

**Technical specifications for machined
part**

30-H-01-CC

Contents

1. Scope	3
2. Applicable Drawing and Documents	3
2.1. Applicable Documents	3
2.2. Applicable Drawing	3
3. Material Specifications, Testing and Acceptance	3
3.1. Material Specification	3
3.2. Material Testing and Acceptance (For Main Pipe)	4
3.3. Raw Material Procurement, Identification and Acceptance	5
4. General Description and requirement of the item	6
5. Manufacturing Procedure And Workmanship	7
5.1. Manufacturing Procedure	7
5.2. Workmanship	7
6. Sub-contracting	7
7. Inspection, Marking and Reports	8
7.1. Inspection	8
7.2. Marking	9
7.3. Reports	9
8. Acceptance criteria	9
9. Guarantee	10
10. Preservation, Packing and Delivery	10
10.1. Preservation:	10
10.2. Packing	10
10.3. Delivery	10
11. Splitting of Order:	11
12. Quotation	11
12.1. Techno Commercial details	11
13. Evaluation	12
14. Confidentiality, Restricted Information, Prohibition against use of BARC's name	13
14.1. Confidentiality	13
14.2. Restricted information	13
14.3. Prohibition against use of BARC's name	13
15. Post supply inspection	14

TECHNICAL SPECIFICATIONS

1. Scope

1.1. This specification establishes the requirement for the supply of raw material, material testing, manufacture, inspection, application of suitable antirust preservative, packing, forwarding, guarantee and safe delivery to BARC Mysore of **125 Nos** of part titled **30-H-01-CC**.

1.2. Quantity Tolerance: **±4%**

2. Applicable Drawing and Documents

2.1. Applicable Documents

The latest issues of the documents listed below constitute a Part of this specification to the extent specified herein. In the event of certain requirements of the specification, drawing or data listed below conflict, the decision will be at the discretion of the purchaser.

All the documents not mentioned here, subsidiary to the documents specified be considered to the extent required by the parent document in its true meaning.

2.1.1. ASTM A-106 Specification for Seamless Carbon Steel Pipe for High Temperature Service.

2.1.2. ASTM A-519 Specification for Seamless mechanical tubing.

2.1.3. ASTM A 530 Specifications for General Requirements for specialized carbon and Alloy Steel pipe.

2.1.4. ASTM E-45 Standard Practice for determining inclusion content of steel

2.1.5. ASTM E-213 Recommended practice for Ultrasonic Inspection of Metal Piping and Tubing.

2.1.6. ASTM E-381 Method of Macro Etch Testing, Inspection and Rating of Steel Products.

2.1.7. IS 2062 Steel for general structural purposes.

2.1.8. IS 3455 Gauging Practice for Plain Work Pieces.

2.1.9. IS 7018 Technical Supply Conditions for gauges

2.1.10. IS-2102(Part 1 and 2) —General Tolerances for Dimensions, Forms and Position.

2.2. Applicable Drawing

Drawing No A1-30-H-01-CC-R0 for Part No. 30-H-01-CC

3. Material Specifications, Testing and Acceptance

3.1. Material Specification

3.1.1. Material for Main Pipe

- i) The main pipe for the manufacturing of component 30-H-01-CC shall be **200 NB /Carbon Steel Seamless Mechanical tubing as per ASTM A 519 Grade 4130/ASTM A 106 Gr B.**
- ii) The steel used shall be killed steel made preferably by electric furnace. The steel shall be **vacuum degassed** by incorporating separate degassing during primary melting and may be followed by secondary melting preferably by vacuum remelting.
- iii) Size and Geometry:

Size	Nominal OD, mm	Nominal Wall thickness, mm
8" (200 NB)	219.10	20.62 mm

- iv) **The size of raw material specified is nominal. The contractor may choose a different size with appropriate tolerances on size and geometry if felt desirable, such that the parts can be machined without leaving any unmachined surfaces.**
- v) The pipes shall be in hot finished condition.
- vi) The steel shall be clean and free from injurious defects and inclusions
- vii) No repair on the pipes by welding or otherwise shall be permitted.

