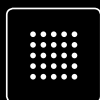


**BÖHLER  
AMPO**

Additive  
Manufacturing  
Powder

## ADDITIVE MANUFACTURING POWDER

A logical step for BÖHLER  
one giant leap for the 3D printing industry.

# METALLURGICAL COMPETENCE SINCE 1870



**BÖHLER  
AMPO**



Additive  
Manufacturing  
Powder

As a technology leader and sustainable leading company in relevant market sectors of powder metallurgy, we offer our customers expertise in development, advice and production at the highest customer-specific level, for more than 25 years.

Our outstanding product quality, process stability and global logistics competence ensure market-leading delivery performance in all global target markets.

Therefore it was a logical step to use this know-how for the production of powder for additive manufacturing and thus expand the product portfolio for our customers. We use our comprehensive research and testing facilities for the development of customer-specific powder variants in order to redefine the performance limits for the most demanding components.



## WE OFFER TO OUR CUSTOMERS SEVEN POWDER TYPES FOR ADDITIVE MANUFACTURING UNDER THE BRAND NAME BÖHLER AMPO.

|                  |                                   |                                   |                                   |                                   |
|------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Highlight Grades | <b>BÖHLER E185</b><br><b>AMPO</b> | <b>BÖHLER W360</b><br><b>AMPO</b> | <b>BÖHLER M789</b><br><b>AMPO</b> |                                   |
| Standard Grades  | <b>BÖHLER L625</b><br><b>AMPO</b> | <b>BÖHLER L718</b><br><b>AMPO</b> | <b>BÖHLER N700</b><br><b>AMPO</b> | <b>BÖHLER W722</b><br><b>AMPO</b> |

### OUR CUSTOMERS BENEFIT FROM:

**Product range.** From stock we offer for the moment our standard program of 7 powder types, but our product portfolio is constantly updated by new developments. For customer-specific topics we can resort to our portfolio of about 250 steel brands. Due to our production facilities and our metallurgical expertise it is possible to adapt alloys.

**State of the art technology.** Vacuum induction melting and atomization under inert gas ensure the highest product quality. Powder is produced

on latest atomization techniques and tested in-house.

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

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

**Test laboratory / Analyses.** The modern laboratories of voestalpine BÖHLER Edelstahl supply our production with important information and product parameters for process control and product certification according to test standards and customer specifications.

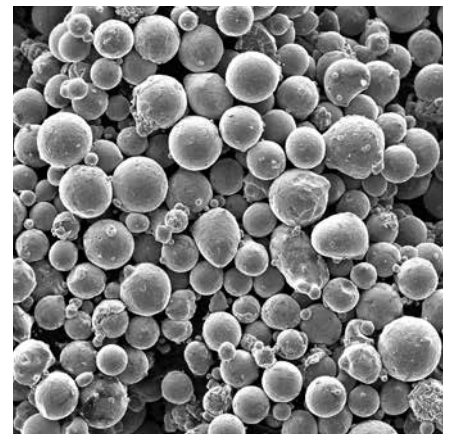
**Global sales network.** Optimal availability through storage at the central warehouse in Kapfenberg and in sales warehouses worldwide as needed. Short delivery times combined with high delivery reliability.



Our test facility enables us to stay one step ahead in research and development.



Process control ensures constant and reproducible quality.



Manufacturing technology and continuous process control ensure spherical powder with optimal properties for 3D printing.



Vacuum induction melting and atomization under inert gas ensure the highest possible metallurgical purity of the powder.

Our production facility enables flexible, customer-oriented powder production.

## BÖHLER AMPO TECHNICAL DATA

We offer powders with the right properties for every application and printing technology. In our global development and testing center we produce test objects with 3D printing in order to acquire experience and explore new application areas for additive manufacturing of components.

