



Government of India
Bhabha Atomic Research Centre Mysuru
BARC/RMP//Machines/FMS/ NRK//SS, Monel/ Piping/26-27



बिड संख्या/Bid Number: GEM/2026/B/7491543

दिनांक /Dated: 30-04-2026

बिड दस्तावेज़ / Bid Document

बिड विवरण/Bid Details	
बिड बंद होने की तारीख/समय /Bid End Date/Time	27-05-2026 15:00:00
बिड खुलने की तारीख/समय /Bid Opening Date/Time	27-05-2026 15:30:00
बिड पेशकश वैधता (बंद होने की तारीख से)/Bid Offer Validity (From End Date)	90 (Days)
मंत्रालय/राज्य का नाम/Ministry/State Name	Pmo
विभाग का नाम/Department Name	Department Of Atomic Energy
संगठन का नाम/Organisation Name	Bhabha Atomic Research Centre
कार्यालय का नाम/Office Name	Mumbai
वस्तु श्रेणी /Item Category	Custom Bid for Services - Stainless steel, Monel process piping fabrication and related MS structural fabrication, erection and testing works at various process facilities
समान श्रेणी/Similar Category	<ul style="list-style-type: none">• Piping Erection Service
अनुबंध अवधि /Contract Period	1 Year(s)
बिडर का न्यूनतम औसत वार्षिक टर्नओवर (3 वर्षों का) /Minimum Average Annual Turnover of the bidder (For 3 Years)	50 Lakh (s)
उन्हीं/समान सेवा के लिए अपेक्षित विगत अनुभव के वर्ष/Years of Past Experience Required for same/similar service	3 Year (s)
इसी तरह की सेवाओं का पिछला आवश्यक अनुभव है/Past Experience of Similar Services required	Yes
टर्नओवर के लिए एमएसई को छूट प्राप्त है / MSE Relaxation for Turnover	Yes Complete
स्टार्टअप के लिए अनुभव के वर्षों और टर्नओवर से छूट प्रदान की गई है /Startup Relaxation for Years of Experience and Turnover	No
विक्रेता से मांगे गए दस्तावेज़/Document required from seller	Experience Criteria,Bidder Turnover,Certificate (Requested in ATC),OEM Annual Turnover,Additional Doc 1 (Requested in ATC) *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer



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बिड विवरण/Bid Details	
क्या आप निविदाकारों द्वारा अपलोड किए गए दस्तावेजों को निविदा में भाग लेने वाले सभी निविदाकारों को दिखाना चाहते हैं? संदर्भ में नू है/Do you want to show documents uploaded by bidders to all bidders participated in bid?	Yes (Documents submitted as part of a clarification or representation during the tender/bid process will also be displayed to other participated bidders after log in)
बिड लगाने की समय सीमा स्वतः नहीं बढ़ाने के लिए आवश्यक बिड की संख्या। / Minimum number of bids required to disable automatic bid extension	3
दिनों की संख्या, जिनके लिए बिड लगाने की समय-सीमा बढ़ाई जाएगी। / Number of days for which Bid would be auto-extended	6
ऑटो एक्सटेंशन अधिकतम कितनी बार किया जाना है। / Number of Auto Extension count	1
बिड से रिवर्स नीलामी सक्रिय किया/Bid to RA enabled	No
बिड का प्रकार/Type of Bid	Two Packet Bid
तकनीकी मूल्यांकन के दौरान तकनीकी स्पष्टीकरण हेतु अनुमत समय /Time allowed for Technical Clarifications during technical evaluation	5 Days
अनुमानित बिड मूल्य / Estimated Bid Value	7000000
मूल्यांकन पद्धति/Evaluation Method	Total value wise evaluation
मध्यस्थता खंड/Arbitration Clause	No
सुलह खंड/Mediation Clause	No

ईएमडी विवरण/EMD Detail

एडवाइजरी बैंक/Advisory Bank	State Bank of India
ईएमडी राशि/EMD Amount	140000

ईपीबीजी विवरण /ePBG Detail

एडवाइजरी बैंक/Advisory Bank	State Bank of India
ईपीबीजी प्रतिशत (x)/ePBG Percentage(%)	5.00
ईपीबीजी की आवश्यक अवधि (माह) /Duration of ePBG required (Months).	14

(a). जेम की शर्तों के अनुसार ईएमडी छूट के इच्छुक बिडर को संबंधित कैटेगरी के लिए बिड के साथ वैध समर्थित दस्तावेज प्रस्तुत करने हैं। एमएसई कैटेगरी के अंतर्गत केवल वस्तुओं के लिए विनिर्माता तथा सेवाओं के लिए सेवा प्रदाता ईएमडी से छूट के पात्र हैं। व्यापारियों को इस नीति के दायरे से



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बाहर रखा गया है।/EMD EXEMPTION: The bidder seeking EMD exemption, must submit the valid supporting document for the relevant category as per GeM GTC with the bid. Under MSE category, only manufacturers for goods and Service Providers for Services are eligible for exemption from EMD. Traders are excluded from the purview of this Policy.

(b).ईएमडी और संपादन जमानत राशि, जहां यह लागू होती है, लाभार्थी के पक्ष में होनी चाहिए। / EMD & Performance security should be in favour of Beneficiary, wherever it is applicable.

लाभार्थी /Beneficiary :

Officer
MYSORE, Department of Atomic Energy, Bhabha Atomic Research Centre,PMO (Pay And Accounts Officer)
(Senior Accounts Officer)

बोली विभाजन लागू नहीं किया गया/ Bid splitting not applied.

एमआईआई अनुपालन/MII Compliance

एमआईआई अनुपालन/MII Compliance	Yes
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एमएसई खरीद वरीयता/MSE Purchase Preference

एमएसई खरीद वरीयता/MSE Purchase Preference	Yes
सूक्ष्म और लघु उद्यम मूल उपकरण निर्माताओं को खरीद में प्राथमिकता, यदि उनका मूल्य L1+X% तक की सीमा में हो / Purchase Preference to MSE OEMs available upto price within L1+X%	15

1. If the bidder is a Micro or Small Enterprise (MSE) as per latest orders issued by Ministry of MSME, the bidder shall be relaxed from the eligibility criteria of "Bidder Turnover" as defined above subject to meeting of quality and technical specifications. If the bidder itself is MSE OEM of the offered products, it would be relaxed from the "OEM Average Turnover" criteria also subject to meeting of quality and technical specifications. The bidder seeking Relaxation from Turnover, shall upload the supporting documents to prove his eligibility for Relaxation.
2. The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated above in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3-year-old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.
3. Years of Past Experience required: The bidder must have experience for number of years as indicated above in bid document (ending month of March prior to the bid opening) of providing similar type of services to any Central / State Govt Organization / PSU. Copies of relevant contracts / orders to be uploaded along with bid in support of having provided services during each of the Financial year.
4. Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference for services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered service. If L-1 is not an MSE and MSE Service Provider (s) has/have quoted price within L-1+ 15% of margin of purchase preference /price band as defined in the relevant policy, then 100% order quantity will be awarded to such MSE bidder subject to acceptance of L1 bid price. The buyers are advised to refer to the [OM No.1 4 2021 PPD dated 18.05.2023](#) for compliance of Concurrent application of Public Procurement Policy for Micro and Small Enterprises Order, 2012 and Public Procurement (Preference to Make in India) Order, 2017. Benefits of MSE will be allowed only if the credentials of the service provider are validated on-line in GeM profile as well as validated and approved by the Buyer after evaluation of submitted documents.
5. If L-1 is not an MSE and MSE Service Provider (s) has/have quoted price within L-1+ 15% of margin of purchase preference /price band as defined in the relevant policy, then 100% order quantity will be awarded to such MSE



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bidder subject to acceptance of L1 bid price.

6. Estimated Bid Value indicated above is being declared solely for the purpose of guidance on EMD amount and for determining the Eligibility Criteria related to Turn Over, Past Performance and Project / Past Experience etc. This has no relevance or bearing on the price to be quoted by the bidders and is also not going to have any impact on bid participation. Also this is not going to be used as a criteria in determining reasonableness of quoted prices which would be determined by the buyer based on its own assessment of reasonableness and based on competitive prices received in Bid / RA process.

7. Past Experience of Similar Services: The bidder must have successfully executed/completed similar Services over the last three years i.e. the current financial year and the last three financial years(ending month of March prior to the bid opening): -

1. Three similar completed services costing not less than the amount equal to 40% (forty percent) of the estimated cost; or
2. Two similar completed services costing not less than the amount equal to 50% (fifty percent) of the estimated cost; or
3. One similar completed service costing not less than the amount equal to 80% (eighty percent) of the estimated cost.

एक्सेल में अपलोड किए जाने की आवश्यकता /Excel Upload Required :

SOQR - [1777540001.xlsx](#)

अतिरिक्त योग्यता /आवश्यक डेटा/Additional Qualification/Data Required

Scope of Work:[1777540191.pdf](#)

Payment Terms:[1777540199.pdf](#)

Penalties:[1777540204.pdf](#)

GEM Availability Report (GAR):[1777540228.pdf](#)

Undertaking of Competent Authority is mandatory to create Custom Bid for Services. Please download standard format document and upload:[1777540280.pdf](#)

Instruction To Bidder:[1777540714.pdf](#)

Pre Bid Detail(s)

मूल्य भिन्नता खंड दस्तावेज़/Pre-Bid Date and Time	प्री-बिड स्थान/Pre-Bid Venue
15-05-2026 12:00:00	Building No.: 1A Bhabha Atomic Research centre, PB No 1, Yelwal, Mysore-571130 PH: 0821-2406534/2406460

Custom Bid For Services - Stainless Steel, Monel Process Piping Fabrication And Related MS Structural Fabrication, Erection And Testing Works At Various Process Facilities (1)

तकनीकी विशिष्टियाँ /Technical Specifications

विवरण/ Specification	मूल्य/ Values
कोर / Core	
Description /Nomenclature of Service Proposed for procurement using custom bid functionality	Stainless steel, Monel process piping fabrication and related MS structural fabrication, erection and testing works at various process facilities
Regulatory/ Statutory Compliance of Service	YES



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विवरण/ Specification	मूल्य/ Values
Compliance of Service to SOW, STC, SLA etc	YES
एडऑन /Addon(s)	

अतिरिक्त विशिष्टि दस्तावेज़ /Additional Specification Documents

परेषिती/रिपोर्टिंग अधिकारी /Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	Quantity	अतिरिक्त आवश्यकता /Additional Requirement
1	Indranil Banerjee	571130, BARC [M], RMP, HUNSUR HIGHWAY, RATNAHALLY COMPLEX, YELWALA, MYSURU, KARNATAKA, INDIA	Project / Lumpsum Based	N/A

क्रेता द्वारा जोड़ी गई बिड की विशेष शर्तें/Buyer Added Bid Specific Terms and Conditions

1. Generic

OPTION CLAUSE: The buyer can increase or decrease the contract quantity or contract duration up to 25 percent at the time of issue of the contract. However, once the contract is issued, contract quantity or contract duration can only be increased up to 25 percent. Bidders are bound to accept the revised quantity or duration

2. Generic

Bidder financial standing: The bidder should not be under liquidation, court receivership or similar proceedings, should not be bankrupt. Bidder to upload undertaking to this effect with bid.

3. Certificates

Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

4. Purchase Preference (Centre)

Bid reserved for Make in India products: Procurement under this bid is reserved for purchase from Class 1 local suppliers as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a class 1 local supplier is denoted in the bid document 50%. All bidders must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which the bid is liable to be rejected. In case the bid value is more than Rs 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020 . In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.



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5. Generic

OPTION CLAUSE: The buyer can increase or decrease the contract quantity or contract duration up to 50 percent at the time of issue of the contract. However, once the contract is issued, contract quantity or contract duration can only be increased up to 50 percent. Bidders are bound to accept the revised quantity or duration.

6. Purchase Preference (Centre)

Procurement under this bid is reserved for purchase from Micro and Small Enterprises whose credentials are validated online through Udyog Aadhaar/URC for that product/service category. If the bidder wants to avail the reservation benefit, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service.

7. Payment

PAYMENT OF SALARIES AND WAGES: Service Provider is required to pay Salaries / wages of contracted staff deployed at buyer location first i.e. on their own and then claim payment from Buyer alongwith all statutory documents like, PF, ESIC etc. as well as the bank statement of payment done to staff.

8. Past Project Experience

Proof for Past Experience and Project Experience clause: For fulfilling the experience criteria any one of the following documents may be considered as valid proof for meeting the experience criteria: a. Contract copy along with Invoice(s) with self-certification by the bidder that service/supplies against the invoices have been executed. b. Execution certificate by client with contract value. c. Any other document in support of contract execution like Third Party Inspection release note, etc. **Proof for Past Experience and Project Experience clause:** For fulfilling the experience criteria any one of the following documents may be considered as valid proof for meeting the experience criteria: a. Contract copy along with Invoice(s) with self-certification by the bidder that service/supplies against the invoices have been executed. b. Execution certificate by client with contract value. c. Any other document in support of contract execution like Third Party Inspection release note, etc.

9. Generic

1. The Seller shall not assign the Contract in whole or part without obtaining the prior written consent of buyer.
2. The Seller shall not sub-contract the Contract in whole or part to any entity without obtaining the prior written consent of buyer.
3. The Seller shall, notwithstanding the consent and assignment/sub-contract, remain jointly and severally liable and responsible to buyer together with the assignee/ sub-contractor, for and in respect of the due performance of the Contract and the Sellers obligations there under.

अस्वीकरण/Disclaimer

The Additional Terms and Conditions (ATC) have been incorporated by the Buyer after approval of their Competent Authority. The Buyer, is solely responsible for the impact of these clauses on the bidding process, its outcome, and consequences thereof including any restriction arising in the bidding process due to these ATCs and including the modification of technical specifications and / or terms and conditions governing the bid. All representations / grievances pertaining to the ATC clauses shall be raised with the buyer organization directly and not with GeM. If any of the clause(s) is/are incorporated by the Buyer regarding the following, the bid & resultant contract shall be treated as null & void. Further, GeM reserves the right, at its sole discretion, to cancel the bid forthwith, without issuance of any prior notice or intimation :-

1. Publishing Custom / BOQ bids for items for which regular GeM categories are available (unless such Custom / BOQ item is bunched with the major regular product Category Item).
2. Mandating procurement of / from specific Brand / Make / Model / Manufacturer / Dealer except in case of



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Single Bid / Proprietary Article Certificate (PAC) Buying.

3. Inclusion of disqualification criteria related to suspension of seller / service provider, where such suspension period has already expired.
4. Mandating submission of documents in physical form as a pre-requisite to qualify bidders.
5. Publishing bids on GeM for procurement of works.
6. Procurement of Goods by creating a Service bid on GeM & vice-versa.
7. Seeking sample with bid or approval of samples during bid evaluation process. However, trial / sample, as the case may be, shall be permitted in cases where trial / sample are allowed as per approved and published procurement policy of the Buyers' controlling Ministry / Department / State / Public Sector Enterprises Headquarters. If there is any violation of trial / sample clause with regard to approved policy of the Buyers' Ministry / Department / State / Public Sector Enterprises Headquarters, then this is to be determined and redressed by the concerned Buyer Organisation only.
8. Seeking experience from specific organization / department / institute only or from foreign / export experience.
9. Creating bid for items from incorrect categories.
10. Reference of conditions published on any external site or reference to external documents/clauses.
11. Asking for any Tender fee / Bid Participation fee, as the case may be.
12. Buyer added ATC Clauses which are in contravention of clauses defined in bid detail section, including specifications, EMD Detail, ePBG Detail and MII and MSE Purchase Preference sections of the bid, unless otherwise allowed by the applicable GeM GTC.
13. Any ATC clause in contravention with GeM GTC Clause 4 (xiii) (h) will be invalid. In case of multiple L1 bidders against a service bid, the buyer shall place the Contract by selection of a bidder amongst the L-1 bidders through a Random Algorithm executed by GeM system.
14. In a category based bid, adding additional items, through buyer added, additional scope of work/ additional terms and conditions/or any other document. If buyer needs more items along with the main item, the same must be added through bunching category based items or by bunching custom catalogues or bunching a BoQ with the main category based item, the same must not be done through ATC or Scope of Work.