3.1.2. Material for other parts

The support flange and the lifting hook shall be weldable grade structural steel conforming to IS 2062 Grade B.

3.2. Material Testing and Acceptance (For Main Pipe).

3.2.1. Chemical Composition of the Material

The steel shall conform to the following chemical composition.

Element	Composition in %
Carbon. max	0.30
Manganese	0.29 to 1.06
Phosphorous. max	0.035
Sulphur, max	0.035
Silicon, min	0.10
Iron, Fe	Balance

3.2.2. Mechanical Testing

- i) **Tensile Testing:** Tensile Testing shall be conducted on 1 length of pipe from each lot of 200 lengths. The result of the tests shall be in conformance to the properties below.

Mechanical Properties: The steel shall conform to the following mechanical properties.

Property	Value
----------	-------

Property	Value
Tensile Strength min	415 MPa
Yield Strength min	240 MPa
Elongation in 50mm min	30 % Longitudinal & 16% Transverse

- ii) **Flattening Test:** One flattening test in accordance with ASTM A 530 shall be carried out from each lot of 200 lengths.

3.2.3. Test for determining Inclusion rating

One pipe from each heat/lot shall be tested to determine the inclusion content as per ASTM E 45 and compared with plate III. The worst field of each inclusion type from each specimen shall be recorded as the rating for specimen.

Acceptance:

- I) Inclusion rating of Thin series shall not be greater than 2.
- II) Inclusion rating of Heavy series shall not be greater than 1.

3.2.4. Macro etch Testing

Macro etch testing as per ASTM E-381 standards conducted on a cross section of the pipe shall show sound and reasonably uniform material free from injurious lamination, cracks and similar objectionable defects. Macro etch testing shall be conducted on one pipe from each lot or heat.

3.2.5. Ultrasonic Testing :

- i) Each finish cut length of pipe shall be examined by ultrasound in accordance with ASTM E 213 to certify freedom from internal defects in the pipe.
- ii) The pipes shall be scanned through the wall thickness using shear wave.
- iii) Inspection of the pipe shall be carried out for both transverse and longitudinal defects.
- iv) The probe shall be directed towards one end moved backward for the transverse defects and in the circumferential path for the longitudinal defects. The pipe shall be rotated or indexed as required to provide inspection of all areas and the procedure shall be repeated with scanning direction reversed.
- v) **Acceptance:** - Any defect indication greater than that given by the artificial notch whose depth is 3% of the wall thickness of the pipe shall be the cause for rejection.

3.3. Raw Material Procurement, Identification and Acceptance

3.3.1. Material shall be procured by the contractor from genuine sources directly from reputed manufacturer (like ISMT Ltd., Pune, Maharashtra Seam less Ltd) or through their authorized dealers. Purchaser's authorized representative shall witness all tests on the raw material at the place of manufacturer.

3.3.2. In case of supply through authorized dealers, the original mill test certificates and shipping documents from the place of manufacturer shall be provided for verification.

3.3.3. In case of original documents and mill certificates are not available or are in doubt, each length of pipe shall be tested for its conformance to this specification at laboratories / agencies approved by the purchaser.

3.3.4. **Material Identification:** Materials immediately after procurement and testing shall be offered to the purchaser for identification and stamping.

3.3.5. Each cut length of pipe shall be identified with the original mill heat markings.

3.3.6. Purchaser approval of the material in the beginning shall not in any case relieve the responsibility of the vendor in supplying the materials as per this specification. When ever correlation with the original test reports is in doubt, purchaser shall be at their liberty to insist for retesting of the material at intermediate stage or on the finished component at vendor's cost. However such retesting shall be limited to chemical analysis of critical elements on one sample each from a lot of 200 Nos or part thereof. In such retesting if the material found unacceptable, the purchaser shall reject any or all lots with no liability to their account.

