Science.
Applied to Life.™

3M Advanced Materials Division

3M™ Evaporation Boats

Introduction

3M Technical Ceramics is a leading global manufacturer of evaporation boats for metallizing applications. Suitable for all vacuum web coaters, 3M™ Evaporation Boats are easy to operate and offer long service life and excellent wetting behavior.

3M™ Evaporation Boat Dimet

Our 3M™ Evaporation Boat Dimet is an excellent all-around solution for all metallization processes. This 2-component boat can be used at high web-speed on all modern vacuum coaters.

- High evaporation rate of at least 0,35 g · min^{-1} · cm^{-2}
- Excellent temperature resistance
- High optical density
- High web-speed

3M™ Evaporation Boat Lasermet

Our patented lasering surface treatment improves initial wetting for easy boat break-in. Aluminum wets this 2-component boat along the whole lasered surface, which has higher TiB_2 content.

- Superior initial wetting behavior
- Larger working surface for increased evaporation rate
- Shorter initial heat-up cycle
- High optical density
- High web-speed

3M™ Evaporation Boat Trimet

Our 3M™ Evaporation Boat Trimet is made from our 3-component material. It can be used on all generations of vacuum coaters and is very easy to handle even for inexperienced operators.

- Suitable for all machine generations
- Evaporation rate of 0,25 g · min^{-1} · cm^{-2}
- Easy control of operating parameters
- Only possible alternative for boats longer than 200 mm

Typical Physical Properties (Not for specification purposes.)

Property	2-component	3-component
Density, ρ (g/cm³)	> 2,75	> 2,80
Porosity, P (%)	<3	<6
Maximum water uptake (%) at 38°C, 90% RH	<1,5	<1,0
Phase composition	TiB_2, BN	TiB_2, BN, AlN
Color	Gray	Gray
Electrical Properties*		
Resistivity[1] at 1600°C, R_{el} (10^{-6} Ωcm)	1300 – 4800	375 – 4800
Mechanical Properties at Room Temperature*		
Brinell hardness (HB 2.5/40)	45	95
Flexural strength, 4-point bending, σ (MPa)	70	90
Weibull modulus, m (1)	>20	>20
Young's modulus, E (GPa)	55	66
Fracture toughness[2] K_{ic} (MPa √m)	1,8	2
Thermal Properties*		
Maximum thermal extension at 20–1600°C (%)	<1,2	<1,5
Coefficient of thermal expansion at 20–1600°C, α (10^{-6}/K)	5,5	7
Specific heat at 20°C, c_p (J/g•K)	0,68	0,67
Thermal conductivity at 20°C, λ (W/m•K)	80	55

*** 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

Ceramic Materials

3M™ Evaporation Boats are made of electrically conductive ceramic composites. Our 2-component boats consist of titanium diboride (TiB_2) and boron nitride (BN), and our 3-component boats also contain aluminum nitride (AlN). These advanced ceramic materials are characterized by a unique combination of chemical, mechanical and electrical properties.

Additional Products for Metallizing

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

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 lasering 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 **+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.