Further, if any seller has any objection/grievance against these additional clauses or otherwise on any aspect of this bid, they can raise their representation against the same by using the Representation window provided in the bid details field in Seller dashboard after logging in as a seller. Buyer is duty bound to reply to all such representations and would not be allowed to open bids if he fails to reply to such representations.

All GeM Sellers/Service Providers shall ensure full compliance with all applicable labour laws, including the provisions, rules, schemes and guidelines under the four Labour Codes i.e. the Code on Wages, 2019; the Industrial Relations Code, 2020; the Occupational Safety, Health and Working Conditions Code, 2020; and the Code on Social Security, 2020 as and when notified and brought into force by the Government of India.

For all provisions of the Labour Codes that are pending operationalisation through rules, schemes or notifications, the corresponding provisions of the pre-existing labour enactments (such as The Minimum Wages Act, 1948, The Payment of Wages Act, 1936, The Payment of Bonus Act, 1965, The Equal Remuneration Act, 1976, The Payment of Gratuity Act, 1972, etc. and relevant State Rules) shall continue to remain applicable.

The Seller/ Service Providers shall, therefore, be responsible for ensuring compliance under:

- All notified and enforceable provisions of the new Labour Codes as mentioned hereinabove; and
- All operative provisions of the erstwhile Labour Laws until their complete substitution.

All obligations relating to wages, social security, safety, working conditions, industrial relations etc. and any other statutory requirements shall be strictly met by the Seller/ Service Provider. Any non-compliance shall constitute a breach of the contract and shall entitle the Buyer to take appropriate action in accordance with the contract and applicable law.

This Bid is governed by the General Terms and Conditions, conditions stipulated in Bid and Service Level Agreement specific to the Service, as the case may be, as provided in the Marketplace.

However, in case of Service, if any condition specified in General Terms and Conditions is



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contradicted by the conditions stipulated in Service Level Agreement specific to said Service, then it will over-ride the conditions in the General Terms and Conditions.

This Bid is governed by the [सामान्य नियम और शर्तें/General Terms and Conditions](#), conditions stipulated in Bid and [Service Level Agreement](#) specific to this Service as provided in the Marketplace. However in case if any condition specified in सामान्य नियम और शर्तें/General Terms and Conditions is contradicted by the conditions stipulated in Service Level Agreement, then it will over ride the conditions in the General Terms and Conditions.

जेम की सामान्य शर्तों के खंड 26 के संदर्भ में भारत के साथ भूमि सीमा साझा करने वाले देश के बिडर से खरीद पर प्रतिबंध के संबंध में भारत के साथ भूमि सीमा साझा करने वाले देश का कोई भी बिडर इस निविदा में बिड देने के लिए तभी पात्र होगा जब वह बिड देने वाला सक्षम प्राधिकारी के पास पंजीकृत हो। बिड में भाग लेते समय बिडर को इसका अनुपालन करना होगा और कोई भी गलत घोषणा किए जाने व इसका अनुपालन न करने पर अनुबंध को तत्काल समाप्त करने और कानून के अनुसार आगे की कानूनी कार्रवाई का आधार होगा। (In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

---धन्यवाद/Thank You---



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Additional Terms and Conditions

Section-I: Introduction

Tender No	BARC/RMP//Machines/FMS/ NRK//SS, Monel/ Piping/26-27
Name of work	Stainless steel, Monel process piping fabrication and related MS structural fabrication, erection and testing works at various process facilities at BARC Mysuru.
Estimated cost	₹70,00,000 (Rupees Seventy Lakhs only)
Completion period	12 Months
Similar experience	Similar work means of Having experience in <i>“Fabrication of Stainless Steel or Monel piping which is welded using Gas Tungsten Arc Welding (GTAW) process and shall have experience in deploying qualified welders as per the requirements of ASME BPVC Section IX for either SS 304L or Monel 400 material of construction and carrying out NDT works.”</i>

1. Additional Terms and Conditions (ATC) shall be read in conjunction with **General Terms and Conditions (GTC), Product / Service specific Special Terms and Conditions (STC), Product /Track / Domain Specific STC of Particular**
2. **Service including its Service Level Agreement (SLA).**
3. The Terms and Conditions stipulated in STC & SLA will supersede those in GTC and Terms and Conditions stipulated in ATC will supersede those in GTC and STC in case of any conflicting provisions.
4. If there are varying or conflicting provisions made in any clauses of the contract, Buyer shall be the deciding authority with regard to the intention/interpretation of the clauses and the decision of the Buyer shall be final and binding on the Seller.
5. Additional Terms and Conditions has the following Sections:

Section-I:	Introduction	Page No 1-2
Section-II:	Instructions to the Sellers, Additional Eligibility Criteria and Compliances.	Page No 3-8
Section-III:	Additional Conditions	Page No 9-38



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Section-IV:	Brief scope of work and Additional Services, Technical Specification & Drawings (If applicable)	Page No 39-129
Section-V:	Proforma of Schedules, Eligibility Criteria / undertaking forms & forms of bank guarantee bond for Performance Security.	Page No 130-148
Section-VI:	Check List. of Documents to be submitted or uploaded	Page No 146-147

6. Some of the Clauses mentioned in the ATC (Except Clauses Mentioned in Section-II) are made specifically for incidental Goods/works; they shall also be applicable for Services to the extent the same are practically possible.

*****End of Section-I *****



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Section-II: Instructions to the Sellers, Additional Eligibility Criteria and Compliances.

1. This Section shall be read along with the bid details mentioned in the bid document.
2. The participation by the bidders in bidding shall be read as his acceptance for all the Terms and Conditions as outlined in the bid document including GTC, STC, ATC and any amendments/corrigendum.
3. The intending bidders should only submit bids if they consider themselves eligible and is in possession of all documents required.
4. Bid Security/ Earnest Money Deposit (EMD):
 - 4.1. The following Clauses shall be read along with the Clauses related to Bid Security/ EMD mentioned in the Bid Document/GTC.
 - 4.2. Bid Security/ EMD is applicable, if the EMD details are mentioned in the bid document.
 - 4.3. The EMD in original for the amount mentioned in bid document should be submitted by the Bidders within the due date i.e. 5 working days of bid opening (National holidays, Saturdays and Sundays are to be considered as holidays).
 - 4.4. Acceptable forms of EMD are **Account Payee Demand Draft, Fixed Deposit Receipt and Banker's Cheque from any of the Scheduled Public /Private Sector Banks.**
 - 4.5. EMD should be in favour of Beneficiary. The Beneficiary details and address for submission of original EMD are mentioned in Bid document.
 - 4.6. Bidders seeking exemption from submitting the EMD (as per the GTC) shall have to upload scanned copy of valid supporting document for the relevant category as per GTC.
5. Pre-Bid Clarifications/Meeting:
 - 5.1. Pre-Bid Meeting if applicable shall be held as per the details mentioned in bid document. Bidders intending to attend the Pre-Bid Meeting should send their request to the contact details mentioned in **Schedule-A**.
 - 5.2. Buyer will upload the Pre-Bid clarifications to the queries raised by bidders if any in GeM Portal. The Pre-Bid clarifications uploaded by Buyer, shall form a part of bid document. It shall be deemed that all Bidders who submit their bid(s) have accepted Pre-Bid clarifications without any deviation.
6. The Bidders are requested to visit the Buyer premises to acquaint themselves with the all-relevant information, risks, contingencies and other circumstances which may influence or affect their bid(s). Interested Bidder can send request to the contact details mention in **Schedule-A** for visit to Buyer premises. Bidder shall be deemed to have full knowledge of the Buyer premises whether he inspects it or not.



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7. **Additional Eligibility Criteria**(to be read along with the Eligibility Criteria given in bid details of bid document):

7.1. The bidder shall have Registration in Appropriate Class of Contractors /License / Certification(s) as per the details mentioned in **Schedule-A**.

7.2. The bidder should be registered under Goods & Service Tax (GST)/ Permanent Account Number (PAN).

7.3. Bidder should be a registered firm in India. Joint Ventures and or Consortiums are not acceptable.

7.4. The bidder should not be under liquidation, court receivership or similar proceedings should not be bankrupt. Bidder to upload undertaking to this effect with bid.

7.5. Bidder shall furnish declaration that he has not been blacklisted/ debarred from tendering by any Govt. Department/ Public sector undertaking/ Govt. entity/ Govt. authority / Govt. agency. Bidder to upload undertaking to this effect with bid.

7.6. **Financial Capability:**

7.6.1. **Average annual financial turnover Criteria:**

7.6.1.1. This criterion is applicable only if mentioned in the bid document.

7.6.1.2. The minimum **average annual financial turnover** of the bidder during the period mentioned in **Schedule-A**, should be as mentioned in the bid document. Documentary evidence in the form of **Form-A** (format given in **Section-V**) shall be uploaded with the bid. **Form-A** should be duly audited by a registered Chartered Accountant; Unique Document Identification Number (**UDIN**) should be mentioned in **Form-A**.

7.6.2. **Profit and loss Criteria:**

7.6.2.1. This criteria is applicable only if mentioned in **Schedule-A**.

7.6.2.2. Bidder should not have incurred any loss in more than two (2) years during last five consecutive financial years as mentioned in **Schedule-A**. Bidder has to submit the details in **Form-A**.

7.6.3. **Bank Solvency Criteria:**

7.6.3.1. This criteria is applicable only if mentioned in **Schedule-A**.

7.6.3.2. Bidder should have a Banker's Certificate (Bank Solvency) from a Scheduled Public / Private Sector Bank (in **Form -B**) for the amount mentioned in **Schedule-A**.

7.7. **Years of Past Experience & Past Experience Criteria:**

7.7.1. These criteria are applicable only if mentioned in the bid document.



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- 7.7.2. Similar Services/Similar type of services that shall be considered applicable for the above criteria shall be as per the definition of “Similar Services” mentioned in **Schedule-A**.
- 7.7.3. Similar Services/Similar type of services provided by the bidders within India shall only be considered.
- 7.7.4. For the “Years of Past Experience Criteria”:
- 7.7.4.1. Both completed and on-going contracts (irrespective of the value) within the period mentioned in the bid document (under bid details) shall be considered. The bidder must have experience for number of years as mentioned in bid document (ending month of March prior to the bid opening) of providing similar type of services.
- 7.7.4.2. Completed and on-going Contracts where the client is Government/Government Autonomous bodies/Public Sector Units or any other private enterprise shall be considered.
- 7.7.5. For the “Past Experience Criteria” only completed contracts within the period mentioned in the bid document shall be considered. The no of contracts and the value of each contract required to be submitted by the bidder shall be as per the bid document. Value of Contracts shall mean gross value of the completed Similar Contracts including the cost of materials supplied by the Client, but excluding those supplied free of cost.
- 7.7.6. The bidder shall upload details of Contracts where Bidder has provided Similar services (as mentioned in **Schedule-A**) in the **Form-C** (format(s) given in **Section-V**). The contracts listed in **Form-C** shall only be considered for qualification under **Years of Past Experience & Past Experience Criteria**.
- 7.7.7. Along with **Form-C** the following documentary proof shall be uploaded by the bidder:
- 7.7.7.1. For contracts where the client is Government/Government Autonomous bodies/Public Sector Units, the bidder shall upload following documents-
- 7.7.7.1.1. Contract Orders/Work Orders/Purchase Orders/Agreements with bill of quantities and rates.
- 7.7.7.1.2. Completion Certificate or similar documentary evidence certifying completeness of Contract/Work Order Purchase Order/Agreement issued by client clearly indicating the name of Contract, WO/PO/Agreement no, commencement date, date of final completion, and actual final completion cost. The completion certificate issued by the officer not below the rank of Executive Engineer/Project Manager or equivalent shall be uploaded for individual Contract Order/Work Order/Purchase Order/Agreement (only for completed contracts).
- 7.7.7.1.3. Clubbing two or more Contract Orders/Work Orders/Purchase Orders/Agreements in one completion certificate shall not be considered



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for evaluation. Bidders shall submit completion certificate for each individual Contract Order/Work Order/Purchase Order/Agreement.

- 7.7.7.2 Certificate for bill wise payment received by the bidder, which shall be signed with seal by practicing Chartered accountant on letter head with Membership no & **UDIN**, and their respective TDS amount & TDS certificate number for the executed contracts.
- 7.7.7.3 The above desired information can be submitted as part of one or more document.
- 7.7.7.4 The Contracts listed by the bidder without uploading the documentary proof shall not be considered. The documentary proof of Contracts uploaded without listing the same in **Form-C** shall not be considered.
- 7.7.7.5 Composite Contract where only a part of a completed composite contract satisfies Past Experience Criteria, value of that part only shall be considered under Past Experience Criteria. The bidder shall also upload the following details and documents (only for completed contracts):
- 7.7.7.6 Statement of final bill /last bill showing quantity of all items executed under the contract and final bill /last bill value should be matching with the amount mentioned under final contract value in completion certificate or similar documentary evidence certifying completeness of contract issued by client.
- 7.7.7.7 Statement of all items and their quantities segregated from final bill / last bill which are fulfilling the Past Experience Criteria and their total amount for consideration under the Past Experience Criteria.

7.8 Geographical Presence:

- 7.8.1 This criteria is applicable only if mentioned in mentioned in **Schedule A**.
- 7.8.2 The registered office or a branch office of the Seller must be located in the location(s) mentioned in **Schedule-A**. Documentary evidence for the same has to be submitted by the Seller.
- 7.9 Any other additional eligibility criteria shall be mentioned by the bidder in **Schedule-A**.

8 Evaluation Criteria:

- 8.8 EMD submitted by the bidders shall be checked first. Similarly, for Bidders seeking exemption from submitting the EMD (as per the GTC), valid supporting document (for the relevant category as per GTC) shall be checked first. If found in order, the bidders will be evaluated for meeting the Eligibility Criteria.
- 8.9 In bids where, Quality & Cost Based Selection (QCBS) or Least Cost Method Based Evaluation (LCS) evaluation are mentioned, the bidders who satisfy Eligibility Criteria shall only be evaluated in QCBS or LCS. The method of evaluation shall be as per the bid document.



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- 8.10 During evaluation missing documents or any other documents, if any, can be asked by buyer for submission through GeM portal.
- 8.11 The Buyer reserves the right to verify the particulars furnished by the Bidder independently, reject any bid without assigning any reason and to restrict the list of qualified bidders (for evaluation in QCBS or LCS) to any number deemed suitable in case too many bids are received satisfying the Eligibility criteria.
- 8.12 Even though a bidder may satisfy the bid requirements, the bidder may be liable to disqualification, if the bidder has:
- i. Made misleading or false representation or deliberately suppressed the information or not submitted sufficient information in the forms, statements and enclosures required.
 - ii. Record of poor performance such as abandoning, not properly completing the contract, or financial failures /weaknesses etc.
- 8.13 Only those bidders who satisfy above eligibility criteria will be further evaluated on the basis of similar works carried out details submitted by the bidders in the following manner:
- i. Bidder shall have experience in fabrication of Stainless Steel or Monel piping which is welded using Gas Tungsten Arc Welding (GTAW) process.
 - ii Shall have experience in NDT works i.e DPT & Radiographic testing.
 - iii Bidder shall have capability or experience in deploying qualified welders (6G position) as per the requirements of ASME BPVC Section IX for either SS 304L or Monel 400 material of construction.
 - iv The supporting documents shall be submitted for the above.