3.3.7. **No manufacturing activity shall commence without the explicit approval of the raw material in writing by the purchaser's authorized engineer.**

4. General Description and requirement of the item

4.1. All parts shall be manufactured strictly conforming to the applicable drawings as stipulated in Para 2.2 above.

4.2. After cold forming of the hook, stress relieving shall be done before welding the same to the pipe.

4.3. All welding on the part shall be done by Gas Tungsten Arc welding (GTAW). The welding procedure shall be qualified in accordance with ASME Code Section IX.

4.4. Stress relieving.

4.4.1. After all welding is completed, the assembly shall be stress relieved in accordance with ASME Section VIII Division 1 Para UCS 56.

4.4.2. The recommended stress relieving cycle is 595 °C with a minimum holding time of one hour. Loading temperature, heating rate and cooling rate shall be as per the stipulated code.

4.4.3. Time temperature chart for each heat treatment batch shall be submitted. Details such as batch number, batch quantity, date of heat treatment etc., shall be printed on the chart.

4.4.4. It is desirable that the assemblies are heat treated in the furnace in vertically hanging position. Necessary structural support shall be provided during stress relieving treatment.

4.4.5. Finish machining of the part shall be done after completing stress relieving and inspection thereof.

4.5. Finish machining of the part shall be done after completing the welding.

4.6. Both inside and outside surfaces of the part shall be machined for full length.

- 4.7. The dia 215.0 ± 0.2 shall be taken as datum at either ends for machining and inspection. To achieve the required dimensional and geometrical tolerances, the datum has to be supported properly while holding.
- 4.8. Adequate support has to be given while machining to avoid sagging of the component.
- 4.9. Necessary sturdy boring bars shall be used for machining of the inside surface without causing any tool chatter.
- 4.10. General surface finish of N7 or better must be achieved all over unless specified.
- 4.11. The Surfaces if marked N6 shall have a roughness value Ra of 0.8 μ m or better. Machining lays on surface with N6 finish shall be concentric circles. These surfaces shall be free from scratches, toolmarks, dents, material defects etc. Such surfaces shall be protected properly during subsequent operations if any, inspection, storage and transportation with extra care.
- 4.12. Geometrical Tolerances, Surface finish and Concentricity etc must conform to those mentioned in the drawing.
- 4.13. Dimensional tolerances wherever not specified, general tolerances as per IS 2102 Part 1(Tolerance Class Fine) shall apply.
- 4.14. Form Tolerances applicable shall be 50% of the dimensional tolerances unless specifically indicated.
- 4.15. All sharp corners shall be deburred and rounded off to 0.2 R.
- 4.16. All dimensional and other details shown in the drawing are as measured at a reference room temperature of 20 deg C. Hence care shall be taken to incorporate appropriate correction for thermal expansion or contraction during manufacturing and inspection depending on the room temperature.

5. Manufacturing Procedure And Workmanship

5.1. Manufacturing Procedure

- The manufacturing procedure shall in no way impair the chemical composition and properties of the materials either by deterioration or by the pick up of impurities.
- The manufacturing procedure shall be such as to achieve the requirements of the drawing with consistency.

5.2. Workmanship

Workmanship shall be of high standard of engineering and shall be good enough to achieve necessary quality of the part such as surface finish, concentricity etc., as required by the drawing.

6. Sub-contracting

- 6.1. Sub-contracting is generally not permitted. However in cases where it is unavoidable, the same shall be subject to prior approval by Purchaser.
- 6.2. The bidder shall define the part or services they plan to subcontract in the technical bid. Reasons for subcontracting shall be described.

6.3. Detailed profile of the sub-contractor shall be attached in the technical bid.

6.4. All sub-contractors are subject to assessment and qualification by the purchaser.

7. Inspection, Marking and Reports.

7.1. Inspection

7.1.1. Quality Assurance Plan (QAP)

A detailed Quality Assurance Plan in line with this specification shall be submitted and the same shall be got approved by the purchaser before commencing the manufacturing activities.

7.1.2. Visual Inspection

All the items after the final machining shall be visually inspected for any scratches, dent marks, cracks, folds, other material defects, damages or any other surface irregularities.

