figures are intended as a guide and should not be used in preparing specifications. They are subject to production tolerances and are in accordance with the current state of the art.

1. Dependent on resistivity group **2.** SENB (single-edge notched bending)

Product Development and Manufacturing

We work closely with our customers and with equipment manufacturers to develop optimal, cost-effective solutions for metallizing applications. 3M™ Evaporation Boats are the result of intensive research and development, the use of modern processing and manufacturing techniques, and high-quality 3M advanced ceramic materials. Our manufacturing processes are optimized to ensure reliable and repeatable product performance, even for large lot sizes. Key raw materials are produced in-house, and we perform quality control checks after each production step. The ceramic powders are hot pressed into homogenous sinter billets, which are then cut to customer specifications in our fully equipped precision diamond cutting and grinding facilities. In the last step of the process, the cavities are machined.

About 3M Advanced Ceramics

3M is one of the world's leading manufacturers of advanced ceramic products and materials for industrial applications. Our extensive range of ceramic materials includes borides (TiB_2, ZrB_2), carbides (SiC, B_4C) and nitrides (Si_3N_4, BN). We offer these products in a variety of forms, including functional additives and final articles such as bearings, seal rings, blast nozzles and crucibles.

3M advanced ceramic products are manufactured at fully dedicated, ISO 9001 and 14001 certified facilities. Our manufacturing processes are optimized for quality, efficiency and consistency – helping ensure reliable and repeatable product performance. We have more than 85 years of experience in designing and manufacturing cutting-edge ceramic solutions, and we continually work to develop new applications for ceramic materials in cooperation with our customers and with research institutions. To learn more about our high-performance ceramic products, contact us at **+49 (0)831 5618-0**.

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The management system has been certified according to DIN EN ISO 9001, DIN EN ISO 50001, DIN EN ISO 14001.