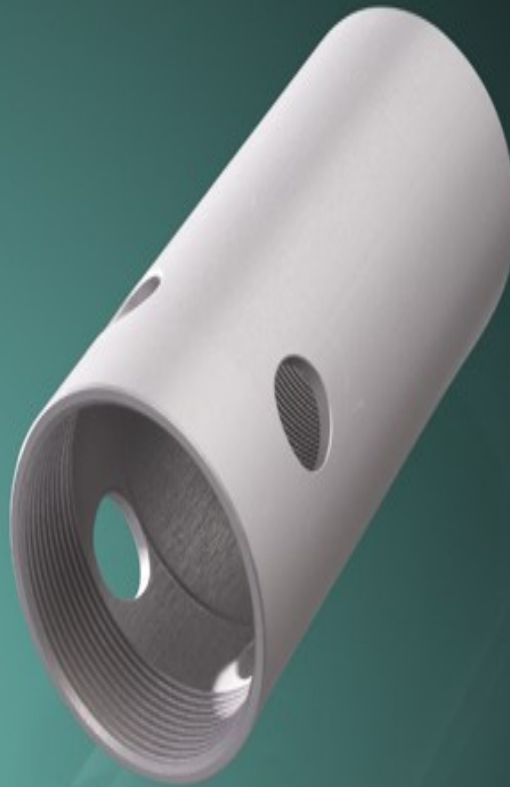


ENGINEERING DATA-SHEET

TUFRAM[®] HO



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Process Description

During the multiple steps of the TUFRAM process, there are a number of variables that can be controlled to produce different surface enhancement characteristics. Through experience and research, the exact control required to produce the desired results of a specific coating type has been refined. There are many different types of coatings within the TUFRAM family of coatings. Each one has unique characteristics to meet application needs or can be modified to achieve special performance requirements.

TUFRAM® HO meets the MIL-8325-Type III.

Engineering Data

Type of baselayer	: Hard anodizing
Type of process	: Spraying
Type of coating system	: 1 coat system (excluding baselayer)
Practice average thickness Top Coat	: 0,50 µm
Practice average thickness Base Layer	: 25 ~ 50 µm Hard anodizing
Colour	: Colourless / Transparent
Tempering	: 360°C
Operating temperature (peak) *5)	: 260°C
Operating temperature (continuous) *5)	: 200°C
Maximum hardness	: 360 ± 20 HV
Average polar contact angle *1) (Water)	: 36°
Average non-polar contact angle *1) (Diiodomethane)	: 28°
Dynamic COF *2)	: 0,85
Wear Resistance *3)	: 1,3 ± 0,2 mg
Breakdown voltage	: 694 V
Corrosion Resistance (valuation grad Rp10) *4)	: 48 hours
Corrosion Resistance (valuation grad Rp8) *4)	: 144 hours
Special characteristics	: Dry lubricated surface on aluminum with good release

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TUFRAM[®] R66F

Test parameters and Explanation

To get a truly authentic picture all samples were coated under production conditions.

- *1) = Measure by the DataPhysics OCAH 200 on water (polar) and Diiodomethane (non-polar). The higher the value, the better the properties.
- *2) = Values determined after 10.000 turns, a force of 5N and at a speed of 10 cm per second. As friction partner a 100Cr6 steel ball was used.
- *3) = Test according to Taber-Abraser with a CS10 wheel. Values determines after 7 runs of 1.000 turns at a speed of 72 turns per minute, a frictional force of 10N, at a temperature of 25-26°C and a humidity between 37-49%.
- *4) = Saltspraytest according to DIN EN ISO 9227

Valuation Grade:

Corrosion Surface in %	Valuation Grade (Rp)
No corrosions	10
$0 < A \leq 0,1$	9
$0,1 < A \leq 0,25$	8
$0,25 < A \leq 0,5$	7
$0,5 < A \leq 1$	6
$1 < A \leq 2,5$	5
$2,5 < A \leq 5$	4
$5 < A \leq 10$	3
$10 < A \leq 25$	2
$25 < A \leq 50$	1
$50 < A$	0

