

Technical Pre-qualification Requirements(PQR) for Gear Blank Forging Suppliers for procurement of Forgings as per specification TM10581**[Rev.:04]****Dated: 26.02.2024****Enquiry No.:****Vendor Name:****1.0 General: a)** The pre-qualification requirements mentioned in this specification are applicable for the procurement of gear blank forgings in normalised condition.**b)** The technical requirements mentioned below should be met by the supplier and details of its compliance should be submitted along with the offer. If the supplier is not complying the requirements of this specification, his offer will not be considered for the supply of gear blank forgings. If at any stage it is found that the information furnished by the supplier is wrong, suitable action will be taken against supplier as deemed fit by BHEL.**2.0 Compliance with Documents:**

Sl. No.	Item Description	Criteria	Compliance of document (Yes/No)
2.1	Drawing no. as mentioned in the enquiry.	Compliance of drawing.	
2.2	Specification TM10581 rev.08.	Compliance of specification & submission of material TC from inhouse lab/NABL approved lab along with consignment.	

3.0 Forging & Heat treatment facilities for Manufacturing of gear blank forgings:

Sl. No.	Item Description	Criteria	Photographs of facility (machine along with rating plate & make) and other details (Make, Model , Year of Installation, Specification of plant and machinery.)
3.1	Forging facilities	Power hammer of capacity min. 10 Tons or hydraulic press above 3000 Tons. The proof for make, model & capacity of power hammer or hydraulic press shall be furnished.	
3.2	Heating furnaces for the heating of the ingots / blooms.	With multi-zones temperature controllers & graph recorder.	
3.3	Heat treatment facilities for gear blank forgings.	Heat treatment furnaces with multi-zones temperature controllers & graph recorder.	

4.0 Facilities for close die forging:

Sl. No.	Item Description	Criteria	Type of forging process to be used & Details
4.1	Manufacturing of gear blank forgings by close die forging process.	The gear blank forgings shall be made by close die forging by process of upset forging, followed by peripheral forging under a power hammer or press.	

5.0 Metallurgical and Chemical Laboratory * :

Sl No.	Item Description	Criteria	Photographs of inhouse facility (machine along with rating plate & make) and other details (Make, Model , Year of Installation, Specification of plant and machinery.) / Outsourced from NABL approved laboratory
5.1	Chemical composition testing facility	Availability of Emission Spectrometer or wet chemical facilities with certified reference material (CRM).	
5.2	Metallurgical Microscope	Metallurgical Microscope with magnification power of min. 500x & metallographic sample preparation facilities .	
5.3	Macro-etch test facility	1. Macro-etch test facility for grain flow checking. 2. Supplier to furnish sketches of grain flow pattern achieved in earlier manufactured gear blank forgings.	
5.4	Experimental/lab heat treatment furnace.	Calibrated laboratory/experimental heat treatment furnace with temperature recorder & controller up to 1200°C.	
5.5	Polishing machine.	Polishing machine for sample preparation (upto mirror/super finish).	

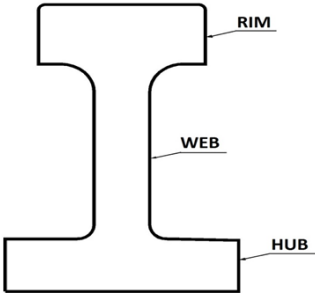
6.0 Physical Laboratory * :

Sl. No.	Item Description	Criteria	Photographs of inhouse facility (machine along with rating plate & make) and other details (Make, Model , Year of Installation, Specification of plant and machinery.) / Outsourced from NABL approved laboratory
6.1	Universal Testing Machine (UTM)	Universal Testing Machine of min. 20 tonne capacity with graphical recording facilities for conducting tensile tests.	
6.2	Hardness testing machine	Hardness testing machine for Brinell and Vickers scale.	
6.3	Impact Testing Machine	Charpy V-Notch facility for conducting impact test along with notch broaching machine & profile projector and trained machinist for making V-notch profile.	
6.4	Shadowgraph facilities	Shadowgraph facilities for assuring correct notch profile and dimension for impact test specimen.	

(*) - In case of non-availability of any testing facility inhouse, the same can be outsourced from NABL approved laboratory.

7.0 NDT Facilities:

Sl. No.	Item Description	Criteria	Photographs of facility (machine along with rating plate & make) and other details (Make, Model , Year of Installation, Specification of plant and machinery.)
7.1	Ultrasonic testing facility	Ultrasonic testing facility with all accessories.	
7.2	Magnetic Particle Inspection (MPI) facility	Magnetic Particle Inspection (MPI) facility for checking sub-surface flaws.	

8.0 Qualified Personnel:			
Sl. No.	Description	Criteria	Details of qualified personnel & certificates
8.1	Qualified personnel for conducting various tests.	The supplier should ensure the availability of Qualified Metallurgist, Chemist and NDT level-II certified personnel with them. The certificates of NDT level-II personnel (duly signed & sealed by forging supplier) shall be provided.	
9.0 Forging Ratio:			
Sl. No.	Description	Criteria	Details of stage wise manufacturing plan with forging ratio & sketches
9.1	Forging ratio from ingot to bloom/billet/bar and from bloom/billet/bar to final blank	<p>1. The forging ratio shall be 4:1 minimum from ingot to bloom/billet/bar & 4:1 minimum from bloom/billet/bar to final blank stage.</p> <p>2. The detailed forging process with dimensional sketch & forging ratio of each stage followed by supplier (meeting the requirement of clause 9.1.1) in earlier manufactured gear blank forgings shall be provided.</p>	
10.0 Past Experience:			
Sl. No.	Description	Criteria	Details of previous PO/ Supporting documents
10.1	Past experience of manufacturing & supply of gear blank forgings by closed die forging.	<p>Supplier shall have past experience of manufacturing & supply of minimum 40 nos. gear blank forgings (made from closed die forging process) with Rim, web & hub shape similar to</p>  <p>and OD of 400mm (min.) as per material specification TM10581 or other Traction grades of case hardening steel of specifications IS:4432-1988/DIN17210/EN 10084 (with min. mechanical properties as per requirement of TM10581), in the last 5 years from date of enquiry.</p> <p>Note: Vendor to ensure that documents submitted against ii) & iv) shall correlate with the submitted P.O. copy. Document submitted against iii) shall correlate with item description/drawing no. mentioned in PO.</p>	<p>a. Details of previous PO's:</p> <p>i) PO copies.</p> <p>ii) Drawing of item.</p> <p>iii) Material test certificate (from inhouse lab/NABL lab).</p> <p>iv) Supply proof (Copy of invoices/R. notes for supply to Railways).</p> <p>v) Photograph of close die.</p>
		<p>2. Supplier to confirm that item mentioned in PO copy is manufactured from close die forging. Supplier shall submit photographs of close die.</p>	(Yes/No)