7.1.3. Surface Finish

Surface marked N6 has to be checked with suitable roughness testing instruments and a report generated has to be enclosed with the inspection report.

7.1.4. The supplier shall carry out inspection as per approved QAP. Reports of inspection in format acceptable to the purchaser shall be prepared and offered to the purchaser's authorized representative at the time of purchaser's inspection.

7.1.5. Only items found acceptable by the supplier shall be offered for purchaser's inspection.

7.1.6. Liquid Penetrant Examination

All welded joint areas shall be inspected with liquid Penetrant as per practice ASTM E 165. Any defect indications shall be evaluated and repaired if necessary, before proceeding with the machining. In case of linear indications, the defect shall be completely removed by grinding before carrying out repair welding.

7.1.7. Dimensional Inspection

- i) The vendor or his authorised representative shall carry out inspection of all dimensions for 100% of the items using standard inspection procedures acceptable to the purchaser.
- ii) Vendor shall use suitable inspection gauges, instruments and comparators designed and made to relevant IS standard for inspection. The calibration of instruments and gauges has to be made at a reputed labs and a reference has to be kept with them for the same.
- iii) All GO and NOGO gauges shall be got done from standard gauge manufacturer conforming to IS 3455.
- iv) For dimensions and forms having tolerances of 50 microns or less special comparators with dial gauge of suitable least count shall be preferred.
- v) Measuring instruments when used for inspection shall have a least count better than 10% of the corresponding dimensional tolerance.

- vi) All gauges comparators instruments shall be got approved from the purchaser before their actual use.
- vii) An identical set of inspection gauges and comparators used for inspection the part shall be given to the purchaser free of cost, which shall be used as a reference for site inspection.

7.2. Marking

All items (components) have to be marked for identification with a numbering system as given below.

- The number marking should start with letter 'C' followed by a three letter supplier code and four digit serial number of the component. The serial number should be continuous. For ex C-KLM/0001 (KLM is supplier code, 0001 is the component serial number).
- The location of the marking shall be decided in consultation with the purchaser

7.3. Reports

7.3.1. The vendor shall prepare inspection reports for each component with the serial number after their inspection, as per the format agreed.

7.3.2. The report shall contain all dimensions and geometrical features as shown in the drawing. Where instruments are used for inspection, absolute values as measured may be indicated.

7.3.3. The vendor shall prepare 3 copies inspection reports for submission to the purchaser.

7.3.4. Correspondence to components and reports shall be maintained.

7.4. The vendor shall inform for purchaser's inspection after his inspection report is ready. The purchaser's representative shall cross check the inspection reports for their dimensional conformance to the drawing and correspondence to the components. In case of satisfactory results, he shall issue necessary inspection memo authorizing the vendor to dispatch the parts.

7.5. Purchaser or his authorized representative shall be permitted free access to the vendor's or his sub-contractor's premises at all reasonable times for the purpose of inspection at all stages of manufacture of the parts.

7.6. Purchaser or his authorized representative shall be given full assistance in the form of tools, gauges, instruments, skilled manpower etc., to facilitate inspection.

7.7. Purchaser shall be at their liberty to specify additional inspection procedures if felt necessary or change the one being used, to ascertain the conformance of the parts with this specification and drawings.

7.8. In addition to the pre-dispatch inspection at the vendor's premises by the purchaser, these parts are also subject to a final inspection by the purchaser at BARC, Mysore before the parts are taken up for assembly. The vendor shall rectify or replace free of cost, any rejections during this final inspection which shall be intimated as and when this final inspection is completed.

8. Acceptance criteria

- 8.1. Conformance of raw material to the stipulated standard.
- 8.2. Dimensional & geometrical conformance of parts with the drawings.

9. Guarantee

The supplier shall guarantee the parts for materials, workmanship and geometry for a period of 12 months from the date of final acceptance. The supplier shall make free replacements for any rejections during the guarantee period due to reasons indicated above.

