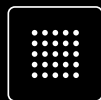




BÖHLER AMPO



Additive
Manufacturing
Powder

ADDITIVE MANUFACTURING POWDER

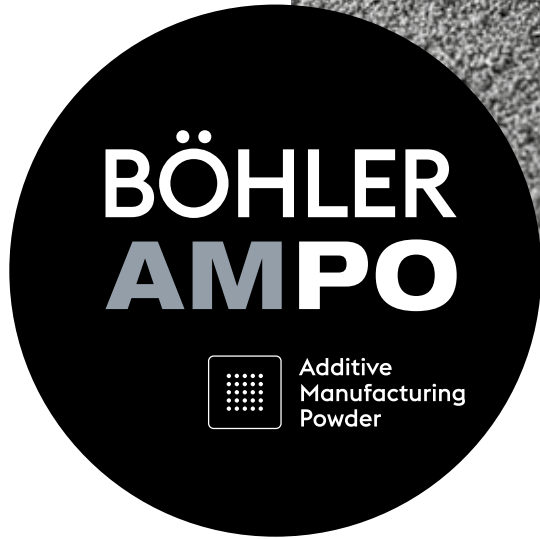
A logical step for BÖHLER
one giant leap for the 3D printing industry.

METALLURGICAL COMPETENCE SINCE 1870

As a technology leader and sustainable leading company in the relevant market segments of powder metallurgy, we offer our customers expertise in development, consulting 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.



SUSTAINABILITY IN THE FOCUS OF OUR ACTIONS

As an innovation leader in the development and production of special steels, we have made sustainable production processes and responsible use of resources an inherent part of our corporate philosophy for decades.

SPECIAL STEEL AN ENVIRONMENTALLY FRIENDLY MATERIAL

Along with innovative solutions for a sustainable future, the raw materials used play a crucial role. Special steel is an indispensable material for our modern world because it is versatile, durable and environmentally friendly. No other material is recycled as effectively as special steel, in unlimited cycles and with no loss of quality. Around 80 percent of all steel ever produced worldwide is still in use today – this makes steel an ecological role model. Böhler AMPO products are manufactured using renewable electrical energy, are 100 percent recyclable and thus make an important contribution to the fight against climate change.

Our laboratory is certified under the NADCAP accreditation program in the three areas of Material Testing Laboratories, Non-Destructive Testing and Heat Treatment.

Other company certifications include EN 9100, EN ISO 14001, EN ISO 50001 and ISO 45001.

FOR ADDITIVE MANUFACTURING, WE OFFER OUR CUSTOMERS ELEVEN POWDER TYPES UNDER THE BRAND NAME BÖHLER AMPO.

Highlight Grades	BÖHLER E185 AMPO	BÖHLER W360 AMPO	BÖHLER M789 AMPO	
Standard Grades	BÖHLER W722 AMPO	BÖHLER N700 AMPO	BÖHLER L625 AMPO	BÖHLER Ti64Gd.5 AMPO
	BÖHLER H525 AMPO	BÖHLER L175 AMPO	BÖHLER L718 AMPO	BÖHLER Ti64Gd.23 AMPO

OUR CUSTOMERS BENEFIT FROM:

Product range. We offer an extensive standard range of currently 11 powder types from stock, whereby our product portfolio is constantly updated with innovative new developments. For customer-specific requirements, we can resort to our in-house portfolio of around 250 grades. Our production facilities and metallurgical expertise make it possible to customize alloys.

State of the art technology. Vacuum induction melting and atomization under inert gas ensure the highest product quality. The powder is manufactured using the latest atomization and processing technology and is then extensively tested in-house in our accredited powder laboratory.

Highest product quality. The integration into the steel mill enables the starting material for the atomization process to be individually tailored to the requirements of the respective alloy. Whether melted conventionally or under vacuum – the right process is available for every product.

This ensures the highest quality standards and minimizes unwanted contamination.

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

Test laboratory / analyses. The modern testing laboratories at voestalpine BÖHLER Edelstahl supply our production with important information on product parameters for process control and product certification according to testing standards and customer specifications.

