

Innovative aluminium solutions from a single source

FeramAL[®] 7075

High-strength precision aluminium rods

A product of GEROSTAL GmbH



FeramAL[®] 7075 rods feature:

- **High flexural strength**
- **Permanent vibration-resistance**
- **Increased edge-layer hardness**
- **Extreme resistance to corrosion**
- **Excellent surface quality**
- **Ring compression**
- **RoHS conformity**
(free from Hg, Cd, Pb and Cr)
- **Aerospace industrie homologation**
- **Approved according to the directives of FDA**

Ring-compressed edge layer means high flexural strength and dynamic strength

Most aluminium rods made today are only cold-hardened in the axial direction. By contrast, Gerostal GmbH uses its utility model-protected method to subject the edge layer of aluminium rods to both axial and radial compression. This method increases the diamond penetrator hardness of the edge zone up to 20% (see Tab. 1). In addition, the brittle aluminium-oxide layers are broken off during compression and any surface irregularities are evened out. In the end, the processed rod gets a highly compressed, flawless edge zone that is stable under pressure, while retaining a tough core.

Rods made of the alloy EN AW 7075 T6 pursuant to DIN 573-3 are used as the base material.

Chemical composition (percent by weight)						
Alloy designation		Si	Fe	Cu	Mn	Mg
Numerical	Chemical nomenclature					
EN-AW 7075	EN AW AlZn5,5MgCu	0,40	0,50	1,2-2,0	0,30	2,1-2,9
Alloy designation		Cr	Zn	Ti	Other additions	
Numerical	Chemical nomenclature				Indiv.	Total
EN-AW 7075	EN AW AlZn5,5MgCu	0,18-0,28	5,1-6,1	0,20	0,05	0,15

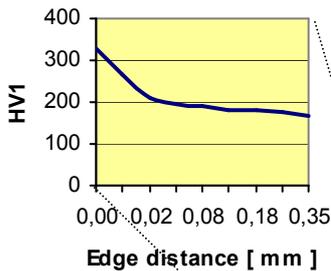
Mechanical properties pursuant to DIN 754-2:

$R_m = 540 \text{ N/mm}^2$
 $R_{p0,2} = 485 \text{ N/mm}^2$
 $A_{50} = 5\%$

All results of the pulling tests show at least a five-percent increase in minimum tensile strength. The ratio of the minimum tensile strength to the yield point changes from approx. 1.05 approx. 1.14. The increase in bending rigidity by approx. 20% has been verified via bending tests pursuant to EN ISO 7438 (see Fig. 4).

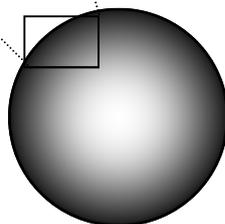
Hardness trend in the edge zone

Fig. 1



Tab. 1

Edge distance [mm]	HV 1
0	330
0,01	269
0,02	210
0,03	197
0,08	189
0,13	182
0,18	182
0,23	175
0,35	169



High surface quality means better coating qualities

This method smoothes and hardens the surface of the rods so that the hard anodized aluminium layer is formed considerably smoother on the surface. The surface is not damaged, even under the enormous strain of the pulling test. Thus the surface of the treated rods is considerably more resistant to tensile and pressure loads.

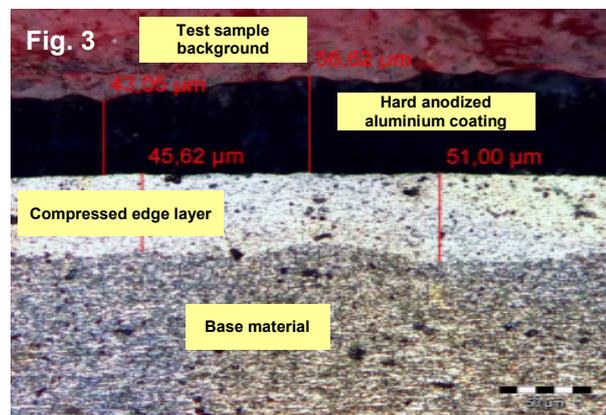


Figure 2 shows the result of a pulling test on an untreated rod and a **FeramAL® 7075** rod.