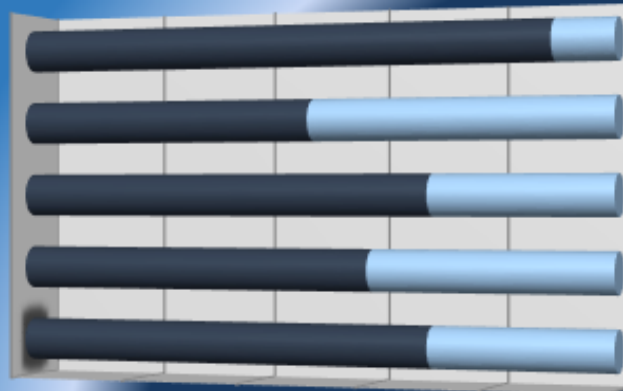
- *5) = Temperature resistance of the Topcoat, the tensile strength of the Aluminum will decrease

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Layer Property Rating (LPR)

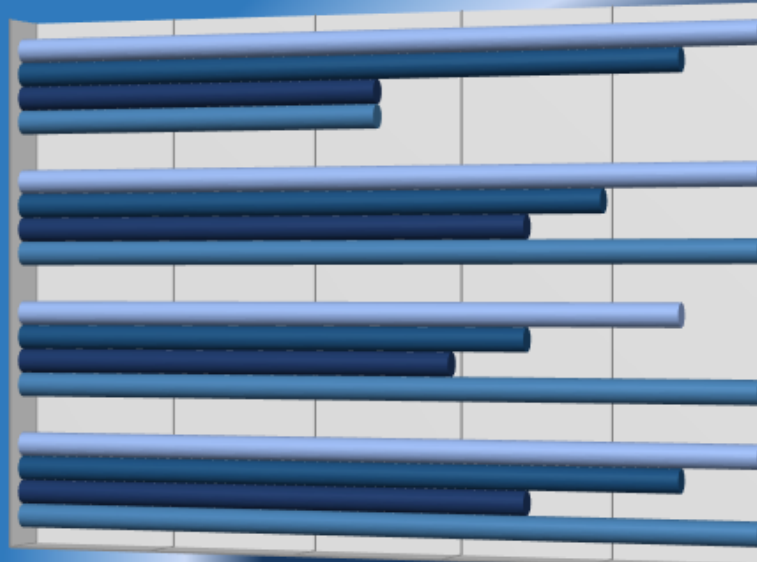
- Wear Resistance
- Corrosion Resistance
- Lubricity
- Non Stick (polar)
- Breakdown Voltage



■ LPR (ouf of 10)

LPR comparison of the TUFRAM variants

- Corrosion Resistance
- Lubricity
- Non Stick (polar)
- Breakdown Voltage



■ R66F
■ C22
■ HO
■ FC12

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Compliances:

FDA/USDA

Tufram HO is in compliance of the FDA **CFR 21** subsection 175.300 of section 175 and subsection 177.1550

EC Regulations

As required by Commission Regulation (EC) **2023/2006**, all food-contact coatings supplied by General Magnaplate are produced in accordance with good manufacturing practice and by the good faith and experience of the General Magnaplate Corporation.

The coating is formulated to comply fully with Commission Regulation (EC) **1935/2004**, as amended, on “Materials and articles intended to come into contact with foodstuffs” which infers that it also meets **Council Directive 82/711/EEC** of 18 October 1982, as amended, “Laying down the basic rules necessary for testing migration of the constituents of plastic materials and articles intended to come into contact with foodstuffs.”

Evaluating the product listed in the subject of this letter under **EC No 1272/2008** and have concluded that this product is not classifiable with this regulation since it is a solid, fully cured material and does not contain hazardous materials listed in this document.

For food contact $\leq 205^{\circ}\text{C}$, the subject coating also meets the compositional requirements of **Chapter L1** of Germany’s “**Kunststoffe im Lebensmittelverkehr**” of the “**Bundesinstitut für gesundheitlichen Verbraucherschutz und Veterinärmedizin (Kunststoffempfehlung des BfR L1)**” on Temperature Resistant Polymer Coating Systems for Frying, Cooking and Baking Utensils.

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