| BÖHLER AMPO grade       | Particle size distribution*                             |   |  |   |
|-------------------------|---|---|--|---|
|                         | 15 - 45 $\mu\text{m}$<br>(e.g. laser powder bed fusion) |   | 45 - 150 $\mu\text{m}$<br>(e.g. direct laser deposition) |   |
|                         | Flowability*<br>[s/50g]                                 | Apparent density*<br>[g/cm <sup>3</sup> ] | Flowability*<br>[s/50g]                                  | Apparent density*<br>[g/cm <sup>3</sup> ] |
| <b>BÖHLER E185 AMPO</b> | 3.00**  | 3.77                                      | 17***  | 2.64***                                   |
| <b>BÖHLER W360 AMPO</b> | 17  | 4.01                                      | 19   | 3.61                                      |
| <b>BÖHLER M789 AMPO</b> | 4.80**  | 3.69                                      | 18   | 3.92                                      |
| <b>BÖHLER L625 AMPO</b> | < 22  | 3.80                                      | < 19   | 3.80                                      |
| <b>BÖHLER L718 AMPO</b> | < 18  | 3.96                                      | < 21,5   | 3.50                                      |
| <b>BÖHLER N700 AMPO</b> | < 19  | 3.96                                      | < 21,5   | 3.40                                      |
| <b>BÖHLER W722 AMPO</b> | < 18  | 3.90                                      | < 22,0   | 3.30                                      |

\* 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 and correspond to typical measured values.

\*\* Data measured with Carney flowmeter ASTM B964 and correspond to typical measured values.

\*\*\* Measurements were done on size fraction 45 - 90  $\mu\text{m}$



We offer high quality powder in tool steel, high-speed steel, corrosion resistant steel and nickel alloy. We adapt the best material properties to achieve best parts performance for our customers.



Within our group structure we do not offer only powder, but also the corresponding printing competence. We achieve this through close cooperation with our global development and testing centers.

Manufacturing technology and continuous process control ensure spherical powder with optimal properties for 3D printing.



The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.

|                    |                              |           |           |           |           |           |          |                |  |  |  |  |  |
|--------------------|------------------------------|-----------|-----------|-----------|-----------|-----------|----------|----------------|--|--|--|--|--|
| <b>BÖHLER E185</b> | patent pending               |           |           |           |           |           |          |                |  |  |  |  |  |
| <b>AMPO</b>        | Chemical Composition [wt. %] |           |           |           |           |           |          |                |  |  |  |  |  |
| <b>Element</b>     | <b>C</b>                     | <b>Si</b> | <b>Mn</b> | <b>Cr</b> | <b>Ni</b> | <b>Mo</b> | <b>V</b> |                |  |  |  |  |  |
| <b>Mass - %</b>    | 0.19                         | 0.22      | 0.30      | 0.95      | 1.25      | 0.20      | 0.15     | <b>Co-free</b> |  |  |  |  |  |

|                    |                              |           |           |           |           |           |                |  |  |  |  |  |  |
|--------------------|------------------------------|-----------|-----------|-----------|-----------|-----------|----------------|--|--|--|--|--|--|
| <b>BÖHLER M789</b> | patent pending               |           |           |           |           |           |                |  |  |  |  |  |  |
| <b>AMPO</b>        | Chemical Composition [wt. %] |           |           |           |           |           |                |  |  |  |  |  |  |
| <b>Element</b>     | <b>C</b>                     | <b>Cr</b> | <b>Ni</b> | <b>Mo</b> | <b>Al</b> | <b>Ti</b> |                |  |  |  |  |  |  |
| <b>Mass - %</b>    | < 0.02                       | 12.20     | 10.00     | 1.00      | 0.60      | 1.00      | <b>Co-free</b> |  |  |  |  |  |  |

|                    |                              |           |           |           |           |          |                |  |  |  |  |  |  |
|--------------------|------------------------------|-----------|-----------|-----------|-----------|----------|----------------|--|--|--|--|--|--|
| <b>BÖHLER W360</b> | patent                       |           |           |           |           |          |                |  |  |  |  |  |  |
| <b>AMPO</b>        | Chemical Composition [wt. %] |           |           |           |           |          |                |  |  |  |  |  |  |
| <b>Element</b>     | <b>C</b>                     | <b>Si</b> | <b>Mn</b> | <b>Cr</b> | <b>Mo</b> | <b>V</b> |                |  |  |  |  |  |  |
| <b>Mass - %</b>    | 0.50                         | 0.20      | 0.25      | 4.50      | 3.00      | 0.55     | <b>Co-free</b> |  |  |  |  |  |  |