10. Preservation, Packing and Delivery

10.1. Preservation:

- 10.1.1. All parts shall be protected for the entire period of storage and dispatch against damages due to atmospheric corrosion and rough handling.
- 10.1.2. The items shall be properly coated with a coat of "RABAKOTE" (An antirust preventive golden color fluid) or equivalent.
- 10.1.3. The parts shall be properly cleaned before applying antirust coating. .Special care shall be taken to protect N6 surface.
- 10.1.4. Details of the antirust coating materials and the solvent required to remove it shall be provided by the vendor.

10.2. Packing

- 10.2.1. The packaging provided shall ensure the retention of antirust coating on the surfaces as well as protection of N6 surfaces on either end during transportation. Bubble packing material may be used to protect N6 faces.
- 10.2.2. The part after antirust coating shall be capped on both ends using good quality rubber caps having sufficient length to cover the N6 area.
- 10.2.3. The part after antirust coating shall be covered with dust free polyethylene cover.
- 10.2.4. Individual wooden boxes of suitable size with half round supports to hold the part shall be used for packing. Suitable soft material shall be used to fill the gaps. Sound packaging material shall be used.
- 10.2.5. A copy of the inspection report must be sent along with the consignment.

10.3. Delivery

The items after inspection and acceptance shall be delivered to Asst Stores Officer, Bhabha Atomic Research Centre, Yelwal, Mysore.

10.3.1. Delivery Schedule

The total supply has to be completed within **06 Months** from the date of receipt of the Purchase Order by the vendor.

The following delivery schedule shall have to be followed.

- Procurement of first batch of first lot of raw material with all testing and its approval by the purchaser with in 3 months from the date of receipt of Purchase Order.

- Pilot lot of 5 parts and gauges for approval has to be sent with in 1 month after the approval of raw material.
- Regular Supply of 50 parts per month after acceptance of pilot lot and gauges.

10.3.2. Any departure from the accepted delivery schedule after placement of the PO would be viewed very seriously and the same shall be treated as sufficient reason for canceling the order at any stage with out any liability to the purchaser. In such case the materials shall be procured from alternate sources at vendors cost and risk to fulfill the purchasers requirement.

11. Splitting of Order:

1.1. Splitting of order is not required.

1.2. The order will be placed on technically acceptable overall L1

12. Quotation

The bidders shall submit their quotation on-line through the e-tender portal

12.1. Techno Commercial details.

The following details shall be furnished under Techno Commercial Bid

- i) Brief process plans the bidder intend to follow for manufacture of the item.
- ii) Details of precision machining facilities suitable for machining large parts similar to the tendered job. Please list the details such as type, make& model, year of purchasing, spindle runout and repeatability.
- iii) Only following machinery shall be considered relevant for the job
 - Machining facilities required for manufacturing jobs of comparable sizes involving through ID boring of 2000 mm length or more.
 - Heavy duty turning centre with minimum turning diameter of 550 to 600 mm and minimum turning length of 2000 mm.
- iv) Inspection facilities: Please give inspection grade instruments and tools available with details such as type, make, model, range, least count etc.
- v) Previous experience: Highlight experience in precision machining jobs involving comparable size, geometry and tolerances. Give details of purchase order references, client's name, address and telephone number, brief description of the job with sketch, and date of completion. Give details of similar jobs carried out for BARC or any other DAE units if any.
- vi) Details of other infrastructure and resources available with the bidder such as space available (built up & open), manpower etc.
- vii) Financial soundness: Give details to establish the financial soundness of the bidder to undertake a job of this magnitude such as audited balance sheets for the last three years, bank solvency certificates, details of credit facilities etc.
- viii) Detailed profile of the firm.
- ix) Details of sub-contractors if any, with details of parts/services intended to subcontract and detailed profile of the sub-contractor.

12.2. Price bid

The bidders shall submit the price-bid in e-tender format given online.