9 **Financial Bids:**

- 9.1 Bids where excel file is uploaded by the buyer, the bidder shall refer the excel file for instruction regarding filling the excel file and uploading it either in technical or price bid, depending on the Buyers requirement.
- 9.2 Bids where “Financial Document Indicating Price Break Up” is required, the bidder have to submit the breakup as per the Buyers instructions. In case of mismatch between the prices mentioned in the Price breakup format and the lump sum quoted amount, then lump sum amount will prevail. Buyer shall ask the bidder to submit the revised Financial Document Indicating Price Break Up. In case of the no response from bidder, buyer shall initiate appropriate action as necessary.
- 9.3 In case of abnormally low bids, Buyer shall seek clarifications/justification from the bidder, including detailed price



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analysis of the bidders bid price. In case, the bidder fails to show the price reasonability, the buyer shall disqualify the bidder.

9.4 The financial bid documents shall be uploaded by the bidder in the financial part only. In case the financial bid documents are uploaded by the bidder along with technical bid/ first part(of the bid), the bid shall be rejected(This clause is not applicable in case of Single packet/ Single Part Bid).

9.5 Any additional instruction for the bidders regarding **Financial Bids** shall be mentioned in **Schedule-A**.

10 Instructions:

10.1 List of Documents to be scanned from original & uploaded by the bidder are mentioned in **Section-VI**. Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

10.2 Bids with any condition including conditional rebate shall be rejected. However, Bids with unconditional rebate will be accepted.

10.3 If any information furnished by the bidder is found to be incorrect at a later stage, they shall be liable to be debarred. Also, if such a violation comes to the notice of Buyer before start or during the execution of contract, buyer shall be free to forfeit the entire amount of EMD, Performance Security and terminate the contract.

10.4 The Buyer reserves the right to cancel/ accept or reject, any or all bids at any time or to allot part of contract to different agencies without incurring any liability to the Buyer and without assigning any reason thereof. Bidder shall be bound to perform the contract at the rates quoted.

11 By participating in the bid the Seller hereby undertakes/agrees to the conditions mentioned in Undertaking-A (Section-V).

*****End of Section-II*****

Additional Terms and Conditions

Section-III: Additional Conditions

1. Performance Security and Performance:
 - 1.1. The following Clauses shall be read along with the Clauses related to Performance Security and Performance mentioned in the GTC.
 - 1.2. Acceptable forms of Performance Security are **Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque and Bank Guarantee from any of the Scheduled Public / Private Sector Banks**. The Performance Security should be in favour of beneficiary. The beneficiary details are mentioned in **Schedule-B**.
 - 1.3. Performance Security must be submitted by Seller to the Buyer within 15 days of award of contract. The period of 15 days can be extended up to 30 days (based on the request from the Seller), with a late fee of 0.1% per day of Performance Security amount. The seller has to request for extending of the Performance Security submission period stating the reason for delay in submitting the Performance Security.
 - 1.4. If the Seller fails to submit the Performance Security within 15 days and also no request is received for extending of the Performance Security submission period, then such failure shall constitute a breach of contract and action as deemed fit may be initiated against the Seller.
 - 1.5. If the Seller fails or neglects to observe or perform any of his obligations under the contract, it shall be lawful for the Buyer to forfeit either in whole or in part, the Performance Security furnished by the Seller. This right shall be in addition to and without prejudice to the rights of the Buyer under the terms and conditions of contract.
2. Contract Period and contract obligation period: Contract Obligation Period is the "Contract Period" (Mentioned in the Bid Document) plus "Period of Maintenance/ Guarantee /Warranty" (Mentioned in the **Schedule-B**).
3. Force Majeure Conditions:
 - 3.1. Decision of the Buyer regarding the applicability of the Force Majeure Conditions shall be final and binding on the seller.
 - 3.2. Buyer can either accept or reject the Force Majeure notice sent by the Seller, the decision of Buyer shall be final and binding on the seller.



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- 3.3. Force Majeure notice sent by the Buyer shall be accepted by the Seller without any protest; the decision of Buyer shall be final and binding on the seller.
- 3.4. If the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any Force Majeure Conditions, for a period exceeding 90 days, only the Buyer has the option to terminate the contract. Seller can only request for termination of the contract. Decision of the Buyer regarding the termination shall be final and binding on the seller.
4. Liquidated Damages:
- 4.1. In cases, where performance or/and quality of services is/are found to be dissatisfactory, Buyer reserves the right to impose penalty as mentioned in the bid document.
- 4.2. In cases where penalty for certain deficiencies by the seller are not mentioned in the bid document, even then the Buyer reserves the right to impose a reasonable penalty.
5. Extension of Contract Period:
- 5.1. The time and uninterrupted delivery of services/execution of the Contract shall be deemed to be the essence of the Contract and the Contract must be completed not later than contract period specified in the Contract.
- 5.2. Extension of Contract period without levy of Liquidated Damages shall be extended by the Buyer if,
- 5.2.1. Execution of the Contract was delayed or stopped due to occurrence of Force Majeure Conditions.
- 5.2.2. Execution of the Contract was delayed or stopped due to the reasons attributable to the Buyer or due to the reasons beyond the control of the Buyer & Seller.
- 5.2.3. In the above cases the Seller shall immediately give notice thereof in writing to the Buyer within 10 days of such happening, but shall nevertheless make constantly his best endeavors to execute the Contract and shall do all that may be reasonably required by him to the satisfaction of the Buyer to proceed with the services. Buyer shall extend the Contract Period as in his opinion is reasonable having regard to the nature and period of delay and the type and portions of the Contract affected thereby. No compensation shall be payable to the



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Seller and the Seller shall execute the Contract at the originally agreed rates.

- 5.3. Extension of Contract period with levy of Liquidated Damages: If the Seller fails to complete the Contract within the Contract period or complete the Contract in the manner as specified in the contract, for the reasons other than the reasons specified above, the Buyer may, if satisfied that the Contract can be completed by the Seller within reasonable time thereafter, allow the Seller for further extension of time as the Buyer may decide. On such extension, the Buyer will be entitled without prejudice to any other right and remedy available on that behalf, to recover from the Seller as agreed damages and not by way of penalty a sum equivalent to @ 0.5% of the contract value of delayed quantity per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value of delayed quantity, without any controversy/dispute of any sort whatsoever. For the purpose of this clause, the contract value shall be taken as value as per contract agreement including any supplementary contract agreement(s) issued. This Clause does not limit the Buyer from imposing penalties under any other provisions and penalties will be applicable concurrently.
- 5.4. Only Buyer reserves the right to extend the Contract Period and the decision of the Buyer shall be final and binding on the Seller.
6. Hindrances: The Seller is required to maintain hindrance register for reporting hindrance if any, while executing the Contract. The Seller shall get record of hindrances in the hindrance register(s) approved/ endorsed by the Buyer. Such hindrance endorsed by the Buyer will only be taken into consideration for granting extensions.
7. Termination of Contract:
- 7.1. If the seller does not perform its obligations within the Delivery Period / Date mentioned in the Contract/ Contract Period, the same would constitute the breach of the Contract and the Buyer shall have the right to Cancel or Withdraw the Contract for the unsupplied portion; after the expiry of the original, extended or re-fixed delivery date or Contract period stipulated in the Contract. Such cancellation of contract on account of non-performance by the Seller would entitle the Buyer to forfeit the performance security besides other actions such as debarment against any bid issued by Buyer in future.



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7.2. The following conditions shall also be considered as breach of the Contract by the Seller:

7.2.1. If the Seller has, without reasonable cause, suspended the execution of the Contract or has failed to proceed with the execution of the Contract with due diligence so that in the opinion of Buyer (which shall be final and binding), the Seller will be unable to secure completion of the Contract within the Contract Period and continue to do so after a notice in writing of 7 days from the Buyer.

7.2.2. If the Seller assigns, transfers, sublets or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire Contract or any portion thereof without the prior written approval of the Buyer.

7.2.3. If the Seller fails to complete the Contract within the stipulated date or portions of the Contract with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing in that behalf by the Buyer.

7.2.4. If the Seller persistently neglects to carry out his obligations under the contract and/ or commits default in complying with any of the items and conditions of the contract and does not remedy it or take effective steps to remedy it within Seven (7) days after a notice in writing is given to him by the Buyer.

8. Foreclosure of contract or reduction in scope of contract:

8.1. During the Contract Period, the Buyer may at its discretion, decide to abandon or reduce the scope of the contract for any reason whatsoever and does not require the whole or part of the contract to be executed. The Buyer shall give notice of two weeks to that effect to the Seller and the Seller shall act accordingly in the matter. The Seller shall have no claim for any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the contract in full but which he did not derive in consequence of the foreclosure of the whole or part of the contract.

8.2. The Seller shall be paid at contract rates, full amount for part of contract executed as per the payment terms. In addition, a reasonable amount as certified by the Buyer will be paid to the Seller for the Goods (If

applicable), which could not be utilized in the contract to the full extent in view of the foreclosure.

8.3. The Seller shall, if required by the Buyer, furnish books of accounts and other relevant documents and evidence as may be necessary to enable the Buyer to certify the reasonable amount payable in case of foreclosure. The decision of the Buyer regarding the reasonable amount is final and binding on the seller.

8.4. Buyer shall have the option to take over Seller's materials or any part thereof either bought for execution of the contract or of which the Seller is legally bound to accept delivery from its Seller (for use in the contract). For materials taken over or to be taken over by the Buyer, cost of such materials as calculated by Buyer shall be paid. The cost shall, however, take into account Contract price, cost of transportation and deterioration or damage which may have been caused to materials whilst in the custody of the Seller.

8.5. If any material supplied by Buyer are rendered surplus, the same except normal wastage shall be returned by the Seller to Buyer at rates not exceeding those at which these were originally issued, less allowance for any deterioration or damage which may have been caused whilst the materials were in the custody of the Seller. In addition, cost of transporting of such materials from Seller's site to Buyer, if so, required by the Buyer, shall be paid.

9. Time Schedule/ Phased delivery program /Milestones/Withholding of payments in case of delay in achieving the milestones:

9.1. The Clause Shall be Applicable only if mentioned in **Schedule-B**.

9.2. Where the contract envisages phased delivery or completion of milestone(s), the delivery date for each phase or milestone shall be deemed to be the essence of contract.

9.3. Seller shall submit a detailed Time and Progress Chart (PERT/Bar Chart) within 7 days from the placement of order, for the approval of Buyer. The major Milestones and their time lines of the contract are mentioned in **Schedule-B**.

9.4. The Time and Progress Chart (PERT/Bar Chart) should be as per the Milestones mentioned in **Schedule-B**.

9.5. Rescheduling of Milestones

- 9.5.1. In case of delay in achieving the milestones due to Force Majeure Conditions or due to reasons attributable to the Buyer or due to reasons beyond the Control of the Buyer & Seller, then the milestones may be rescheduled by the Buyer.
- 9.5.2. The milestones shall be rescheduled only after (i) acceptance of the Force Majeure notice by the Buyer and (ii) Extension of delivery date by the Buyer.
- 9.6. In case, the Seller does not achieve a particular milestone or the re-scheduled milestone (s), the amount shown against that milestone (**Schedule-B**) shall be withheld, to be adjusted against the Liquidated Damages at the final grant of Extension of Time. Withholding of this amount on failure to achieve a milestone, shall be automatic without any notice to the Seller. However, if the Seller catches up with the progress on the subsequent milestone(s) the withheld amount shall be released.
- 9.7. In case the Seller fails to make up for the delay in subsequent milestone(s) amount mentioned against each subsequently milestone(s) missed shall also be withheld.
- 9.8. The amount shown against that milestone(s) shall be withheld from the payments made to the Seller.
- 9.9. No interest, whatsoever shall be payable on such withheld amount.
- 9.10. If the Seller does not achieve 50% of the milestone, then it shall be deemed as non-performance of the Seller's obligations and would constitute the breach of the Contract.
10. The Buyer shall have power to make alteration in, omissions from, additions to or substitution for the quantity, specifications, drawings, designs and instructions that may appear to him to be necessarily advisable either during placement of the Contract or during the progress of the Contract and the Seller shall be bound to carry out the Contract in accordance with any instructions given to him by the Buyer and such alterations, omissions, additions, or substitutions shall form part of the contract as if originally provided therein and any altered, additional or substituted portions of the Contract.
- 10.1. For the changes in the quantity:
- 10.1.1. The Buyer reserves the right to increase or decrease the quantity to be ordered, up to certain percentage (mentioned in **Schedule-B**) of bid quantity at the time of placement of contract. Sellers are bound to

accept the orders accordingly. The Percentage limits are mentioned in the **Schedule-B**.

10.1.2. The Buyer also reserves the right to increase or decrease the ordered quantity, by certain percentage (mentioned in **Schedule-B**) of the bid quantity during the currency of the contract at the contracted rates. Sellers are bound to accept the orders accordingly. The Percentage limits are mentioned in the **Schedule-B**.

10.2. For the increase in the quantity above the percentage mentioned in **Schedule-B**: In cases where the Contract requires increase in the quantity above the percentage limits mentioned in **Schedule-B**, for Completion of the Contract, the Buyer and Seller shall mutually agree upon the reasonable quantity and the rates for the same.

10.3. Cost of Executed Contract, up on which Quantity/ Amount Variation will be calculated for entire Schedule of Quantities (SOQ) deemed without alteration of the bid structure as mentioned in Schedule-B.

10.4. For the addition of new Item(s):

10.4.1. In cases where the Contract requires addition of new Item(s) for Completion of the Contract, the Buyer reserves the right to add new Item(s) (Including the Specifications/Drawings/Design/Instruction etc. for these items).

10.4.2. The rates for the new Item(s) shall be decided by the Buyer as per the Market Rates.

10.4.3. The Buyer shall provide reasonable time to the Seller for the execution of these new Items.

11. Payment Terms:

11.1. If there are any Specific Payment Terms, they shall be mentioned in the **Schedule-B** by the Buyer.

11.2. Buyer shall except as otherwise provided, ascertain and determine by measurement, the value of executed Contract in accordance with the contract terms and conditions.

11.3. Checking and payment by the Buyer shall not be considered as conclusive evidence as to the sufficiency of any, all or some portion(s) of the executed Contract, which it relates nor shall it relieve the seller from liabilities from any defects noticed till completion of the Contract Obligation Period.

12. Statutory Deductions: The Buyer has the right to make statutory deductions from the payments made to the Seller as applicable on the date of making such payment as per the provisions of relevant Act or Rules made there under. Appropriate certificate to that effect will be provided by the Buyer's paying authority.
13. Rejection: During the execution of the Contract, if certain portions of the executed Contract are rejected by the Buyer because of non-conformation to the Bid Document; then the Buyer shall intimate the Seller the regarding the rejection through a notice. Buyer shall give reasonable time (Buyer's decision regarding the reasonable time shall be final and binding on the Seller) for the Seller to rectify the portions of the executed Contract. In case the Seller doesn't rectify the rejected portions of the executed Contract within the reasonable time, then this shall be considered as the breach of the Contract and action deemed fit may be initiated against the Seller by the Buyer.
14. Recovery of sums due: Whenever any claim for liquidated damages / payment arises out of or under this contract against the Seller, the Buyer shall be entitled to recover the sum by appropriating, in part or whole, the performance security submitted by the Seller or any payment which at any time may become due to the Seller under this or any other contract with the Buyer. If this sum is not sufficient to cover the full amount recoverable, the Seller shall pay to the Buyer on demand the remaining balance due. Similarly, if the Buyer has or makes any claim, whether liquidated damages or not, against the Seller under any other contract with the Buyer the amount payable to the Seller under the contract including the performance security shall be withheld till such claims of the Buyer are finally adjudicated upon and paid by the seller.
15. Lien in respect of claims in other contracts: It is agreed that any sum of money due and payable to the Seller under any contract may be withheld or retained by way of lien by the Buyer or any other person or persons contracting through the Buyer against any claim of the Buyer or such other person or persons in respect of payment of a sum of money arising out of or under any other contract made by the Seller with the Buyer or with other such person or persons. It is further agreed term of the contract that the sum of money so withheld or retained under this Clause by the Buyer will be kept withheld or retained as such by the Buyer until the claim arising out of in the same contract or any other contract is either mutually settled or determined by the

arbitrator, and that the Seller shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this Clause and duly notified as such to the Seller.

