

Technical Specifications

Powders for Laser Powder Bed Fusion – 3D Printing				
SL. No	Description and Technical Specification of the item	QTY	UNIT	Delivery
1	SS 304L Detailed Specifications attached as annexure	300	KG	30 DAYS
2	SS 316L Detailed Specifications attached as annexure	300	KG	30 DAYS
3	SS 321 Detailed Specifications attached as annexure	300	KG	30 DAYS
4	SS 410 Detailed Specifications attached as annexure	200	KG	30 DAYS
5	SS 420 Detailed Specifications attached as annexure	150	KG	30 DAYS
6	SS 430L Detailed Specifications attached as annexure	200	KG	30 DAYS
7	H13 Detailed Specifications attached as annexure	250	KG	30 DAYS
8	Nickel alloy 625 Detailed Specifications attached as annexure	200	KG	30 DAYS
9	Nickel alloy 718 Detailed Specifications attached as annexure	200	KG	30 DAYS
10	Stellite 6 Detailed Specifications attached as annexure	200	KG	30 DAYS
11	Stellite 21 Detailed Specifications attached as annexure	200	KG	30 DAYS
12	Cobalt 400 - Cobalt based powder Detailed Specifications attached as annexure	100	KG	30 DAYS
13	Cobalt 800 - Cobalt based powder Detailed Specifications attached as annexure	100	KG	30 DAYS

Specifications for Powders for Laser Powder Bed Fusion – 3D Printing

1. Supplied powders shall be suitable for 3D printing using laser powder bed fusion
2. Powders should meet the following technical specifications – Point wise confirmation to be provided by the bidder
 - a. **Method of Manufacturing** - The powder shall be manufactured by VIM - gas atomisation in inert gas like Argon or any other inert gas or by plasma atomisation, which is to be mentioned clearly in the offer for each grade of powder
 - b. **Morphology** - The powder shall be majorly spherical ($\geq 98\%$) with smooth surface and with very little powder satellites ($< 2\%$)
 - c. **Sieve Analysis** - Particles size shall be in the range of 15 – 55 μm
 - i. Maximum percentage of particles in size $\leq 15 \mu\text{m}$ shall be $< 2.5 \%$
 - ii. Maximum percentage of particles in size $\geq 55 \mu\text{m}$ shall be $< 2.5\%$
 - d. **Chemistry (in Weight %)**

Ferrous Materials

Grade	C	Si	Mn	P	S	Mo	Cr	Ni	Nb	Ti	V	Others	O	N	Fe
SS 304L	0.03 max	1.0 max	2.0 max	0.045 max	0.03 max	-	18 - 20	8- 12	-	-		0.3 max	0.08 max	0.12 max	Bal
SS 316L	0.03 max	1.0 max	2.0 max	0.045 max	0.03 max	2 – 3	16 – 18	10 – 14				0.3 max	0.06 max	0.12 max	Bal
SS 321	0.08 max	0.75 max	2.0 max	0.045 max	0.03 max	-	17- 19	8- 12		0.3- 0.7		0.5 max	0.06 max	0.12 max	Bal
SS 410	0.03 max	1.0 max	1.5 max	0.04 max	0.03 max	-	10.5- 12.5	1.5 max	-	-		0.5 max	0.06 max	0.12 max	Bal
SS 420M	0.15 min	1.0 max	1.0 max	0.04 max	0.03 max	0.5 max	12- 14	0.75 max	-	-		0.5 max	-	-	Bal
SS 430L	0.03 max	1.0 max	1.0 max	0.04 max	0.03 max	-	16- 18	0.75 max				0.3 max	0.06 max	0.12 max	Bal
H13	0.3 - 0.45	0.8- 1.25	0.2- 0.6	0.03 max	0.03 max	1.10- 1.75	4.75- 5.5	-	-	-	0.8- 1.2	0.3 max	0.06 max	0.12 max	Bal

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Nickel Based Alloys

Grade	C	Si	Mn	P	S	Mo	Cr	Ni	Nb	Nb + Ta	Al	Ti	Co	Cu	B	Others	O	N	Fe
Nickel alloy 625	0.1 max	0.5 max	0.5 max	0.015 max	0.015 max	8-10	20-23	Bal	3.15-4.15	-	0.4 max	0.4 max	1.0 max	0.04 max		< 0.1	0.04 max	0.04 max	5 max
Nickel alloy 718	0.08 max	0.35 max	0.35 max	0.015 max	0.015 max	2.8-3.3	17-21	50-55	-	4.75-5.5	0.2-0.8	0.65-1.15	1.0 max	0.3 max	0.006 max	< 0.5	0.04 max	0.04 max	Bal