13. Evaluation

- 13.1. Technical suitability of the bids will be assessed based on information furnished as required in **S. No. 12.1**. The bids shall be assessed based on the following parameters for which weightage points have been assigned. The weightage point based evaluation scheme and qualifying levels are described under Para 13.8.
- 13.2. Infrastructure available with the bidders, which include space, manufacturing and inspection facilities relevant to the tendered job and their loading. The bidders shall attach clear details of facilities available with them along with the technical bids.
- 13.3. Previous experience of the bidder in executing similar jobs. The bidder shall attach details of previous jobs executed by them revealing the technical character, volume and delivery schedule compliance.
- 13.4. The tendered job calls for high degree of skill and experience in precision machining of steel components. Hence preference will be given to bidder having adequate in house facilities and previous experience in precision machining of jobs of comparable nature.
- Machining facilities required for manufacturing jobs of comparable sizes involving through ID boring of 2000 mm length or more and Heavy duty turning centre with minimum turning diameter of 550 to 600 mm and minimum turning length of 2000 mm are minimum requirements for qualifying for the tendered job.
- 13.5. Availability of spare capacity vis-à-vis the delivery schedule as assessed by the purchaser.
- 13.6. **Financial soundness to undertake the job:** Financial soundness of the bidder to undertake a job of this magnitude will be assessed based on audited balance sheets for the last three years, bank solvency certificates, credit facilities as well as the jobs executed and the jobs in hand.
- 13.7. **Evaluation scheme based on weightage points assigned to evaluation parameters.**

Subject to meeting the terms and conditions of the tender, the technical bids will be evaluated on a 100 point scale based on weightage points assigned to different evaluation parameters as described in the table given below.

Sl. No.	Evaluation Parameters	weightage Points		Remarks
		Own	Sub-contract	
1	Facilities	40	20	
1.1	Fabrication/welding/heat treatment facilities	8	4	
1.2	Relevant Machining facilities	16	8	
1.3	Manpower	8	4	
1.3	Inspection facilities	8	4	
2	Previous experience	20	0	
3	Delivery commitment, if facilities match	15	0	

Sl. No.	Evaluation Parameters	weightage Points		Remarks
		Own	Sub-contract	
4	Past Performance in similar/comparable jobs carried out in last 3 years	10	0	
5	Financial capabilities	15	0	Audited Balance sheet for last three years/bank solvency/credit facility etc.
	Total	100		

Note:-

- i. Facilities and machineries in full working condition having requisite profiles and features required for manufacturing the item only shall be considered relevant.
- ii. Facilities, machineries and resources owned by the bidder shall be given full weightage and belonging to the sub-vendor or out sourced shall be given 50% weightage as per the table depending on band of assessment.
- iii. Permanent manpower employed by the bidder shall be given full weightage and temporary/out sourced manpower employed the sub vendor shall be given 50% weightage as per the table depending on the band of assessment.
- iv. The figures of weightage points shown in the table are maximum applicable for respective bands. The evaluation authority of the purchaser reserves the right to assign a lower weightage in the band based on its assessment.

v. Qualifying levels

Bids scoring following points or more shall only be considered technically qualified

- Overall:60 points;Facilities:24 points; Delivery commitment:12 points and Financial capability:12 points
- Purchaser however reserves the right to modify the qualifying levels depending upon the response in the tender to ensure fair competition and hassle free supply of parts.

14. Confidentiality, Restricted Information, Prohibition against use of BARC's name.

14.1. Confidentiality

No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

This clause shall apply to the sub-contractors, consultants, advisers or the employees engaged by the party with equal force.

14.2. Restricted information

"Restricted information" categories under section 18 of the Atomic Energy Act, 1962 and "Official secrets" under section 5 of the Official Secrets Act, 1923

Any contravention of the above mentioned provisions by any contractor, sub-contractors, consultants, advisers or the employees of a contractor would invite penal consequences under the aforesaid legislation.

14.3. Prohibition against use of BARC's name

The contractor, sub-contractors, consultants, advisers or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any public media like press, radio, TV or internet without the prior written approval of BARC.

15. Post supply inspection

Post supply inspection in respect of supplies made is not permitted. Any offer containing the condition of post supply inspection will be out-rightly rejected. It is therefore mandatory for the bidders while quoting, to indicate in clear terms the requirement of post supply inspection.