16. Price Variation Clause (PVC):

16.1. The Price Variation Clause (PVC) is applicable only if mentioned as “Applicable” in **Schedule-B**.

16.2. In Contract(s) where the salaries / wages of the professional staff and laborers coming under Category-I (Refer **Clause-41**) are changed by the Buyer (by issuing Notice to the Seller), then the Seller has to make the payment of salaries / wages as per the instructions of the Buyer. Buyer shall compensate the seller based on the actuals. Seller has to submit the documentary proof for the same.

16.3. If prices of materials (not being materials supplied or services rendered at fixed prices by the Buyer in accordance with **Clauses 19 & 35** thereof) and/or salaries / wages of professional staff and laborers (under Category-II); required for execution of the contract increase/decreased, the amount of the contract shall accordingly be varied, based on the following provisions:

(i) The base date for working out such escalation/price variation shall be the last stipulated date of receipt of Bids (i.e., Bid End Date) including extension, if any.

(ii) The cost of executed contract on which the Price Variation will be payable shall be reckoned as below:

i.	Gross value of Executed Contract up to this quarter as per the Bills.	(A)
ii.	Gross value of Executed Contract up to the last quarter as per the Bills.	(B)
iii.	Cost of material supplied by the Buyer as per Clause 19 and recovered during the quarter.	(C)
iv.	Cost of services (Electricity /water etc.) rendered at fixed charges as per Clause 35 and recovered during the quarter.	(D)
v.	Extra items/deviated quantities of items paid based on prevailing market rates during this quarter.	(E)
vi.	Cost of Executed Contract, up on which Price Variation is applicable. $W = (A-B-C-D-E)$	

(iii) Components of materials, labour, Fuel etc. shall be pre-determined for every Contract by the Buyer and shall be mentioned in the Schedule-B.

(iv) The Price Variation amount shall be worked as per the formulae given below:

For Materials: $V_M = W \times (XM / 100) \times \{(MI - MI0) / MI0\}$

For P.O.L.: $V_F = W \times (Z / 100) \times \{(FI - FI0) / FI0\}$

For Labour: $V_L = W \times (Y / 100) \times \{(LI - LI0) / LI0\}$



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Where,

V_M : Variation in Materials cost i.e., increase or decrease to be paid or recovered.

V_F : Variation in cost of Fuel, Oil and Lubricant i.e., increase or decrease to be paid or recovered.

V_L : Variation in labour cost i.e., amount of increase or decrease to be paid or recovered.

W : Cost of Executed Contract, up on which Price Variation is applicable. This will be calculated either for entire Schedule of Quantities (SOQ)/ particular schedule(s) of SOQ / a group of items as mentioned in **Schedule-B**.

X_M : Component of 'Materials' (Individual Commodities / group Items) mentioned in **Schedule-B**.

MI : All India Whole Sale Price Index of 'Materials' i.e. Individual Commodities / group Items as mentioned in **Schedule-B**, (Note: Relevant component as indicated in **Schedule-B**) as worked out on the basis of All India whole sale Price Index for Individual Commodities/ group items for the period under consideration as published by the Economic Adviser to Government of India, Ministry of Industry and Commerce, and applying weightages to the Individual Commodities / group Items. The price index of nearest similar Individual Commodities / group Items as indicated in **Schedule-B** will be considered. (In respect of the extended contract period with levy of Liquidated Damages, the index prevailing at the time of stipulated original Contract period including the extended Contract period without levy of Liquidated Damages (as applicable) or the prevailing index of the period under consideration, whichever is less shall be considered)

MI_0 : All India Whole Sale Price Index of Individual Commodities / group Items as mentioned in **Schedule-B** (Note: Relevant component as indicated in **Schedule-B**) as worked out on the basis of All India whole sale Price Index for Individual Commodities/ group items valid on the last stipulated date of receipt of Bids (i.e., Bid End Date) including extension, if any, as published by the Economic Adviser to Government of India, Ministry of Industry and Commerce, and applying weightages to the Individual Commodities / group Items. The price index of nearest similar Individual Commodities / group Items as indicated in **Schedule-B** will be considered.

Z : Component of Fuel, Oil and Lubricant mentioned in **Schedule-B**.

FI : All India Whole Sale Price Index for Fuel, Oil and Lubricant (The price index of nearest similar material as mentioned in **Schedule-B** will be considered.) for the period under consideration as published by the Economic Adviser to Government of India, Ministry of Industry and Commerce, New Delhi. (In respect of the extended contract period with levy of Liquidated Damages, the index prevailing at the time of stipulated original Contract period including the extended Contract period without levy of Liquidated Damages (as



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applicable) or the prevailing index of the period under consideration, whichever is less shall be considered)

- FI₀: All India Whole Sale Price Index for Fuel, Oil and Lubricant (The price index of nearest similar material as indicated in **Schedule-B** will be considered.) as published by the Economic Adviser to Government of India, Ministry of Industry and Commerce, New Delhi valid on the last stipulated date of receipt of Bids (i.e., Bid End Date) including extension, if any.
- Y: Component of labour mentioned in **Schedule-B**.
- Ll: Minimum wage in rupees of an unskilled adult male mazdoor, fixed under any law, statutory rule or order as applicable on the last date of the quarter previous to the one under consideration.
- Ll₀: Minimum daily wage in rupees of an unskilled adult male mazdoor, fixed under any law, statutory rule or order as on the last stipulated date of receipt of Bids (i.e., Bid End Date) including extension, if any.
- (v) The Price Variation shall be worked out at quarterly intervals and shall be with respect to the value of the executed contract as per bills paid during the three calendar months of the said quarter. The first such payment shall be made at the end of three months after the month (excluding the month in which the bid was accepted) and thereafter at three months interval. At the time of completion of the contract, the last period for payment might become less than 3 months, depending on actual date of completion.
- (vi) The index (MI/FI etc.) relevant to any quarter / period for which such compensation is paid shall be the arithmetical average of the indices relevant to the three calendar months. If the period up to date of completion after the quarter covered by the last such instalment of payment, is less than three months, the index MI & FI shall be the average of the indices for the months falling within that period.
- (vii) The minimum wage of an unskilled Male Mazdoor mentioned above shall be the higher of the wage notified by Government of India, Ministry of Labour and that notified by the local administration, both relevant to the place where the contract is being executed and the period of reckoning.
- (viii) The escalation for labour also shall be paid at the same quarterly intervals when escalation due to increase in cost of materials and/or P.O.L. is paid under this clause. If such revision of minimum wages takes place during any such quarterly intervals, the escalation compensation shall be payable at revised rates only for portion of executed contract in subsequent quarters.
- (ix) Irrespective of variation in minimum wages of any category of labour, for the purpose of this clause, the variation in the rate for an unskilled adult Male Mazdoor alone shall form the basis for working out the escalation compensation payable on the labour component.
- (x) The Price Variation as worked out above, i.e., either increase or decrease shall be applicable for the stipulated original Contract period including the extended



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Contract period where such extension has been granted without levy of Liquidated Damages. However, where extended Contract period granted with levy of Liquidated Damages price adjustment shall be limited to prices / wages prevailing at the time of stipulated original Contract period including the extended Contract period without levy of Liquidated Damages (as applicable) or as prevailing for the period under consideration, whichever is less.

17. Completion certificate:

- 17.1. Within ten days of completion of the Seller's obligations for Contract (except for the Seller's obligations under the Maintenance/ Guarantee /Warranty Period), the Seller shall give notice of such completion to the Buyer and within 10 days of receipt of such notice, the Buyer shall inspect and furnish the Seller with a final certificate of completion (except for the Seller's Obligations under the Maintenance/ Guarantee /Warranty period Period), otherwise a notice indicating defects/shortcomings to be rectified by the Seller shall be issued by the Buyer. Certificate of Completion will be issued by the Buyer after rectification of the defects/shortcomings.
- 17.2. The Seller shall remove all their materials (including all the waste generated) from the premises of the Buyer and restore it to the original condition, to the satisfaction of the Buyer. This shall be considered as the Seller's obligations during the Contract Period.

18. Suspension of Services

- 18.1. The Seller shall on the order of the Buyer, suspend the execution of the Contract or any part thereof for such time or times and in such a manner as the Buyer may consider necessary, and shall during such suspension, properly protect and secure the executed portions of the Contract, so far as is necessary in the opinion of the Buyer. If such suspension is:
- 18.1.1. Provided for in the contract,
- 18.1.2. Necessary for the proper execution of the Contract or by the reason of extraneous conditions or by some default on the part of the Seller, and or
- 18.1.3. Necessary for the safety of the executed portions of the Contract or any part thereof
- 18.2. The Seller shall not be entitled to extra costs, if any, incurred by him during the period of suspension of the Contract, but in the event of any suspension ordered by the Buyer for reasons other than aforementioned and when each such period of suspension exceeds 30 days, the Buyer shall

extend the Contract period for completion of the Contract as the Buyer may consider proper, having regard to the period or periods of such suspensions and to such compensations as the Buyer may consider reasonable in respect of salaries or wages paid by the Seller to his employees/ workers during the periods of such suspension.

18.3. Suspension lasting more than 3 months for reasons other than aforementioned: If the execution of the Contract or any part thereof is suspended on the order of the Buyer for more than three months at a time, the Seller may serve a written notice on to Buyer requiring permission within 15 days from the receipt thereof to proceed with the execution of the Contract or that part thereof in regard to which progress is suspended and if such permission is not granted within that time the Seller by further written notice so served may, but is not bound to, elect to treat the suspension where it affects part only of the service as an omission of such part or where it affects the whole of the services, as an abandonment of the contract by the Buyer.

19. Materials supplied by Buyer:

19.1. Wherever the contract envisages supply of materials by the Buyer to the Seller for the performance of the contract, the details of the materials will be mentioned by the Buyer in the **Schedule-B**. The details shall include, quantum, place of issue, rate(s) to be charged in respect thereof and the location where the materials are to be stored/used by the Seller i.e., either in the Buyers Premises or at the Sellers Premises (Sellers Office/Factory etc.). The Seller shall be bound to procure them only from the Buyer.

19.2. As soon as the Contract is awarded, the Seller shall give his estimates of materials required on the basis of drawings/Specification etc. The Seller shall submit his requirement to the Buyer and the materials shall be issued to him keeping in view the progress of Contract as assessed by the Buyer, in accordance with the agreed phased programme of Contract indicating monthly requirements of various materials. The Seller shall place his indent in writing for issue of such materials at least 7 days in advance of his requirement.

19.3. The Seller shall not utilize the materials for any job other than the one contracted out in this case and also not indulge in any act, commission or omission or negligence which may cause/result in any loss/damage to the

Buyer and in which case, the Seller shall be liable to pay full compensation to the Buyer to the extent of damage/loss as assessed by the Buyer. The decision of the Buyer will be final and binding on the Seller. The Seller shall be responsible for the safety of the materials after these are received by him and all through the period during which the materials remain in his possession/control/custody. The materials on receipt by the seller shall be inspected by Seller for ensuring safe and correct receipt of materials. The Seller shall report the discrepancies, if any, to the Buyer immediately but not later than five working days from the date of receipt of materials. The Seller shall take all necessary precautions against any loss, deterioration, damage or destruction of the materials from whatever cause arising whilst the said materials remain in his possession/custody or control.

- 19.4. The value of the materials so supplied, at the rates specified in the aforesaid schedule shall be set off or deducted, as and when materials are consumed during the execution of the Contract (including incidental/normal wastage), for which payment is being made to the Seller, from any sum then due or which may therefore become due to the Seller under the contract or otherwise or from the Performance Security. At the time of submission of bills, the Seller shall certify that balance of materials supplied is available at Buyers premises or Sellers premises, in original good condition.
- 19.5. The Seller shall submit along with every bill material-wise reconciliation statement supported by complete calculations reconciling total issue, total consumption and certified balance and resulting variations and reasons thereof. Buyer shall (whose decision shall be final and binding on the Seller) be within his rights to recover the cost of the materials at any stage of the Contract if reconciliation is not found to be satisfactory.
- 19.6. The Seller shall bear the cost of getting the materials issued, loading, transporting to Buyers Premises or Sellers premises, unloading, storing as required. Notwithstanding anything to the contrary contained in any other clause of the contract all materials so supplied to the Seller shall remain absolute property of Buyer and the Seller shall be the trustee of the materials, and the said materials shall not be removed/disposed from the Buyers premises or Sellers premises on any account and shall be at all times open to inspection by the Buyer or his authorised agent. The



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decision of the Buyer, as to whether the Seller has caused any loss, destruction, damage or deterioration of materials while in his possession, custody or control from whatever cause arising and also on the quantum of damage suffered by the Buyer, shall be final and binding upon the Seller.

19.7. Any such materials remaining unused shall be returned to the Buyer, in as good condition in which they were originally supplied at a place of issue or any other place specified by him as he shall require. But in case it is decided not to take back the materials the Seller shall have no claim for compensation on any account of such materials so supplied to him as aforesaid and not used by him or for any wastage in or damage to in such materials.

19.8. On being required to return the materials, the Seller shall hand over the materials on being paid or credited such price as the Buyer shall determine, having due regard to the condition of the materials. The price allowed for credit to the Seller, however, shall be at the prevailing market rate not exceeding the amount charged to him, excluding the storage charge, if any. The decision of the Buyer shall be final and conclusive. In the event of breach of the aforesaid condition, the Seller shall in addition to throwing himself open to account for contravention of the terms of the licences or permit and/or for criminal breach of trust, be liable to Buyer for all advantages or profits resulting or which in the usual course would have resulted to him by reason of such breach. Provided that the Seller shall in no case be entitled to any compensation or damages on account of any delay in supply or non-supply thereof all or any such material.

19.9. The Seller shall see that only the required quantities of materials are got issued. Any such material remaining unused and in perfectly good/original condition at the time of completion or Termination of the contract shall be returned to the Buyer at the stores from which it was issued or at a place directed by him by a notice. The Seller shall not be entitled for loading, transporting, unloading and stacking of such unused material except for the extra lead, if any involved, beyond the original place of issue.

19.10. The following Clauses are applicable for the materials when they are taken to the Sellers Premises for execution of the Contract:

19.10.1. Wherever the contract envisages supply of materials (FIM) by the Buyer (as mentioned in **Schedule-B**) to the Seller and the seller is

allowed to take the Supplied materials to the Sellers Premises for the performance of the contract, such materials shall be safeguarded by a Bank Guarantee (as per format in Buyers format) or insurance policy to be provided by the Seller at his own cost for the full value of materials and the insurance policy or Bank Guarantee shall cover, the following risks specifically. The insurance policy or Bank Guarantee shall be valid for the period mention in **Schedule-B** beyond the Contract Period. The details of the materials and full value of materials are mention in **Schedule-B**.

