BÖHLER

BÖHLER AMPO

Additive Manufacturing Powder

BÖHLER M789 AMPO

GAS ATOMIZED POWDER FOR ADDITIVE MANUFACTURING

Additive manufacturing is the revolution in manufacturing technology! Especially in this promising segment, we as BÖHLER can build on our extensive materials experience and expertise in the field of powder metallurgy.

Why to buy from BÖHLER?

Customized alloys depending on your requirements. We atomize BÖHLER standard grades, theoretical selection of 250 grades.

BÖHLER leverages the metallurgical knowledge and manufacturing options of a special steel producer for this new technology.

Powder is produced on latest atomization techniques and tested in-house. Vacuum induction melting and atomization under inert gas ensure highest product quality.

Depending on the steel grade and customer requirements, raw materials molten under vacuum or remolten can be used. This ensures the highest quality standards and minimizes undesired impurities.

Depending on the requirements of the specific AM process used, we can provide the appropriate particle fraction in a range from 15-150µm.

Safety recommendations

See the SDS (Safety Data Sheet) in the version localized for the country where the material will be used. (AMPO - Safety Data Sheets).

M789 AMPO Development

Additive Manufacturing offers a multitude of advantages over conventional manufacturing methods like design freedom, shorter lead times or zero tooling costs. However, up to now there has been only a limited number of commercial alloys available for additive manufacturing.
We as BÖHLER use our extensive materials experience for the development of customer-specific powder variants. Like our newly developed BÖHLER M789 AMPO.
This patent pending alloy combines the easy printability of a maraging steel with the corrosion resistance of a 17-4PH. The M789AMPO requires no preheating during the printing process and reaches 52 HRC by applying a simple heat treatment.

BÖHLER M789 AMPO

Chemical Composition [average %]

Element	C	Cr	Ni	Mo	Al	Ti	Co-free
Mass - %	< 0.02	12.20	10.00	1.00	0.60	1.00	

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ACHIEVABLE MECHANICAL PROPERTIES OF PRINTED PART AFTER HEAT TREATMENT

Tensile strength (Rm)	Yield strength ($Rp_{0.2}$)	Elongation (%)	Hardness	Toughness (ISO V)
1780 – 1880 MPa	1760 – 1810 MPa	4.5 – 7.6	50 – 54 HRc	6 – 14 J

Samples for mechanical testing were printed in heating chamber on two different machines with pre-heating at 230°C and 400°C

PARTICLE SIZE DISTRIBUTION*

15 - 45 µm (e.g. laser powder bed fusion)		**45 - 150 µm** (e.g. direct laser deposition)	
Flowability* [s]**	**Apparent density* [g/cm³]**	**Flowability* [s]**	**Apparent density* [g/cm³]**
4.80	3.69	18	3.92

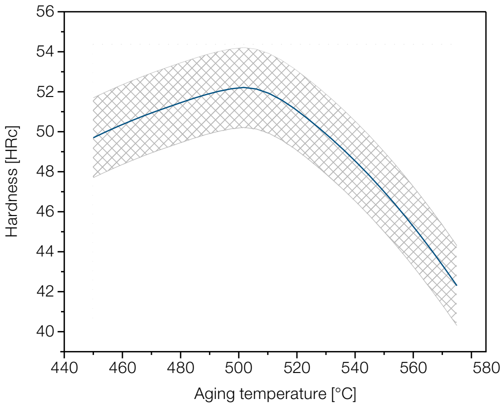
* Measurement of particle size distribution is based on ISO 13322-2 (Dynamic image analysis methods); Flowability and apparent density are based on DIN EN ISO 4490 resp. DIN EN ISO 3923-1.

** Carneyflow ASTM B964

COMPARISON WITH TYPICAL PLASTIC MOULD STEELS AND AMPO GRADES

BÖHLER grade	DIN No	Achievable hardness [HRc]	Corrosion resistance	Wear resistance
BÖHLER M310 ISOPLAST	1.2083	50	★★	★★★★★
BÖHLER M300	1.2316	30	★★★	★★
BÖHLER W722 AMPO	1.2709	50 - 54	-	★★★★
BÖHLER N700 AMPO	1.4542	40	★★★★	★★
BÖHLER M789 AMPO	patent pending	52	★★★★★	★★★★

HEAT TREATMENT



Heat Treatment for optimum properties:
Solution Annealing: 1000°C / 1h soaking time / air cooling to room temperature
Ageing: 500°C / 3h soaking time / air cooling