Worldwide sales network. By storing in the central warehouse in Kapfenberg and, if required, in the sales warehouses worldwide, we offer optimal availability through short delivery times combined with high delivery reliability.



In our test laboratory, we rely on qualified and carefully trained staff.



We pay close attention to cleanliness and proper testing to ensure the highest standard.



The use of up-to-date measuring technology and investment in new methods is important to us.



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	nominally 15 to 45µm, 45 to 90µm, or according to customer requirements Titanium: 20 to 63 µm, or according to customer requirements			Apparent density** [g/cm ³]
	Particle size distribution*			
	D10 [µm]	D50 [µm]	D90 [µm]	
BÖHLER E185 AMPO	18-24	29-35	42-50	≥ 3.5
BÖHLER M789 AMPO	18-24	29-35	42-50	≥ 3.5
BÖHLER W360 AMPO	18-24	29-35	42-50	≥ 3.6
BÖHLER W722 AMPO	18-24	29-35	42-50	≥ 3.5
BÖHLER H525 AMPO	18-24	29-35	42-50	≥ 3.5
BÖHLER N700 AMPO	18-24	29-35	42-50	≥ 3.4
BÖHLER L625 AMPO	18-24	29-35	42-50	≥ 3.7
BÖHLER L718 AMPO	18-24	29-35	42-50	≥ 3.5
BÖHLER L175 AMPO	18-24	29-35	42-50	≥ 3.6
BÖHLER Ti64Gd.5 AMPO	18-24	31-41	53-67	≥ 2.0
BÖHLER Ti64Gd.23 AMPO	18-24	31-41	53-67	≥ 2.0

* Measurement of the particle size distribution according to ISO 13322-2 (Dynamic image analysis methods);

** The apparent density measurement is based on ASTM B417 and ASTM B212 and relates to typical measured values.



We offer high quality powder in tool steel, corrosion resistant steel, titanium, cobalt and nickel based alloy. We optimize the material properties to enable maximum performance of the materials.



voestalpine BÖHLER Edelstahl GmbH & Co KG is not just a powder supplier. Thanks to the cooperation with our globally active research and test centers, the voestalpine Group also has in-depth knowledge of 3D printing and can therefore offer the customer a holistic solution from the concept drawing to the finished component.



Consistent quality of customized powders in flexible quantities.

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.