- 19.10.2. Risks to be covered: Any loss or damage to the materials due to fire, theft, riot, burglary, strike, civil commotion, terrorist act, natural calamities, etc. and any loss or damage arising out of any other causes such as other objects falling on materials while in his possession including transit period.
- 19.10.3. Notwithstanding the insurance cover taken out by the Seller as above, the Seller shall indemnify the Buyer and keep the Buyer indemnified to the extent of the value of materials to be issued till such time the entire contract is executed and proper account for the materials is rendered and the left over/surplus and scrap items are returned to the Buyer. For this purpose, an indemnity bond (as per Buyers format) shall be executed by the Seller.
- 19.10.4. FIM will be issued to the Seller only after receipt of the insurance policy/Bank Guarantee from the Seller. The Seller shall arrange collection of the FIM from the Buyer 's premises and safe transportation of the same to his premises at his risk and cost.
20. Materials, Machinery, tools & plants supplied by Seller:
- 20.1. The Seller shall provide at his own cost all materials (except those materials, if any, supplied by the Buyer), machinery, tools & plants required for execution of the Contract.
- 20.2. Some of the important machinery, tools & plants required for execution of the Contract are mentioned in the **Schedule-B**. Seller shall deploy the mentioned machinery, tools & plants during the execution of the Contract. In case the Seller doesn't deploy the mentioned machinery, tools & plants, it shall be considered as the breach of the Contract by the Seller.
- 20.3. The list of machinery, tools & plants mentioned in the **Schedule-B** are only some of the requirements for execution of the Contract, Seller may



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- deploy, more than the mentioned machinery, tools & plants, as applicable for execution of the Contract.
- 20.4. Bidders shall quote/offer/provide only those materials in the bid which are not obsolete in the market and has at least 2 years residual market life i.e., they offered product shall not be declared end-of-life by the OEM before this period.
- 20.5. Materials to be supplied by the seller at the rates mentioned/determined by the Buyer: The materials that are to be supplied by Seller at the rates mentioned by the Buyer are mentioned in the **Schedule-B**. Seller shall supply the mentioned materials at the rates indicated. The indicated rates shall be valid throughout the contract obligation period.
- 20.6. Materials supplied by the seller at their quoted rates, the material: For the materials listed in **Schedule-B**, the seller has to quote the rates in the price break-up or financial break up format (refer to instructions for filling price break-up or financial break up format). Seller shall supply the mentioned materials at their quoted rates. The indicated rates shall be valid throughout the contract obligation period. Buyer has the option either to procure the materials from the seller (at their quoted rates) or supply to the seller. Seller shall execute the contract with the materials supplied by the Buyer.
21. Restricted information categories under Section 18 of Atomic Energy Act, 1962 and Official Secrets under Section 5 of the Official Secrets Act, 1923:
- 21.1. Any contravention of the above-mentioned provisions by the Seller or its sub-contractor (in case sub-contracting is allowed); consultant, adviser or its employees will invite penal consequences under the aforesaid legislations as amended from time to time.
22. Prohibition against use of the name of any institution of Department of Atomic Energy without permission for publicity purposes:
- 22.1. The Seller or its sub-contractor (in case sub-contracting is allowed), consultant, adviser or its employees or any one claiming on behalf of them shall not use the name of any Institution of Department of Atomic Energy for any publicity purpose through any public media like Press, Radio, T.V. or Internet without the prior written approval of the Buyer.
23. Confidentiality
- 23.1. The drawings, specifications, prototypes, samples or any other correspondence/ details/information provided by the Buyer relating to the



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Bid or the contract shall be kept confidential by the Seller as the case may be, and should not be disclosed or passed on to any other person/firm without prior written consent of the Buyer. This clause shall also apply to anyone claiming through Seller, i.e., the sub-contractors, consultants, advisers of the Seller and its employees, etc.

24. End use certificate:

24.1. If the Buyer is willing to provide the End use certificate, then the same shall be mentioned in **Schedule-B**.

24.2. Whenever an End Use Certificate is desired by the Seller, the same shall be clearly mentioned by the seller in the bid submission and the Buyer shall provide an End Use Certificate (as per the Buyers format). The Buyer will not provide any other document/declaration in this regard.

25. Compliance with the security:

25.1. The Seller shall strictly comply with the security/safety rules and regulations of the Buyer in force and shall complete the required formalities including verification from police and any other authority and obtain necessary prior permission for entry into the Buyer's premises.

25.2. In case of receipt of any adverse charter and antecedent remarks/ notification against the bidder or bidder's personnel, consequent to the security vetting, Buyer reserves absolute right to terminate the contract forthwith without assigning reason/ show cause notice. Under the circumstance the Seller will have no right to claim good any losses/liability that may be incurred as consequence to the above action initiated by Buyer.

25.3. Buyer also reserves the right to forfeit in part/full EMD/ performance security for failure on the part of the Seller to abide/adhere to the Security instruction issued by Buyer from time to time.

26. Safety requirements: The Seller shall at his own expense arrange for the safety provisions as per approved Job Hazard Analysis/ Instructions (from Buyer). In case the Seller fails to make arrangements and provide necessary facilities as aforesaid, he shall be liable to pay a penalty of Rs. 20,000/- for each default and in addition the buyer shall be at liberty to make arrangement and provide facilities as aforesaid and recover the costs incurred in that behalf from the Seller. The list of Safety PPE's to be provided by the seller for his Professional staff (Engineers, Supervisors etc.) and labourers are mentioned in **Schedule-B**.



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27. Seller will be required to obtain Police Verification Certificate (PVC)/ Medical certificate at his own cost for all his workmen. i.e., for Professional staff (Engineers, Supervisors etc.) and labourers to work at the Buyers premises. The PVC/ Medical certificate shall be valid till completion of Contract.
28. Details of bankers: The Seller shall submit the account details, IFSC code, the name and address of his bankers for refund of EMD and payment(s) (Format given in **Section-V**) as per as applicable.
29. Sub-contracting:
- 29.1. The Seller shall not assign/sublet or delegate the contract or any part thereof without the prior written consent of the Buyer.
- 29.2. The Portions of the contract that are allowed for Sub-contracting are mentioned in **Schedule-B**.
- 29.3. The Seller, with the Buyer's consent should purchase such parts, accessories, raw materials etc. from any of the leading and reputed manufacturers in case he does not normally manufacture such items provided these items comply with the specifications.
- 29.4. The Seller shall be solely liable and responsible for satisfactory execution/ performance/ of the contract irrespective of the fact whether a part or a portion of the contract has been assigned or sublet by him to a sub-contractor even when such sub-contracting has been done with the prior written consent of the Buyer.
30. Quality surveillance/ inspection of the Office/Shop/factory/ premises of executed Contract (s): The Buyer or his technical authorities may at his / their discretion depute his inspector or any quality surveillance agency to the Office/Shop/factory/workshop/ premises of executed Contract (s) to assess and establish the eligibility etc., of the Seller. Similarly, the Buyer may also depute his inspector/quality surveillance agency for inspection of the Goods/ services during various stages of manufacture/execution. In such an event, the Seller shall allow reasonable facility and free access to his factory/work/records to the inspector for the purpose of inspection or for ascertaining the progress of contract.
31. Samples
- 31.1. In Bids, where the Seller is required to inspect (if mentioned in the Bid Document) the sample(s) of the Goods available with the Buyer, the Buyer will provide the sample(s) on submission of a deposit (other than Bid

Security/ EMD) as indicated in **Schedule-B**, as a standard sample(s) for bidding, on request by the Seller. The Seller may send their representative at an address mentioned in **Schedule-B** for collection of the sample(s). The Buyer will not be responsible for any delay in receipt/collection of samples(s) by the Seller. It will be the responsibility of the Seller to return the sample(s) without any damage/deterioration as indicated in the Bid document. In the event of non-return of the sample(s) in the desired condition within fifteen days from the date of intimation, the Buyer reserves the right to forfeit the deposit of the Seller.

31.2. During the execution of the contract, for certain Goods mentioned in the **Schedule-B**, the Seller has to supply advances sample(s)(as per **Schedule-B**) before initiating the bulk supply. Bulk supply to be done as per the instruction of the Buyer.

32. Drawings and Specifications:

32.1. The drawings and specifications in the Bid Document are intended to be complementary and to provide for and comprise everything necessary for the completion of the contract. Any material shown in the drawing even if not particularly described in specifications or vice versa is to be supplied/executed by the Seller, if it were both shown and specified. In case any discrepancy is noted in the drawings and/or specifications and any interpretation of the same be required, the matter shall be referred to the Buyer for clarification, which shall be binding upon the Seller. Otherwise, the Seller shall assume responsibility for the interpretation of the drawings and specifications including his sub-contractor(s). In case any difference or dispute arises with regard to the true intent and meaning of drawings or specification or in case any portion of the same is obscure or capable of more than one interpretation, the same shall be referred to the Buyer. The decision of the Buyer shall be final and binding on the Seller. All lettering on the drawings is to be considered as part of the specification and contract. In all cases figured dimensions are to be followed rather than those indicated by scale. Large scale drawings will take precedence over smaller scale drawings.

32.2. The Seller's drawings shall, when approved by the Buyer, be deemed to be included in the list of drawings which form part of the contract. The Seller shall not proceed with execution of the contract or portion(s) of the contract; until all drawings associated therewith have been duly approved



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by the Buyer in writing or as specified in the Bid Document. Without such approval, the Seller shall be responsible for and shall pay for any alterations of the already executed portion of the contract. The Seller shall indemnify the Buyer for any consequential expenditure incurred by him due to any discrepancies, errors, omissions etc. whatsoever in the drawings or other specifications supplied by him; whether such drawings etc. whatsoever have been approved by the Buyer or not, provided that such discrepancies, errors or omissions etc. is not due to inaccurate information or specifications furnished to the Seller on behalf of the Buyer.

32.3. Submission of drawings along with the Bid: The Seller shall upload all drawings, wherever called for in the Bid document for understanding and evaluation of the bid. Seller's drawing will form part of the contract only after these are approved by the Buyer. The drawings that are to be submitted by the Seller along with the Bid are mentioned in the SLA/ Specifications.

32.4. The Seller shall execute the contract in accordance with the specifications unless any deviation has been expressly specified in the contract and any amendments agreed thereto in writing.

32.5. The Seller's bid to execute the contract in accordance with the specifications shall be deemed to be an admission on his part that he has fully acquainted himself with the details thereof and no claim shall lie against the Buyer on the ground that the Seller did not examine or acquaint himself fully with the specifications of the contract.

33. Inspection:

33.1. The Seller shall be responsible for and perform all testing required in accordance with the contract and specifications included therewith. The Buyer may at his option depute inspector(s) for inspection of Seller's Goods/works/services. The Seller shall facilitate such inspection. The Seller shall give notice of readiness for inspection to the inspector so that the inspector can be present at the requisite time.

33.2. The Seller shall allow reasonable facility and free access to his work/factory/premises and records to the inspector for the purpose of inspection or for ascertaining the progress of contract. The Seller shall provide the drawings, tooling, gauges, instruments etc. and extend all the



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help required for carrying out the inspection. The Seller shall produce an inspection plan to the Seller's satisfaction notifying check points on the plan. The final inspection shall be conducted as per the approved quality assurance plan.

33.3. The Seller shall not supply or deliver the Goods unless and until a shipping release or an authorization for dispatch is obtained in the format provided by the Buyer, if Pre-Dispatch Inspection is mentioned in technical specification. Failure to comply with this instruction as applicable will not only make the Seller ineligible for payment for the supply, but also hold the Seller liable for payment of compensation to the Buyer due to delay in clearance of the Goods from the carriers. If the Seller dispatches Goods without obtaining shipping release or authority to dispatch, he will not be entitled to get any payment for such supply, in addition the Seller will pay damages for delayed clearance of the Goods from the carrier.

34. Advance intimation: Wherever applicable, Seller shall send advance intimation to the Buyer preferably by e-mail regarding intended delivery of Goods/ Services at least Seven days prior to the date of delivery.

35. Electricity (Power supply), Water, Land (for Labour Camp, Site office & Material storage):

35.1. It is the responsibility of the Seller to make arrangements for Electricity (Power supply), Water, Land (for Labour Camp, Site office & Material storage) required for the execution of the Contract.

35.2. Buyer may supply/ provide Electricity (Power supply), Water and Land for the Contract Period or part of the Contract Period.

35.3. However, the Buyer does not guarantee to supply/ provide Electricity (Power supply), Water and Land for the Contract Period or part of the Contract Period.

35.4. If Electricity (Power supply), Water and Land are provided by the Buyer, the quantum, place of issue, rate(s) to be charged and other details are mentioned in **Schedule-B**.

35.5. Electricity: Electricity for the activities to be executed at Buyers premises will be provided by the buyer seller with following conditions mentioned below:

35.5.1. Electricity will be provided purely based on the availability at working area or nearest panel/ Switch board only. Seller shall make his own arrangements if the supply is not available.

- 35.5.2. 11kV/415 V feeder based on the availability will be shown by the Buyer. The Seller shall strictly arrange his own FRLS- UG Cable, Metering, Protection equipment and other equipment as per specification/instructions of the Buyer.
- 35.5.3. All safety procedures, as instructed by Buyer shall be strictly followed by the Seller, without any deviation.
- 35.5.4. Safety equipment, Panels, Distribution boards, MCCB's, RCBO's, plug tops, Sockets etc. are to be used as per the instructions by the Buyer without any deviation.
- 35.5.5. No loose wires, connections shall be permitted; utmost priority shall be given for safety.
- 35.5.6. In case of violations, supply will be disconnected. Seller shall be bound by this and no claims shall be entertained in this regard, whatsoever may be the case.
- 35.5.7. Proper earthing connections and earth pits shall be made as per the directions of the Buyer.
- 35.5.8. Any other instructions given by the Buyer shall be followed without any additional claims.
- 35.5.9. The Seller shall make arrangement for dedicated Electrical supervisor to be available at site 6 days a week for connections above 11kV line at his own cost, in due coordination with Buyer.
- 35.5.10. Sufficient illumination shall be provided in equipment/meter/panel area.
- 35.5.11. The panel area shall be fenced as per the instructions by Buyer.
- 35.5.12. Procedure for Obtaining Electricity connection
- 35.5.12.1. The Seller shall submit a request letter to the Buyer requesting for the Electricity supply.
- 35.5.12.2. On acceptance and approval of Buyer's competent authority, SLD shall be prepared and submitted by the Seller for approval of the Buyer.
- 35.5.12.3. Seller should procure Equipment as per the Buyers specifications/ instructions. Installation will be done by Experienced Electrical Team deployed by the Seller.
- 35.5.12.4. UG Cables shall be laid at a depth not less than 800 mm and Cable route markers as approved by the Buyer shall be placed on the ground.
- 35.5.12.5. "DANGER" boards shall be placed as per the instructions of Buyer.



