

3M Advanced Materials Division

3M™ Evaporation Boats 2 Series

Introduction

3M Technical Ceramics is a leading global manufacturer of evaporation boats for metallizing applications. 3M™ Evaporation Boats 2 Series are a new generation of two-component boats optimized for high efficiency and consistent product quality. These high-performance boats are easy to run and provide high evaporation rates combined with a long service life.

3M Evaporation Boats 2 Series 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.)

In comparison with previous generations of evaporation boats, the improved formulation of 3M Evaporation Boats 2 Series provides:

- Increased evaporation rates allow higher web speed and/or higher optical density
- Up to 30% longer boat lifetime
- Improved break-in behavior
- Less spitting due to homogeneous wetting and corrosion resistance
- Energy consumption reduced by up to 10%

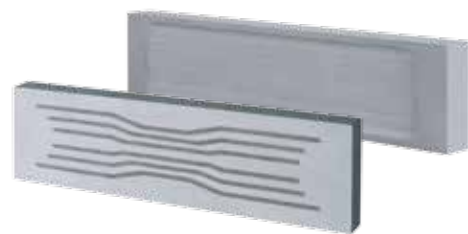
The standard product in the 2 Series portfolio is 3M™ Evaporation Boat 2C, a two-component boat with cavity.

3M™ Evaporation Boat 2L offers the added advantages of Lasermet™ technology, a lasering surface treatment for improved wetting. These boats are used for the most challenging metallizing conditions.

- Shorter initial heat-up cycle
- Excellent break-in behavior
- Optimized evaporation cloud for fully homogeneous aluminum layer

Additional Products for Metallizing

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



Hot Resistivity Types

(Not for specification purposes.)

2-component	Hot Resistivity (m Ω c)
Type 2	3700 \pm 300
Type 3	3200 \pm 300
Type 4	2700 \pm 300
Type 5	2300 \pm 200

Typical Physical Properties (Not for specification purposes.)

Property	3M™ Evaporation Boats 2 Series
Density, ρ (g/cm ³)	> 2.75
Porosity, P (%)	< 3
Maximum water uptake (%) at 38°C, 90% RH	< 1.5
Phase composition	TiB ₂ , BN
Color	Gray
Electrical Properties*	
Resistivity ¹ at 1600°C, R ₉₁ (10 ⁻⁶ Ω cm)	1,300–4,800
Mechanical Properties at Room Temperature*	
Brinell hardness (HB 2.5/40)	45
Flexural strength, 4-point bending, σ (MPa)	70
Weibull modulus, m (1)	> 20
Young's modulus, E (GPa)	55
Fracture toughness ² K _{Ic} (MPa \sqrt m)	1.8
Thermal Properties*	
Maximum thermal extension at 20–1600°C (%)	< 1.2
Coefficient of thermal expansion at 20–1600°C, α (10 ⁻⁶ /K)	5.5
Specific heat at 20°C, c _p (J/g•K)	0.68
Thermal conductivity at 20°C, λ (W/m•K)	80

* 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 grade 2. Sharp notch

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 grinding facilities. In the last step of the process, the cavities are machined or a laser surface treatment is applied.

About 3M Advanced Ceramics

3M Technical Ceramics (formerly ESK Ceramics) 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 **1-800-367-8905**.

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