BÖHLER E185 AMPO	Patent pending																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Si</th> <th>Mn</th> <th>Cr</th> <th>Ni</th> <th>Mo</th> <th>V</th> <th colspan="2">Co-free*</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>0.19</td> <td>0.22</td> <td>0.30</td> <td>0.95</td> <td>1.25</td> <td>0.20</td> <td>0.15</td> <td colspan="2"></td> </tr> </tbody> </table>	Element	C	Si	Mn	Cr	Ni	Mo	V	Co-free*		Mass - %	0.19	0.22	0.30	0.95	1.25	0.20	0.15		
Element	C	Si	Mn	Cr	Ni	Mo	V	Co-free*													
Mass - %	0.19	0.22	0.30	0.95	1.25	0.20	0.15														
BÖHLER M789 AMPO	Patent																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Cr</th> <th>Mo</th> <th>Ni</th> <th>Ti</th> <th>Al</th> <th colspan="3">Co-free*</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>≤ 0.02</td> <td>12.20</td> <td>1.00</td> <td>10.00</td> <td>1.00</td> <td>0.60</td> <td colspan="3"></td> </tr> </tbody> </table>	Element	C	Cr	Mo	Ni	Ti	Al	Co-free*			Mass - %	≤ 0.02	12.20	1.00	10.00	1.00	0.60			
Element	C	Cr	Mo	Ni	Ti	Al	Co-free*														
Mass - %	≤ 0.02	12.20	1.00	10.00	1.00	0.60															
BÖHLER W360 AMPO	Patent																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Si</th> <th>Mn</th> <th>Cr</th> <th>Mo</th> <th>V</th> <th colspan="3">Co-free*</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>0.50</td> <td>0.20</td> <td>0.25</td> <td>4.50</td> <td>3.00</td> <td>0.55</td> <td colspan="3">Ni-free**</td> </tr> </tbody> </table>	Element	C	Si	Mn	Cr	Mo	V	Co-free*			Mass - %	0.50	0.20	0.25	4.50	3.00	0.55	Ni-free**		
Element	C	Si	Mn	Cr	Mo	V	Co-free*														
Mass - %	0.50	0.20	0.25	4.50	3.00	0.55	Ni-free**														
BÖHLER W722 AMPO	DIN 1.2709																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Si</th> <th>Mn</th> <th>P</th> <th>S</th> <th>Mo</th> <th>Ni</th> <th>Co</th> <th>Ti</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>≤ 0.03</td> <td>≤ 0.10</td> <td>≤ 0.15</td> <td>≤ 0.01</td> <td>≤ 0.01</td> <td>4.90</td> <td>18.00</td> <td>9.30</td> <td>1.10</td> </tr> </tbody> </table>	Element	C	Si	Mn	P	S	Mo	Ni	Co	Ti	Mass - %	≤ 0.03	≤ 0.10	≤ 0.15	≤ 0.01	≤ 0.01	4.90	18.00	9.30	1.10
Element	C	Si	Mn	P	S	Mo	Ni	Co	Ti												
Mass - %	≤ 0.03	≤ 0.10	≤ 0.15	≤ 0.01	≤ 0.01	4.90	18.00	9.30	1.10												
BÖHLER H525 AMPO	DIN 1.4841 / UNS S31400																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Cr</th> <th>Si</th> <th>Mn</th> <th>Ni</th> <th>Fe</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>0.08</td> <td>24.80</td> <td>1.70</td> <td>1.20</td> <td>19.80</td> <td>Balance</td> </tr> </tbody> </table>	Element	C	Cr	Si	Mn	Ni	Fe	Mass - %	0.08	24.80	1.70	1.20	19.80	Balance						
Element	C	Cr	Si	Mn	Ni	Fe															
Mass - %	0.08	24.80	1.70	1.20	19.80	Balance															
BÖHLER N700 AMPO	DIN 1.4542 / 17-4PH / UNS S17400 (chemistry of AMS 5643 respectively AMS 5622)																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Cr</th> <th>Ni</th> <th>Cu</th> <th>Nb</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>0.04</td> <td>16.25</td> <td>4.00</td> <td>4.00</td> <td>0.34</td> </tr> </tbody> </table>	Element	C	Cr	Ni	Cu	Nb	Mass - %	0.04	16.25	4.00	4.00	0.34								
Element	C	Cr	Ni	Cu	Nb																
Mass - %	0.04	16.25	4.00	4.00	0.34																