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- 35.5.13. In case of damage to the Buyer's connecting feeder/panel/cables/equipment etc. the Seller shall replace the damaged feeder/panel/cables/equipment etc. with either same or higher rated feeder/panel/cables/equipment etc. (quality duly approved by the Buyer). If the Seller fails to replace the same in the given period (as instructed by the Buyer), damages/ compensation of 1.5 times the actual cost will be recovered from payments/ performance security of the seller. The decision of the Buyer in this respect shall be final and binding on the seller.
- 35.6. Water, if possible, will be made available by the Buyer. The Seller will be allowed to draw water at one place in the main line; location of which will be decided by the Buyer. The Seller should make his own arrangements for drawing water from the main line. The Seller should bear the cost of making all connections, boosting water pressure, laying all the pipe lines, maintaining all installations and dismantling the same upon completion of Contract.
- 35.7. Land for setting up Labour Colony, Site Office and Material storage may be made available by the Buyer. The Seller shall visit the Buyer Premises/site before submission of bids and inspect the locations of Labour Colony, Site Office and Material storage. The Labour Colony and Material storage sheds should be removed by the contractor at his own expenses to the satisfaction of the purchaser before completion of the Contract.
- 35.8. The Buyer does not guarantee uninterrupted supply of water/electricity, provide land and it will be incumbent on the Seller to make alternative arrangements at his own cost in the event non availability (of water, electricity and land) so that the progress of contract is not affected. No claim(s) of damages or refund will be entertained on account of such non availability of water, electricity and Land.
36. Maintenance/ Guarantee /Warranty period:
- 36.1. In case there is change in the Guarantee /Warranty period from the period mentioned in the GTC, the same shall be mentioned in the **Schedule-B**.
- 36.2. If it becomes necessary for the Seller to replace or renew any defective portions of the executed Contract (Goods/Services) for purpose of rectification under this Clause, the provisions of this Clause shall apply to the portions of the executed Contract so replaced or renewed until expiration of Twelve months from the date of such replacement or renewal

- or until the end of Maintenance/ Guarantee /Warranty period whichever is later.
- 36.3. Buyer shall issue notice for the defects/shortcomings that are observed by the Buyer in the executed contract, during the Maintenance / Guarantee /Warranty period. Buyer shall give reasonable time to the Seller for rectification of the defects/shortcomings. The reasonable time required shall be decided by the Buyer and shall be binding on the Seller.
- 36.4. If the defects/shortcomings are not rectified by the Seller within a reasonable time, it shall be considered as the non – performance/ breach of the contract by the Seller.
- 36.5. All inspections adjustments, replacements or renewals carried out by the Seller during the Maintenance/ Guarantee /Warranty period shall be subject to the same conditions as in the contract.
- 37.If the Seller or his Professional Staff/labourers break, deface, injure or destroy any Buyer’s property the Seller shall upon receipt of a notice from the Buyer, shall restore the Buyer’s property to the original condition within a reasonable time. The reasonable time required shall be decided by the Buyer and shall be final and binding on the Seller. If the Seller doesn’t restore the Buyers property within a reasonable time specified by the Buyer, it shall be considered as the non – performance/ breach of the contract by the Seller, in such case the Buyer may Termination the contract or part thereof whose decision will be final and binding on the Seller.
- 38.Training: The Seller shall, if required by the Buyer`, should provide facilities for the practical training of Buyer’s personnel and for their active association on the manufacturing/service process. Expenses incurred for the training shall be borne by the Seller.
- 39.Seller shall be responsible for proper coordination with other agencies operating at the Buyers Premises/site so that the contract may be carried out concurrently, without any hindrance to others. Buyer shall resolve disputes, if any, in this regard, and the decision shall be final and binding on the Seller.
- 40.Documentation (If applicable):
- 40.1. Seller shall submit the following documents (after placement of Contract):
- 40.1.1. Job Hazard Analysis for activities/works/services to be carried out at the Buyers premises. This shall be submitted before commencement



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of activities/works/Services. This document shall also contain the safety measures to be followed during the execution of the Contract.

40.1.2. Quality Assurance Plan. To be submitted within 7 Days of Placement of order

40.1.3. Site Management Plan (in case land is provided by the Buyer in their Premises) showing location of site office, material storage area, etc. This has to be submitted before commencement of work at site.

40.1.4. Completion Documents: The following documents/ drawings should be submitted by the Seller in Triplicate & one soft copy in CD or in the format as per the instructions of the Buyer; as part of completion documents:

40.1.4.1. Test certificate for materials supplied by the Seller.

40.1.4.2. Certified records of field tests on materials / equipment, as applicable.

40.1.4.3. Material appropriation statement as required.

40.1.4.4. Inspection Certificates/ Reports.

40.1.4.5. Catalogues, Operating & maintenance manual.

40.1.4.6. Guarantee certificates.

40.1.4.7. Other documents as mentioned in Technical Specification.

40.1.4.8. No Claim certificate in the Proforma prescribed by owner.

40.1.4.9. Return of all drawings and documents issued to the Seller.

40.1.4.10. "AS BUILT" Drawings: Upon completion of Contract, the Seller shall complete all drawings to "As built" status (including all Sub contractor/ vendor / Sub - vendor's drawings for bought out items, with details of embedded and covered works, incorporating all additions and alterations) and shall submit for the approval of Buyer. This shall be duly certified by the Buyer.

40.2. Any other documentation required by the Buyer shall be mentioned in **Schedule-B**.

41. Employment of Professional staff (Engineers, Supervisors etc.) and labourers:

41.1. The Professional staff and labourers employed by the Seller for the execution of the Contract shall be categorized as following:

41.1.1. Category-I: Professional staff and labourers employed by the Seller for whom the payment of Salaries / wages shall be as per the Salaries / wages mentioned by the Buyer in the bid document. Salaries / wages of the staff in Category-I shall be varied by the seller based on



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- the order issued by the Buyer. The details and the number of Professional staff and labourers to be employed by the Seller are mentioned in the bid document as no of resources/ no of man-days etc.
- 41.1.2. Category-II: Professional staff and labourers employed by the Seller for execution of the Contract without any reference to the Salaries / wages mentioned by the Buyer. Salaries / wages of the staff in Category-II shall be based on the minimum wages circular issued by the central/ state government.
- 41.2. Seller shall submit name(s), qualifications, experience, age, address(s) and other particulars along with certificates, of the principal representative to be in charge of the work and other professional staff and labourers who will be involved in the execution of the work.
- 41.3. Minimum requirements (no, qualifications and experience) of such professional staff and labourers under Category-I, shall be as per the Specifications/SLA/Item description.
- 41.4. Minimum requirements (no, qualifications and experience) of such professional staff and labourers under Category-II, shall not be lower than as mentioned in **Schedule-B**. In case of sellers default in deploying the required professional staff and labourers, penalty at the rates as per the mentioned in **Schedule-B** shall be levied by the Buyer.
- 41.5. The Professional staff and labourers supplied by the Seller should not have any Police records/criminal cases against them. The Seller should make adequate enquiries about the character and antecedents of the Professional staff and labourers whom they are recommending/employing. The character and antecedents of Professional staff and labourers shall be verified by the Seller before their deployment through local police, collecting proofs of residence, driving license, bank account details, previous work experience and recent photograph and a certification to this effect submitted to Buyer.
- 41.6. Instructions given to the principal representative or other professional staff shall be deemed to have the same force as if these have been given to the Seller.
- 41.7. The professional staff and labourers deployed for this contract shall not have any duties except those related to this Contract. Substitutes, duly approved by Buyer shall be provided in the event of absence of any of the Professional staff and labourers.



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- 41.8. The Buyer shall be at liberty to object and require the Seller to remove from the working for this contract any person(s) who in his opinion misconducts himself, or is incompetent or negligent in the performance of his duties or whose employment is otherwise considered by the Buyer to be undesirable. Such person shall not be employed again for this contract without the written permission of the Buyer and the person(s) so removed shall be replaced as soon as possible by competent substitutes.
- 41.9. The Seller will not allow or permit the employees to participate in any trade union activities or agitation in the premises of Buyer.
- 41.10. It is the responsibilities of the Seller to bring to the notice of his professional staff and labourers that they have no right whatsoever to claim employment in Buyer by virtue of their employment under this contract.
- 41.11. Medical facilities at Buyer premises will not be extended for operating staff of service provider, only basic first aid will be provided.
42. Labour laws to be complied by the Seller:
- 42.1. The Seller shall abide by the provision of the following acts:
- 42.1.1. Child Labour (Prohibition & Regulation) Act-1998.
 - 42.1.2. The Employees Provident Funds and Miscellaneous Provision's Act, 1952.
 - 42.1.3. Minimum Wages Act, 1946.
 - 42.1.4. Contract Labour (Regular and Abolition) Act, 1970.
 - 42.1.5. Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979.
 - 42.1.6. Maternity Benefit Act, 1960.
 - 42.1.7. Industrial Disputes Act, 1961.
 - 42.1.8. Payment of Bonus Act, 1965.
 - 42.1.9. Building and Other Construction Workers (Regulation of Employment and Condition of Service) Act, 1966.
 - 42.1.10. Labour Laws (Exemption from Furnishing Returns and Maintaining Registers by Certain Establishments) Act, 1988.
 - 42.1.11. Equal Remuneration Act, 1976.
 - 42.1.12. Payment of Gratuity Act, 1979.
 - 42.1.13. The Employees' State Insurance Act, 1948
- 42.2. The Seller is required to pay Salaries / wages of the professional staff and labourers deployed by the seller and then claim PF & ESIC payment

- from Buyer by submission with all statutory documents of ESIC & PF receipts along with the bank statement of payments made to them.
- 42.3. The Seller shall ensure that the ESIC/EPF components of Salaries / wages, for professional staff and labourers falling under Category-1 are paid regularly and documentation for the same is submitted before 20th day of the next Calendar Month or along with the submission of the bills whichever is earlier.
- 42.4. The Seller shall ensure that all their professional staff (Engineers, Supervisors etc.) and labourers falling under Category-II are covered either under Employees Compensation Insurance Policy/ Group Insurance/ Personal Insurance Policy (from nationalized insurance company) or ESI for the contract period including extensions. Documentation for the same shall be submitted before the 20th day of the next Calendar Month.
- 42.5. All Labour Clauses mentioned in the Contract are also applicable to the sub-contractors and the Seller shall be held liable for any lapses by the sub-contractors.
43. The Seller shall indemnify the Buyer, from any loss, responsibility, legal, moral, or otherwise for and in the unwelcome event of any accident that is caused by criminal negligence and or any unsafe working condition which in the opinion of the Buyer could have been caused by and for any reason attributable to the Seller for even force majeure, causing loss of life, incapacitation, grievous injury to any professional staff & labourers or any other person and the indemnity so executed separately on a non-judicial stamp paper shall be in force during the contract obligation period.
44. Contractor's All Risk Policy (CAR Policy): The Seller shall obtain CAR policy for the contract value valid for the contract obligation period from a nationalized insurance company. This Clause shall be applicable if mentioned in **Schedule-B**.
45. Working hours for execution of Contract:
- 45.1. The normal working hours will be from 0900 Hrs. to 1730 Hrs. on normal working days from Monday through Friday and excluding Saturday, Sunday and holidays. Depending upon the requirement, time schedule and the targets set to complete the job in time, the Contract may be executed beyond normal working hours and also on Holidays, for which no extra claim shall be entertained by the Buyer. Permission for working beyond 1730 hrs on normal working days from Monday through



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Friday and for working on Saturday, Sunday & Holidays, may be obtained from the Buyer based on written request from the Seller, provided Seller complied with all statutory requirements and applicable labour laws. Any permission to be obtained for the same is in the scope of the Seller. It is therefore imperative that the Seller mobilizes sufficient manpower and tools & tackles to complete the work within normal working hours and weekdays (Monday to Friday).

45.2. The above Clause is not applicable to the Manpower Supply Contracts.

46. All gold, silver, oil and other minerals of any description and all precious stones, coins, treasures, relics, antiquities, lost and found, property of the Buyer or Buyers Staff etc., which shall be found in or upon the Buyer's premises shall be the property of the Buyer and the Seller shall duly preserve and submit the same to the Buyer.

47. The Seller shall ensure that all the relevant licenses/registrations/ permission, which are/may be required related to the Services provided are valid during the entire period of the Contract, failing so will attract the appropriate penalties.

*****End of Section-III*****



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Additional Terms and Conditions

Section-IV

Additional Service Specific Specification & Drawings (If applicable)

Technical specifications

1.Scope of work: There are many Process piping in BARC Mysuru. The current scope of work is to carry out maintenance and modification in Process/utility piping(SS/Monel) which includes welding of pipes and structural steel members. As and when the work arises, the contractor shall depute the team for carrying out the required maintenance or modification work. Few materials are issued by purchaser and some materials are to be supplied by the contractor. All necessary consumables for carrying out the work shall be in the scope of the contractor. Any breakdown in the piping shall have to attend immediately. The welder and support team shall be present within 24 hours upon receiving the breakdown call and start the work. Under this works, contractor needs to supply few items like structural steel, and Enamel paints. Remaining raw materials such as different sizes of Pipes, fittings, structural steel and valves will be issued by the department. Contractor has to supply all the consumables required such as welding rods, tools, tackles and skilled man power including qualified welder as per ASME section IX to execute the GTAW & SMAW. The contractor shall carry out piping and structural welding works.

- Contractor shall execute works as per department instruction and approved drawing.
- The contractor shall follow all safety norms as per tender.

All the works detailed below are to be carried out within BARC premises, Mysuru.

The Scope of work as follows:

- a. Stainless steel and Monel piping fabrication, inspection, non-destructive testing & erection of fabricated and tested pipe spools as per approved drawings.
- b. Pickling and Passivation of Stainless Steel Pipes, Tubes and Fittings, issued by purchaser.
- c. Fillet welding on SS 304L, Monel 400 plates for fabrication of equipment's etc as per approved drawings.
- d. Supply, fabrication of structural material for piping/equipment supports & erection of the same as per approved drawings followed by epoxy painting for the same.
- e. Shifting & erection of Stainless steel/Monel process vessel, container, equipment etc.
- f. Dismantling, shifting of used SS/Monel piping, M.S. Structural supports within BARC site, Mysuru, etc. as described below.
- g. Radiography of weld joints

Some items will be issued to the contractor by purchaser for carrying out piping fabrication and erection as per the guidelines indicated by BARC. Some items are to be supplied & fabricated by the contractor and to be erected as per the requirement and instructions by BARC.



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2.1.0 CODES AND STANDARDS.

The following codes and standards, including all official amendments / revisions and other specifications given in this shall form part of this tender specification. All materials and workmanship shall comply with the latest issue of the relevant codes, standards and the specifications.

Sl.No	Codes/Standard No	Description
1	ANSI / ASME B 31.3	CODE FOR PROCESSING PIPING:
2	ASME – SECTION IX	WELDING AND BRAZING QUALIFIATIONS
3	ASME SECTION VIII DIVISION I	RULES FOR CONSTRUCTION OF PRESSURE VESSELS.
4	ASME – SECTION V	NON-DESTRUCTIVE TESTING
5	SA 193/SA 193M	Alloy steel and stainless-steel bolting materials for high temperature service.
6	SA 194/SA 194M	Carbon and alloy steel nuts for bolts materials for high pressure and high temperature service.
7	SA 380	Standard practice for cleaning, Descaling and passivation of Stainless Steel parts, equipment and systems.
8	AWS A 5.1	Carbon steel electrodes for SMAW
9	AWS A 5.12	Tungsten and Tungsten alloy electrodes for Arc welding and cutting.
10	AWS A 5.32	Welding shielding gases.
11	ANSI/ASC Z 41.1	Safety-Toe foot wear.
12	ANSI/ASC Z 49.1	Safety in welding, cutting and allied process.
13	ANSI/ASC Z 871.1	Practice for occupational and educational eye and face protection.
14	ASTM E 94	Standard guide for radiographic testing.
15	ASTM E 165	Standard guide for Liquid penetrant examination.
16	IS 2062	Steel for general structural purposes.
17	IS 2102	General tolerances.

2.2.0 Description of Piping Work.

2.2.1 The term “piping work” or piping referred herein covers fabrication and erection of pipes, fittings (such as bends, tees, long radius elbows, reducers, sockets, end

caps, flanges, blind flanges, all types of vacuum and utility valves (ball, globe, flush bottom valves, diaphragm valves, non-return, pressure relieving, etc.) filters, flexible hoses for air flushing, hose couplings, hose clamps, hose nozzles, sampling points, pipe bolts, clamps, saddles, turn buckles, tie rods, lifting hooks lugs, sliding supports, anchors, guide supports, stiffeners, etc., and all other piping components as per the approved fabrication drawing including metering instruments, flow measuring devices, throttling pieces, etc... and testing of the piping as per the approved quality assurance plan. The quantum of job indicated in this schedule is indicative. The actual quantity shall be arrived at finally and payment made according to the unit composite rate quoted by the bidder.