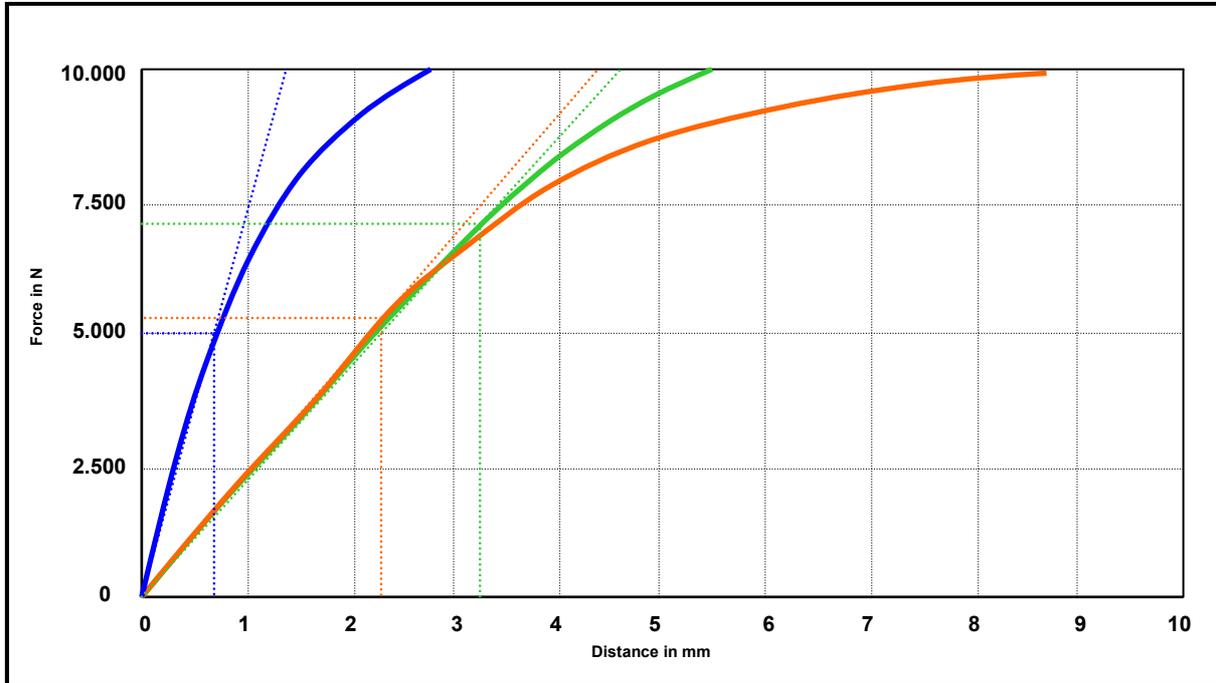
Even with an extreme load such as this, the **FeramAL® 7075** rod shows no signs of surface damage, whereas the coating of the untreated rod has torn along the entire length of the pulling test sample.

Metallography

Figure 3 shows a contrasted cross section of a compressed 16 mm rod captured using metallography. This photo was taken by an independent test laboratory. The compressed edge zone of the aluminium rod, which shows better resistance to wear in combination with the applied hard anodized aluminium layer, is easily recognizable.



Bending test pursuant to EN ISO 7438



Legend:

- Stainless-steel rod: diameter 16 mm; material: 1.4021
- FeramAL® 7075**: aluminium rod: diameter: 16mm; alloy: EN AW 7075; drawn, compressed, hard anodized
- Aluminium rod: diameter: 16mm; alloy: EN AW 7075; drawn, non-compressed, hard anodized

The results of the bending tests clearly shows that the ring compression leads to an approx. 20% increase in flexural stiffness in comparison to the untreated rod. The treated aluminium rod bends more than the stainless-steel 1.4021 subjected to the same test, but can be subjected to an approx. 40% greater load until a lasting deformity is created. This positive result leads to a considerable increase in strength properties under alternating flexural stresses.

As shown above, it is clear that the stainless-steel rod can withstand a load of approx. 500 kg. The non-compressed aluminium rod withstands a load of approx. 520 kg. The **FeramAL® 7075** rod can withstand a load of approx. 720 kg before a lasting deformity is created.

Standard product range
Optional product range based on customer's need:

Diameter [mm]	Tolerance	Supplied length [mm]	Longitudinal tolerance [mm]	Surface roughness
8,0	h8	3.000	+/- 10	Rz ≤ 3
10,0	h8	3.000	+/- 10	Rz ≤ 3
12,0	h8	3.000	+/- 10	Rz ≤ 3
14,0	h8	3.000	+/- 10	Rz ≤ 3
16,0	h8	3.000	+/- 10	Rz ≤ 3
18,0	h8	3.000	+/- 10	Rz ≤ 3
20,0	h8	3.000	+/- 10	Rz ≤ 3
22,0	h8	3.000	+/- 10	Rz ≤ 3
25,0	h8	3.000	+/- 10	Rz ≤ 3
30,0	h8	3.000	+/- 10	Rz ≤ 3
32,0	h8	3.000	+/- 10	Rz ≤ 3

- Range of diameters from 8,0 mm to 32 mm in 1mm steps
- Diameter tolerance class up to h6
- Surface Roughness up to Rz = 1
- Supplied length up to 6.000 mm +/- 10mm
- Fully processed components can be supplied based on customer's schematics