BÖHLER L625 AMPO	DIN 2.4856 / UNS N06625 (upon request chemistry according to AMS 5666, ASTM B 446, ASTM B 564 possible)																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Cr</th> <th>Mo</th> <th>Ni</th> <th>Co</th> <th>Ti</th> <th>Al</th> <th>Nb</th> <th>Fe</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>0.05</td> <td>21.50</td> <td>9.00</td> <td>> 58.00</td> <td>≤ 1.00</td> <td>0.20</td> <td>0.20</td> <td>3.65</td> <td>≤ 5.00</td> </tr> </tbody> </table>	Element	C	Cr	Mo	Ni	Co	Ti	Al	Nb	Fe	Mass - %	0.05	21.50	9.00	> 58.00	≤ 1.00	0.20	0.20	3.65	≤ 5.00
Element	C	Cr	Mo	Ni	Co	Ti	Al	Nb	Fe												
Mass - %	0.05	21.50	9.00	> 58.00	≤ 1.00	0.20	0.20	3.65	≤ 5.00												
BÖHLER L718 AMPO	DIN 2.4668 / UNS N07718 (upon request chemistry according to API Std. 6ACRA or AMS 5662 respectively AMS 5663 possible)																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Cr</th> <th>Mo</th> <th>Ni</th> <th>Ti</th> <th>Al</th> <th>Nb</th> <th>B</th> <th>Fe</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>0.04</td> <td>19.00</td> <td>3.05</td> <td>52.50</td> <td>0.90</td> <td>0.50</td> <td>5.13</td> <td>0.004</td> <td>Balance</td> </tr> </tbody> </table>	Element	C	Cr	Mo	Ni	Ti	Al	Nb	B	Fe	Mass - %	0.04	19.00	3.05	52.50	0.90	0.50	5.13	0.004	Balance
Element	C	Cr	Mo	Ni	Ti	Al	Nb	B	Fe												
Mass - %	0.04	19.00	3.05	52.50	0.90	0.50	5.13	0.004	Balance												
BÖHLER L175 AMPO	UNS R30075 (chemistry of ASTM F75)																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Si</th> <th>Mn</th> <th>Cr</th> <th>Mo</th> <th>Ni</th> <th>Co</th> <th>Fe</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>≤ 0.35</td> <td>≤ 1.00</td> <td>≤ 1.00</td> <td>28.50</td> <td>6.00</td> <td>≤ 0.50</td> <td>64.00</td> <td>≤ 0.75</td> </tr> </tbody> </table>	Element	C	Si	Mn	Cr	Mo	Ni	Co	Fe	Mass - %	≤ 0.35	≤ 1.00	≤ 1.00	28.50	6.00	≤ 0.50	64.00	≤ 0.75		
Element	C	Si	Mn	Cr	Mo	Ni	Co	Fe													
Mass - %	≤ 0.35	≤ 1.00	≤ 1.00	28.50	6.00	≤ 0.50	64.00	≤ 0.75													
BÖHLER Ti64Gd.5 AMPO	3.7164 (3.7165) UNS 56400																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Ti</th> <th>Al</th> <th>V</th> <th>Fe</th> <th>O</th> <th>N</th> <th>H</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>≤ 0.08</td> <td>> 87.00</td> <td>6.13</td> <td>4.00</td> <td>≤ 0.30</td> <td>≤ 0.20</td> <td>≤ 0.05</td> <td>≤ 0.02</td> <td>≤ 0.01</td> </tr> </tbody> </table>	Element	C	Ti	Al	V	Fe	O	N	H	Y	Mass - %	≤ 0.08	> 87.00	6.13	4.00	≤ 0.30	≤ 0.20	≤ 0.05	≤ 0.02	≤ 0.01
Element	C	Ti	Al	V	Fe	O	N	H	Y												
Mass - %	≤ 0.08	> 87.00	6.13	4.00	≤ 0.30	≤ 0.20	≤ 0.05	≤ 0.02	≤ 0.01												
BÖHLER Ti64Gd.23 AMPO	3.7165 (3.7164) UNS 56407																				
Chemical composition [wt. %]	<table border="1"> <thead> <tr> <th>Element</th> <th>C</th> <th>Ti</th> <th>Al</th> <th>V</th> <th>Fe</th> <th>O</th> <th>N</th> <th>H</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>Mass - %</td> <td>≤ 0.08</td> <td>> 87.00</td> <td>6.00</td> <td>4.00</td> <td>≤ 0.25</td> <td>≤ 0.13</td> <td>≤ 0.05</td> <td>≤ 0.01</td> <td>≤ 0.01</td> </tr> </tbody> </table>	Element	C	Ti	Al	V	Fe	O	N	H	Y	Mass - %	≤ 0.08	> 87.00	6.00	4.00	≤ 0.25	≤ 0.13	≤ 0.05	≤ 0.01	≤ 0.01
Element	C	Ti	Al	V	Fe	O	N	H	Y												
Mass - %	≤ 0.08	> 87.00	6.00	4.00	≤ 0.25	≤ 0.13	≤ 0.05	≤ 0.01	≤ 0.01												
Order quantity	10 kg minimum	*Co-content ≤ 0.1%																			
Particle size distribution	Nominal 15 to 45 µm, 45 to 90 µm, or customized after request Titanium: 20 to 63 µm, or customized after request	**Ni-content ≤ 0.1%																			

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voestalpine BÖHLER Edelstahl GmbH & Co KG

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voestalpine

ONE STEP AHEAD.