2.2.2 Contractor shall remain responsible for receipt of all items supplied by him, proper storage and safe transportation of all piping items from storage point to work site, cleaning, passivation, fabrication including cutting, edge preparation, inclusive of grinding the edges of pipe, fittings, flanges etc, to match with the mating edges of uneven / different thickness wherever required, fit-up, bending, welding, threading, pre-erection, surface preparation, supply and application of pre-erection, prefabrication primer and laying of pipes of all types, overhead on racks and at all elevations, connecting with equipment nozzles, Flow meters, tapping for pressure gauges, thermo wells, sample connections etc. including fixing of gasket, bolts, nuts wherever required & all other online mounted instruments and alignment, cleaning & flushing by compressed air (moisture and oil free) for equipment and piping, special cleaning as per specifications wherever called for in this technical specification, testing as specified, draining, drying by moisture and oil free compressed air, completing all such works in all respects as per the specifications, drawings and instructions of BARC.

3 MATERIALS IN THE SCOPE OF CONTRACTOR.

Contractor shall, at all times provide dust free environment for fabrication of Stainless steel and Monel piping.

4. Consumables applicable in the scope of the contractor

04.01.01 Chemicals like trichloroethylene, acetone for surface cleaning of pipes, fittings, flanges, weld joints etc and barium sulfate for weld passivation, as per the specifications.

04.01.02 The composite rate quoted by the contractor shall include all consumables such as oxygen and acetylene gas, permissible solvents/cleansing agents (acetone), lint free tissue paper, emery paper, cotton waste, SS wire brushes, weld passivation chemicals, materials required for dye penetration test etc. Consumables for performing passivation of weld joints like Barium Sulphate powder, cotton waste, etc as per BARC approved procedure after final pass welding.

- 04.01.03 NDT chemicals, machines and arrangements for Dye Penetrant tests as well as Radiography test. Consumables for performing Liquid Penetrant examination of weld joints like Acetone, cleaner, Penetrant, developer, spray device, lint free cloth/ tissue paper etc.
- 04.01.04 2% thoriated tungsten electrode, Argon gas for TIG welding shielding and purging, Oxy-Acetylene cutting set with gases for cutting mild steel, E6013 electrodes for SMAW process, Grinding and parting wheel for stainless steel and mild Steel, purging tapes, purging dams required for argon purging of pipes.
- 04.01.05 Epoxy thinner, Epoxy Primer, Epoxy Paint and related consumables.
- Tools, tackles and PPE in the scope of the contractor**
- 04.01.06 TIG/SMAW Welding equipment, High frequency sets, Oxy-Acetylene cutting set for cutting Mild steel, fabrication tools, drilling machine and accessories, pipe cutting & beveling machines, grinding machines, gas cutting equipments, tools and tackles, X Ray machines, Electrical concrete drilling machine for anchoring fasteners.
- 04.01.07 All instruments and measuring devices required for stainless steel piping fabrication like spirit levels, try squares, Vernier calipers, micrometers, height gauges, measuring tapes, weld inspection kit consisting of Steel rules, Tri Square, bevel gauges, dentist mirror, plumb bob, water level, magnification glass, bulbs for illuminating inspection area, and other visual aid Instruments like black light.
- 04.01.08 Arranging suitable test rig facility for pneumatic, hydrostatic, MSLD testing, etc at site
- 04.01.09 Electrical control boxes switch board panel extension board, cables, industrial sockets, Industrial plugs, etc.
- 04.01.10 All material handling equipments and machinery for piping fabrication including nylon ropes, trolleys, pallet trucks, tackles, etc. Chain pulley blocks of different capacities, ladders, wooden planks, wire rope, 'D' shackles, slings, 'U' clamps, eye bolts etc. and any other additional tools and tackles needed for material handling.
- 04.01.11 Conventional manual/hydraulic tube & pipe bending machines, pipe racks for storage, stands, required for the job as deemed necessary. MS base plates and pad plates for supporting / leveling of the equipment.
- 04.01.12 All personnel protective equipment's like safety shoes, safety goggles, safety helmet, safety belts, welding hand gloves, material handling gloves, surgical gloves for passivation, scaffoldings, hooks and other safety equipment and



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gadgets as recommended in ANSI Z 49.1: Safety in Welding Cutting and Allied Process.

- 04.01.13 Contractor shall arrange scaffoldings/temporary platforms, road, drain crossings etc., for erection/fabrication of pipelines, inspection activities at all elevations.
- 04.01.14 The contractor shall provide all stores, tarpaulins and covers for storing of the materials. All materials likely to deteriorate shall be stored under suitable conditions.

General instructions regarding materials, fabrication and bidding to contractor

- 04.01.15 Contractor shall fabricate and supply all supports including any special pipe supports and other structural items as per the approved drawings. Erection at all elevations of pipe supports like shoes, cradles, clamps of pipes on the structural platform or on civil structure or on the field shall be done in accordance with the details shown in drawings or instructions of purchaser. The composite rate shall also include application of primer and final epoxy painting as called for in wherever applicable.
- 04.01.16 All holes required for fixing U-clamp/fasteners shall be drilled and not gas cut. Whenever it is not possible to drill due to non-availability of space, holes may be burnt by gas cutting very neatly and shall be ground smooth by round files with prior approval of BARC.
- 04.01.17 At certain places of civil structures, on instruction of BARC, existing civil beam / wall / structure shall be used for welding pipe supports and grouted. The same shall be done by contractor at no extra cost.
- 04.01.18 Contractor shall be responsible for replacement of material/machineries due to faulty use, mishandling and damage of the department machines and material issued by purchaser.
- 04.01.19 Supplying of qualified personnel and instruments for non-destructive testing with ASNT- TC-1A/ISNT Level I & Level II qualification.
- 04.01.20 At certain places of civil structures, on instruction by BARC holes are to be drilled to fix the self-gripping bolt. The same shall be drilled grip bolts fixed by the contractor at no extra cost
- 04.01.21 The composite rate shall also include the hydrostatic and pneumatic, and all other test of piping system as called for in this specification and approved quality assurance plan.
- 04.01.22 The composite rate shall also include epoxy painting of mild steel structural as called for in this specification.



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- 04.01.23 The Contractor shall ensure safe working practices and ensure safety of all staffs. All scaffolding, temporary structures, safety devices etc used during erection shall be duly removed by the contractor on completion of the work.
- 04.01.24 The Contractor shall clear away periodically any rubbish, waste, scrap material etc. The removal of debris and waste to the dumping yard shall be done to keep the site clean and safe, at all times. The site shall be handed over to the client in a clean and tidy condition on completion of work.
- 04.01.25 Contractor shall take into account the enclosed specification while quoting the composite rate for the job. The contractor shall prepare at his own cost a detailed isometric spool drawing with bill of material of individual systems based on the approved P & I Diagram/ plant & elevation drawing. Preparation of isometric individual spool drawings/ sketches for fabrication of piping with bill of material and number of welding joints as per the approved system drawing.
- 04.01.26 A copy of Isometric/other drawings for fabrication containing all required information for bill of material, material identification, fabrication, testing etc shall be made available by the contractor. Piping installation shall be done as per the approved drawings containing all required information. Information for piping fabrication and installation shall subject to approval by the Engineer. The contractor shall consult the Engineer in case of any doubt or discrepancies in the drawings/ specification and shall commence fabrication only after approval from him.
- 04.01.27 Engineer reserves the right to modify or alter the drawings in case if he feels so. In case of any modification the contractor shall submit a fresh drawing to Engineer incorporating the modifications for his approval.

5 Planning of work and mobilization of adequate work force.

The Contractor shall provide supervision of each Piping / erection work, which will include without limitation.

- 5.1 A competent Site - In-charge of all site works (subject to the approval of the Engineer) shall be posted at the site and he shall devote his full time, for Planning and managing of the erection of all site works. His duties and responsibilities shall include the supervision of the entire work, including the timely arrangement of required machineries, equipment, consumables and other necessary inputs for the work.
- 5.2 The employment of sufficient number of Competent Assistants to the Site-in-Charge to complete the work within the time specified (Planning Engineer/Erection Engineers/ Supervisory and other staff and work force).



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- 5.3 The employment of a competent Senior Inspection Engineer and supporting staff. The Contractor shall employ only such persons, who are skilled and experienced in their several trades.
- 5.4 The qualified and approved site in-charge and the senior inspection engineer (QC)/ Erection engineers, Draftsmen shall be available at site during all stages of execution of work. The following non-refundable recovery shall be made from the running account bills as per the Clause 36 of General Conditions of Contract during their absence (for more than 2 days) without duly approved substitute.
- Site In-Charge (for all site works) - Rs. 1070/- per day
 - Senior inspection Engineer (QC) /Erection engineers- Rs. 980/- per day
 - Draftsmen Rs. 980/- per day
- 5.5 The contractor shall work out time schedule and manpower requirement to carry out the work within the stipulated time, based on the drawings and specifications. The same should be submitted to BARC and regularly reviewed and updated as the job progresses.
- 5.6 It shall be the responsibility of the contractor to ensure the availability of the above manpower at site during the various stages of execution. On some rare occasions, the average workload may slightly vary from the estimated average workload on account of unforeseen delays in the availability of some material to be issued by purchaser. Necessary steps may be taken to ensure that the overall time schedule does not get affected and at the same time there is no idling of work force.
- 5.7 **Quality of workmanship.**
- As the process piping involves critical application, maintaining a very high degree of quality right from fabrication stage to final erection is very much essential. Further, the valves, flanges, piping and other equipments etc., are to be handled with utmost care to prevent any damages, dents, etc otherwise, which may lead to failure after their installation. The entire work shall be subjected to stringent quality control and quality shall be controlled as per the approved quality plan. The contractor shall prepare the detailed Quality assurance plan and BARC shall approve the same before commencement of the job.
- 5.8 **Penalty for damages/wastage.**
- The contractor shall be responsible for any theft / damage / wastage (of all the materials issued by purchaser as well as the material brought by the contractor) and shall bear all the expenses on account of the same, if any. The value of issued items shall be decided by BARC and the same will be final and binding.

5.9 Drawings.

All the fabrication drawings / Isometric piping drawings are to be prepared by the contractor. A schematic drawings/sketch of proposed piping layout will be issued to the contractor, which shall be preserved carefully and returned back to BARC, Mysore after completion of work and shall be enclosed along with the bill. In the absence of any drawing/sketch the piping engineer of BARC shall explain the routing or modification of the proposed work. It is the responsibility of the contractor to prepare the piping/equipment drawing and get the same approved by the Engineer before commencement of work. Project authority reserves the right to issue revised drawings and/or additional drawings to supplement drawings issued and/or to cover addition/deletion in work and/or to cover extra work. Modifications in the drawing as deemed necessary by the engineer shall be incorporated by the contractor and the same shall be submitted for approval.

All the drawings shall be returned to the Project Authority after the completion of work. No drawings will be permitted to be taken out of the premises / site without approval from the project authority. The contractor shall maintain all the drawings carefully mounted on racks/cupboards of appropriate size and well protected from the ravages of termites and other insects. Hard disk drives, pen drives etc of computer containing drawings shall also be handed over to the project authority.

5.10 Record, procedures and reports.

The contractor shall maintain records pertaining to the quality of work, inspection and testing in compliance with the entire technical requirement, together with the certificate of the quality surveyor in the approved format. All the materials and consumables procured by the contractor shall be reputed manufacturer. Contractor shall produce all the relevant test certificates at the time of supply. In case original certificates are not available the Contractor shall at his expense make necessary arrangement for testing and certification.

Quality control records shall comprise the following

- i. Manufacturer's certificate for consumables supplies (welding electrodes, Argon, liquid penetrant, NDT consumables etc) as and when deemed necessary by the engineer.
- ii. Welding procedure specifications and procedure qualification records.
- iii. Welder performance qualification records.
- iv. Procedure for Non-destructive examinations.
- v. Quality assurance plan for fabrication.
- vi. Qualification certificate of the personnel performing Non-destructive examination.



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- vii. Results of radiographic examinations.
- viii. Cleaning report for materials
- ix. Material identification report
- x. Weld inspection reports
- xi. Pneumatic test report for individual spool.
- xii. Erection report
- xiii. Pneumatic test report for individual systems after erection.
- xiv. For each joint there shall be a record attesting that work was completed, examined and found to comply with all the requirements of this specification.

5.11 The above records shall be submitted to the engineer of M/s BARC at the time of completion of the work. When there is only a single copy exists, such as radiographs, the same shall become the property of BARC on completion of the contract or earlier if so directed by the engineer. All the reports shall be prepared on a standard reporting form by the contractor, which shall be countersigned by the quality surveyor on completion of his examination.

6.00 Quality surveillance by BARC.

All work covered by this specification shall be subjected to quality surveillance by BARC as per the stipulated codes, standards and specifications. Quality surveyor designated by the engineer will represent BARC. The quality surveyor and his designated staff will be responsible for checking the quality of work to the extent necessary to assess compliance with the provisions of the specifications. His surveillance shall not be limited to the examination of the end product and he shall have complete access to the work and the right to intervene where bad practice is detected. He shall also have the right to conduct or require the contractor to perform, any additional inspection or testing he deems necessary if any unacceptable practices are noticed. The contractor shall repair the defects as and when required by the Engineer.

The surveillance/approval provided by the Engineer of finished work shall not relieve the contractor of any of his responsibilities under this specification. Any work executed not meeting this specification is liable for rejection. The contractor shall maintain quality control records, which shall record all the quality control operations that were performed and shall submit copies to the Engineer for future reference. The quality surveyor shall have the right to witness any or all such operations.

The contractor shall allow access to quality surveyor and his designated staff at all times during fabrication and installation to verify the premises in which the work is being carried out, the drawings and/or tooling involved, gauges, instruments, inspection kit etc. along with calibration certificate, as per



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manufacturer's recommendation required for inspecting the work. Prints of drawings shall be made available for inspection and retention.

Waiving of quality Surveillance or acceptance of executed work by the quality surveyor shall not relieve the contractor from the responsibility of furnishing material and workmanship in accordance with this specification.

6.01 Material reconciliation.

The contractor shall be accountable, for all the material issued by the purchaser and the material he procures. All the issued items by purchaser found in excess of the required quantity shall be returned to BARC with proper records.

07.00 Receipt, transportation and erection of Material issued by dept at site.

07.01 Whenever materials are issued by department, the Contractor shall receive the equipment and other materials from the department stores as and when required and shall properly store till they are erected.

07.02 All erection works shall be carried out strictly under the supervision of BARC. Necessary formats to keep a record of the inspection carried out at various stages shall be provided by the contractor and the contractor shall maintain the inspection reports till the completion of the job.

07.03 Contractor shall fabricate supply and erect in position MS base plates and pad plates, all special supports necessary for erection of material issued i.e equipment/machineries, leveling of the equipment at all elevations as per relevant drawings and specifications. Necessary cutting on mezzanines shall be done as required, to accommodate equipments on structures. The composite cost shall include supply and insertion of shims made of steel / brass for fine leveling.

07.04 **Erection of material and equipments issued by department such as pumps, valves etc are covered by the manufacturer's manuals and these form part of this specification. The contractor shall be required to perform any fieldwork and adjustments requested in the manufacturer's manuals if the need arise. These will be issued by the Engineer at the time of executing the particular installation. The contractor shall provide all necessary material handling equipments and adequate safety precautions shall be ensured for safe installation of the equipment. Any damage to the equipment caused during installation shall be at contractor's risk.**

07.05 Prior to the erection of the equipment/items any foreign materials present shall be removed by flushing with moisture and oil free air at a pressure of 7 bar and then by solvent cleaning. The same shall be witnessed, documented and certified by BARC.