Cobalt Materials

Grade	C	Si	Mn	P	S	Mo	Cr	Ni	Fe	W	Al	Others	Co
Stellite 6	0.9-1.4	0.7-1.5	0.5 max	0.03 max	0.03 max	1.0 max	27.0-30.0	3.00 max	3.00 max	3.5-5.5	-	< 0.1	Bal
Stellite 21	0.15-0.45	1.5 max	1.5 max	0.01 max	0.01 max	4.0-4.7	25.0-30.0	1.5-4.0	3.00 max	0.5 max	0.05 max	< 0.1	Bal
Tribaloy 400	0.05 max	2.3-2.8	0.3 max	0.035 max	0.035 max	27.0-30.0	7.0-8.5	1.0 max	0.5 max			< 1.0	Bal
Tribaloy 800	0.03 max	3.25-3.75	-	0.03 max	0.03 max	27.5-28.75	17.0-18.0	-	0.25 max	-	-	<0.1	Bal

- e. Powders shall be dense and have good flowability without coagulation
- f. Powders shall be without any ceramic impurities
3. Typical physical properties like particle size distribution, apparent density, morphology and flowability (hall flow) along with the method used to measure the same to be mentioned along with the offer.
4. Typical mechanical properties (tensile, etc.) achievable shall be clearly indicated for each grade of powder with the corresponding test standards
5. The powders shall be supplied in tightly sealed containers of 3-5 10 or 20 kg containers and remaining in 50 kg containers

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PART A**QUALIFYING CRITERIA FOR THE SUPPLY OF 'METAL POWDERS FOR LASER POWDER BED FUSION- 3D PRINTING'**

S. No.	PARTICULARS	VENDOR'S RESPONSE
1.0	Number of Years of Experience of the Powder Manufacturer in the field of manufacture and supply of 'Metal Powders for Laser Powder Bed Fusion - 3D Printing.	
2.0	Details on International Standards followed in Manufacturing and Testing of the Powders quoted	
3.0	<p>Powder manufacturer shall mandatorily have the following:</p> <p>i) Minimum of Two Years of Continuous Experience in the Manufacture and Supply of Metal Powders for Laser Powder Bed fusion - 3D Printing. Proofs like certificate of incorporation as powder manufacturer /relevant PO copies or any other authentic proof to be attached.</p> <p>ii) The powder manufacturer should have supplied at least 2 tonnes of metal powders cumulatively in at least two or three different grades of metal powders for laser powder bed fusion 3D printing applications, i.e. in the particle size of 15/20-53 μm in the last three years. Proofs like unpriced PO copies along with the contact details of their customer shall have to be necessarily attached along with the offer to validate their experience.</p>	
4.0	Powder manufacturer having approval from reputed industry/institute or OEM of 3D printing machines for supply of metal powders for laser powder bed fusion 3D printing applications will be an added advantage	
5.0	If the bidder is representing an OEM, authorization certificate from the powder manufacturer to be attached.	
6.0	List of facilities available with the manufacturer for manufacturing and quality assessment of metallic powders to be attached.	

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Annexure – A- Additional Terms and Conditions for GeM Enquiry

The terms and condition mentioned in this document are applicable in addition to the GeM General Terms and Conditions. Bidders shall furnish pointwise confirmation/details.

<i>To be filled by bidder</i>		
Description of the Equipment:		
GeM Tender No. & Date		
Name of the firm (Bidder)		:
Address		:
Contact person 1		Contact person 2
Name:		Name:
Designation:		Designation:
Office Phone:		Office Phone:
Mobile:		Mobile:
e-mail:		e-mail:
Offer/Quotation reference with date		:
SI	Terms and conditions	Vendor's confirmation
1.	Inspection by BHEL/as per Technical specification(if any).	
2.	<p>Payment terms:</p> <p style="text-align: center;">10 days after CRAC</p> <p>Note: Deviation in above payment terms is not acceptable. In case of Auto PRC/CRAC, Payment due date shall be calculated from CRAC date or material acceptance date by BHEL whichever is later.</p>	
3.	Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration number which should clearly mentioned in the offer. Indicate the GST registration number. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.	GST Registration No. _____
4.	Performance Bank Guarantee: Not Applicable	
5.	Kindly Indicate the HSN Code for all items	HSN CODE : _____
6.	Rate quoted in GeM portal should be on FOR destination basis inclusive of all taxes, P&F, freight etc. Transit Insurance is under Supplier scope. Please indicate how much GST percentage is included in quoted price.	GST in %: _____

Vendor's Seal & Signature