|                    |   |           |           |          |          |           |           |           |           |           |           |              |           |
|--------------------|---|-----------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|-----------|
| <b>BÖHLER L625</b> | DIN 2.4856 / UNS N06625 (upon request chemistry according to AMS 5666 / ASTM B 446 / ASTM B 564 possible) |           |           |          |          |           |           |           |           |           |           |              |           |
| <b>AMPO</b>        | Chemical Composition [wt. %]  |           |           |          |          |           |           |           |           |           |           |              |           |
| <b>Element</b>     | <b>C</b>  | <b>Si</b> | <b>Mn</b> | <b>P</b> | <b>S</b> | <b>Cr</b> | <b>Mo</b> | <b>Ni</b> | <b>Co</b> | <b>Ti</b> | <b>Al</b> | <b>Nb+Ta</b> | <b>Fe</b> |
| <b>min</b>         | -   | -         | -         | -        | -        | 21.00     | 8.00      | -         | -         | -         | -         | 3.20         | -         |
| <b>max</b>         | 0.03  | 0.40      | 0.50      | 0.010    | 0.010    | 23.00     | 10.00     | remainder | 1.00      | 0.40      | 0.40      | 3.80         | 5.00      |

|                    |   |           |           |           |          |          |           |           |           |           |           |           |           |           |
|--------------------|---|-----------|-----------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>BÖHLER L718</b> | DIN 2.4668 / UNS N07718 (upon request chemistry according to API Std. 6ACRA or AMS 5662 or AMS 5663 possible) |           |           |           |          |          |           |           |           |           |           |           |           |           |
| <b>AMPO</b>        | Chemical Composition [wt. %]  |           |           |           |          |          |           |           |           |           |           |           |           |           |
| <b>Element</b>     | <b>C</b>  | <b>Ni</b> | <b>Cr</b> | <b>Mn</b> | <b>P</b> | <b>S</b> | <b>Si</b> | <b>Mo</b> | <b>Fe</b> | <b>Cu</b> | <b>Co</b> | <b>Al</b> | <b>Nb</b> | <b>Ti</b> |
| <b>min</b>         | 0.02  | 50.00     | 17.00     | -         | -        | -        | -         | 2.80      | remainder | -         | -         | 0.30      | 4.70      | 0.65      |
| <b>max</b>         | 0.08  | 55.00     | 21.00     | 0.35      | 0.015    | 0.015    | 0.35      | 3.30      | remainder | 0.30      | 1.00      | 0.70      | 5.50      | 1.15      |

|                    |  |           |           |           |          |          |           |           |           |           |     |  |  |
|--------------------|--|-----------|-----------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----|--|--|
| <b>BÖHLER N700</b> | DIN 1.4542 / 17-4PH / UNS S17400 (chemistry of AMS 5643 respectively AMS 5622) |           |           |           |          |          |           |           |           |           |     |  |  |
| <b>AMPO</b>        | Chemical Composition [wt. %]   |           |           |           |          |          |           |           |           |           |     |  |  |
| <b>Element</b>     | <b>C</b>   | <b>Ni</b> | <b>Cr</b> | <b>Mn</b> | <b>P</b> | <b>S</b> | <b>Si</b> | <b>Mo</b> | <b>Cu</b> | <b>Nb</b> |     |  |  |
| <b>min</b>         | -  | 3.00      | 15.00     | -         | -        | -        | -         | -         | -         | 3.00      | 5xC |  |  |
| <b>max</b>         | 0.07   | 5.00      | 17.00     | 1.00      | 0.025    | 0.015    | 0.70      | 0.50      | 5.00      | 0.45      |     |  |  |

|                    |                              |           |           |          |          |           |           |           |           |           |  |  |  |
|--------------------|------------------------------|-----------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----------|--|--|--|
| <b>BÖHLER W722</b> | DIN 1.2709                   |           |           |          |          |           |           |           |           |           |  |  |  |
| <b>AMPO</b>        | Chemical Composition [wt. %] |           |           |          |          |           |           |           |           |           |  |  |  |
| <b>Element</b>     | <b>C</b>                     | <b>Si</b> | <b>Mn</b> | <b>P</b> | <b>S</b> | <b>Cr</b> | <b>Mo</b> | <b>Ni</b> | <b>Ti</b> | <b>Co</b> |  |  |  |
| <b>min</b>         | -                            | -         | -         | -        | -        | -         | 4.50      | 17.00     | 0.80      | 8.50      |  |  |  |
| <b>max</b>         | 0.03                         | 0.10      | 0.15      | 0.01     | 0.01     | 0.25      | 5.20      | 19.00     | 1.20      | 10.00     |  |  |  |

**Order quantity** 10 kg minimum

**Particle size distribution** 15 to 45 µm, 45 to 150 µm, or customized after request

**voestalpine BÖHLER Edelstahl GmbH & Co KG**

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**voestalpine**

ONE STEP AHEAD.