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- 07.06 Contractor shall remain responsible for safe transportation of all items issued by department from storage area to work site, assembling of parts, erection at all elevations, aligning on the foundation, tightening of foundation bolts, welding of items wherever required, cleaning and flushing by moisture and oil free air/water, draining, providing ancillary, enabling works, cleaning, applying primer coats and final paints as required and completing erection in all respects as per drawings, specifications and instructions of BARC. If any discrepancy is noticed in the dimension, centerlines, levels, locations etc. of the foundation or anchor bolts or other embodiments, the same shall be brought to the notice of BARC and got clarified before proceeding with the work.
- 07.07 All valves, online mounted instruments, which are provided or issued by department, may have to be removed and reinstalled number of times as per the erection need at site during testing or commissioning including minor rectification. The composite cost indicated by the contractor shall include these services. No valve / on line mounted items shall be paid for more than one time under these composite rates quoted. All vacuum valves shall be leak tested using MSLD at the leak rate better than 1×10^{-9} mbar lit/sec. Only those valves leak tested and certified by the quality surveyor of BARC shall be taken up for installation. Composite rate shall include the necessary assistance including, providing adaptors, bolts & nuts, cleaning solvents, manpower etc for the same.
- 07.08 If any defect is noticed on foundation after placement of equipment, the contractor shall be responsible for removing the equipment, rectification of foundation and placement of equipment on foundation after rectification at his cost without affecting the time schedule.
- 07.09 Contractor shall arrange scaffoldings/temporary platforms etc if required, for the erection/fabrication work.
- 07.10 Contractor shall provide all erection consumables but not limited to items such as oxygen and acetylene gas, permissible solvents/cleansing agents, lint free tissue paper, sand / emery paper, cotton waste, cotton cloth, etc. required for carrying out erection works. The composite rate quoted by the contractor shall include all these consumables.
- 07.11 The contractor shall supply all erection materials but not limited to items such as packing plates, machined taper wedges, leveling screws, shims, tags, jointing compounds, sealing compounds, Teflon tapes, skid rollers, chain pulley block, packing materials, wood pieces, spacers, templates etc. required for erection.
- 07.12 Contractor shall undertake, if required, minor rectification on equipment, structural steel work during erection /assembly/ trials by minor cutting, as a part of erection work.



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- 07.13 Wherever the size or shape of equipment makes it impossible to ship it in one piece; the contractor may ship minimum number of shop-fabricated sections suitable for shipment. The contractor shall complete the assembly, erection and testing in strict accordance with the provisions of applicable code/specification. All pieces shall be shop fit up into sections and each section fit to the adjacent one match marked thereafter to facilitate fitment and erection at site.
- 07.14 Suitable erection lugs and locating pins shall be used to ensure proper fit up of the equipment.
- 07.15 During erection the steel work shall be securely bolted or otherwise fastened wherever necessary and also shall be properly braced to provide for all loads to be carried by the structure during erection including load of equipment.
- 07.16 No permanent bolting or welding should be done until proper alignment is obtained.
- 07.17 The contractor shall take all precautions to ensure structural stability during the course of erection, welding and testing of tank/vessels. In case of any damage to the tank/ vessels or other structures during construction / erection, the contractor shall carry out all the rectification work at his own cost.
- 07.18 The contractor's work shall be considered complete when the equipment and systems are installed in accordance with the drawings and specifications and have passed all the inspection and test requirements described in the document.
- 07.19 All equipments shall be inspected for any internal or external damages. Any damage or discrepancies for those material issued by purchaser for items caused during shipment/transportation shall be brought to the notice of BARC. Only after that the contractor shall continue his work further.
- 07.20 All pieces shall be shop fit up into sections and each section fit to the adjacent one match marked thereafter to facilitate fitment and erection at site.
- 07.21 All erected equipment/piping shall be checked for alignment, inspected, documented and certified by contractor and BARC. For any major deviation Design concession request (DCR)/ Non-conformance report (NCR) as applicable shall be raised and submitted for approval.
- 08.00 Chemical cleaning.**
- 08.01 Pickling.**
All stainless-steel pipes, fitting, etc. shall be pickled and passivated by the contractor as per the procedure mentioned in **Appendix A** of this specification, under the supervision of BARC. The method followed for chemical cleaning shall be as per **ASTM A380** - Standard practice for cleaning, de-scaling, and passivation of Stainless steel parts, equipment, and systems.



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The flanges shall be stored with proper protection and handled with white cotton gloves. If storage or handling resulted in contamination the engineer will decide on suitable cleaning depending on the nature of the contamination. The quality surveyor shall witness and certify the cleaning procedure. The contractor shall make a separate document for the same.

08.021 The contractor shall supply the requisite labor and technical personnel for carrying out the various operations such as cleaning, drying, packing, transportation to the work spot, etc at his own cost.

Nylon brushes shall be used to ensure adequate cleaning of surfaces and to speed up the cleaning operation. Flat brushes can be used on flat surfaces or small components and circular brushes mounted on rods shall be used for scrubbing inner surfaces of pipes. Air driven rotary nylon brushes or nylon hand brushes are to be used for cleaning piping materials. The cleaning operation shall consist of passing the rotary brush or hand brush through the pipe by a blast of compressed air and repeating the same if required to remove loosely adhering matter. They shall be in continuously good condition and shall be examined before, during and after cleaning operations. Brushes showing any sign of disintegration shall be replaced. Rags of any kind shall not be permitted for cleaning or any other use in washing area.

Detergent cleaning with DDB based liquid soap shall be done for pipes to remove grease, foreign matter and halide contamination. Ordinary water shall be used for cleaning. The detergent used shall be 25-ppm maximum free halogen expressed as chlorine in solution at strength for use and 25 ppm maximum Sulphur in solution at strength for use.

08.022 Solution preparation.

The preparation of cleaning solution with respect to concentration and temperature shall be done as per the recommended procedure and there will be no addition of any other chemical or ingredient. An item to be washed shall be immersed in the solution, allowed to soak, and then its surface shall be brushed thoroughly. The item shall be allowed to drain and shall be retained in a position outside the cleaning tank where it will be adequately rinsed with demineralized water which will be supplied by BARC. Subsequently the item shall be soaked in rinse tank in which, demineralized water is continuously overflowing. It shall be allowed to drain and dried with oil free compressed air.

08.023 Drying.

All the pipes, fittings shall be suitably dried as recommended in the procedure in an oven which will be issued by purchaser. Pipes shall be kept inside oven in



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such a way that they do not touch each other. Direct contact of stainless steel piping component with mild steel supports of oven are not permitted.

08.024 **Inspection.**

After inspection and clearance, the open ends shall be closed with protective caps. Quality surveyor (QS) shall be available in the area when cleaning operations are in progress. Any piece of equipment, pipe or fitting shall not be moved into the installation area without prior approval from the quality surveyor. The cleaning operation should not develop into voluminous production for stock piling reason and must be planned as required. Each equipment, pipe or fitting shall be checked for traces of acid with litmus paper before dispatching for drying in presence of quality surveyor. If a particular lot has passed cleanliness inspection the same lot shall be adequately protected from further contamination with polythene sheets, blind flanges or neoprene/PVC caps shall be installed on ends and inspection report shall be made ready duly certified by contractor and BARC.

08.025 **Chemical cleaning reports.**

A chemical cleaning report shall be prepared for record which shall include the MIR number, line number; size report number etc and the chemical cleaning reports number shall be included in the corresponding weld inspection report. Chemical cleaning reports shall consist of three copies and shall be duly signed and submitted at the time of pipe fit up inspection.

09.00 **Cleanliness in work area & Safety of working personnel.**

Work area shall be kept free from dirt, liquid spillages, dust etc at any time. The personnel working in the chemical cleaning area shall be provided with suitable chemical resistant aprons, helmets, goggles and chemical resistant shoes and suitable hand gloves, masks etc by the contractor at his own cost.

10.00 **Fabrication.**

10.01 **General requirements.**

The fabrication/welding work shall comply with ASME B31.3 Code for process piping CATEGORY D fluid and the relevant appendices of this technical specification. Since the pipelines/equipments fabricated is for special and corrosive application, stringent quality control requirements are called for in this technical specification. Whenever stringent quality control requirements are called for in this technical specification in comparison with code, the requirements of this technical specification shall apply. Any waiver shall be purely at the discretion of the engineer.

10.02 The contractor shall submit a detailed drawing of all types of joints, piping to the engineer for his approval. All piping equipment etc shall be joined or



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welded and erected, in accordance with the drawing approved by the engineer. Fabrication shall be carried out only as per the quality control plan prepared by the contractor. This plan is to be approved by engineer before start of fabrication. As a minimum the quality control plan shall include the applicable items indicated in this specification.

During all stages of the work all materials used, shall be traceable and shall comply with all relevant documents and certificates. All the fabrication, assembly and erection shall be done strictly under the supervision of BARC. Necessary formats to keep a record of the inspection carried out at various stages shall be provided by the contractor. The contractor shall maintain all the inspection reports. Any deviation from the drawings, specification or any doubts shall be referred to BARC before commencement of the work. Fabrication shall be done under suitable weather conditions, including but not limited to airborne moisture, blowing sands, or high winds etc. At all times spools/piping shall be kept clean at inside mainly for debris/dirt, and at outside for metallic contamination by other metals. If any construction is to be carried out in the vicinity of piping or equipment already installed then, before such construction work commences adequate protection shall be provided to prevent any damage to the piping or equipment from weld spatter, arc cutting droplets etc. Care shall be taken to avoid overstressing, damage or deformation in any of the piping components at all stages of the work. Shrinking or hot bending is not allowed in any case. Hot work if any shall not be carried out without approval. All material shall be stored according to the recommendations of the BARC, until required for use. Detailed records of used and rejected materials shall be kept at all times.

10.03 **Identification of Raw Material.**

Each piece of pipe, regardless of length, and each fitting or other component, except minor fasteners, shall be clearly identified by legible marking on the part. The marking shall consist of the applicable specification number, grade/type, heat number and any non-destructive testing performed. When a pipe is cut to make more than one spool the marking shall be transferred to all the spools. The materials shall be marked by any method that will not result in any harmful contamination or sharp discontinuities. Vibroetching is permitted for marking on all thickness provided minimum wall thickness requirements are met and marking is acceptable to the quality surveyor.

10.04 **Handling of Piping during fabrication.**

The material during fabrication shall be adequately protected to avoid any damage or deterioration. Storage and handling of piping components shall be on non-metallic pallets. Pipelines shall be protected with plastic end caps to prevent ingress of water, moisture and foreign matter. All pipelines and

components shall be stored in separate areas away from storage areas for carbon steel and other materials to avoid direct contact with carbon steel. canvas or nylon slings shall be used. Steel wire slings shall not be used for handling and transportation of pipes. A Procedure for off-loading, storage, retrieval, control, traceability and inspection of piping material supplied for fabrication and installation shall be worked out. Loading and unloading of materials and equipment shall be done by hoisting or skidding so as to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skid ways shall not be skidded or rolled against another pipe.

10.05 Cleanliness requirement.

10.05.01 Fabrication tools.

Direct contact of all piping with carbon steel is not permitted. Tools containing carbon steel and grinding discs containing carbon steel particles shall not be used. Tools used for fabrication shall be clearly identified. Tools to be used only for fabrication of stainless steel piping components shall be stored separately to avoid accidental switching with tools previously used on carbon steel fabrication work.

10.05.02 Halide & Sulphur contamination.

Contamination from halide and sulphur shall be completely eliminated. Hence the use of the solvents, cleaning agents, tapes, paints etc containing free halides and sulphur exceeding 25 ppm are prohibited to eliminate the possibility of inadvertent use on stainless steel materials.

Furthermore, wherever approved tapes are used the residue after removal of tape must be completely removed by suitable solvent to avoid possibility of breakdown of such residue under radiation to form organic acid.

10.05.03 Surface contamination.

Following recommendations are to be adopted to avoid any surface contamination of piping while fabrication

- a. Fabrication of pipe spool shall be carried out in a separate area.
- b. Only stainless-steel wire brushes that have not been used on any other material shall be used.
- c. Grinding wheels used for stainless steel shall not have been used for other purposes. Earthing clamps for welding and cutting should be made of stainless steel.
- d. Moisture shall be removed by carefully and controlled heating in an oven. Skin temperature shall not exceed the temperature mentioned in the procedure.

- e. Acetone or equivalent solvent (subject to approval) shall be used for cleaning surfaces.
- f. Clean lint free white hand gloves and shoe covers shall be used and fabrication, welding shall be done in clean room facility.
- g. Handling equipment, such as slings, hooks, and lift truck forks, shall be protected by clean wood, cloth, or plastic buffers to exclude contact with the stainless-steel surface. These protection means shall be immediately replaced after any contact with carbon steel.
- h. Piping materials shall be stored indoors, or otherwise protected from moisture, dust, salt, iron particles, and other matter that may initiate or cause corrosion.

10.06 **Joint preparation.**

In all instance the end preparation for welding shall be as per the drawing approved by the engineer /welding procedure specification. When counter boring or any other machining is done, the remaining wall thickness of pipes or fittings shall not be less than that shown on the joint design drawing. Edge preparations may be made by shearing machining, beveling machines or carbon and iron free hand grinding to an accurate form. Any machining used for this purpose must achieve the accuracy specified for the particular end preparation. All edge preparation shall be checked with profile gauges. Joints of other geometry may be prepared by drilling and grinding.

The tools used for edge preparation and cleaning shall cause no detrimental metallurgical effects upon the edges to be welded. Edges shall be left free of slag, spatter, scale, dirt, grease, or other foreign matter which might affect the quality of the weld and the cut surface shall be ground to a smooth bright uniform surface. After grinding the weld edges shall be visually examined to ensure freedom from defects. Beveled ends shall be neatly cleaned for 2” from the ends to remove oxide and scale. Solvent cleaning shall be done after removal of scales. No contamination of the bevel with low melting alloys or foreign particles shall exist. Any bevelled edge that has been damaged shall be restored within the tolerances required by the welding procedure. All ends of pipes after end preparation shall be protected by caps to prevent the entry of dirt or any mechanical damage until further welding is carried out. No liquids of any kind for cleaning other than acetone shall be admitted to the pipelines or the equipment except when authorized by the engineer.

10.06.01 **Special requirements for process headers.**

All process piping joints shall be of full penetration weld only to avoid crevice corrosion. No joints of any form, which forms a crevice, such as fillet welds, socket weld, etc shall not be made on process piping joints. Only standard

fittings shall be used for branches and change in direction. **Miter joints are prohibited in process piping.** However, in utility piping bends and miters are allowed, at the discretion of the engineer.

Following are the special requirements for process headers which shall be done other than conventional fabrication methods using special machines, dies, by the contractor.

i. **Pipe branching.**

The pipe branching shall be done using standard fittings. However, in certain cases for pipe lines (12", 8", 6", 4", 3", 2", 1" NPS) which are to be branched to smaller dia branch connections as mentioned in the drawings, nozzling shall be carried out by nozzling machines issued by BARC. In case the nozzling machines are not available, the same shall be done with conventional/ rotary grinding machines arranged by the contractor.

ii. Long radius Elbows (Bends to be made for the size up to 1").

Only long radius elbows shall be used unless otherwise specifically mentioned in the drawing. The elbows shall have a reasonably good surface finish on the inner side and shall be butt weldable to thin walled pipes without any mismatch. Any objectionable dents or abruptness shall be machined/ground and leveled to the satisfaction of the quality surveyor. The transition of diameter shall be gradual and more than 1:4.

iii. **Pipe build-up.**

All the pipes are to be built up into a network as shown in the relevant approved drawings. If, at any point of time the cleaning is not found satisfactory the entire cleaning procedure shall be repeated at the discretion of the quality surveyor of BARC.

10.07 During all stages of the prefabrication all used materials shall be traceable and shall comply with all relevant documents and certificates. During all stages of the fabrication, all pipe spools shall be properly engraved with their unique spool number. Piping spools shall be fabricated such that dimensional inaccuracies due to welding are minimized. All measures shall be taken to ensure correct positioning and fit-up of the components to be welded. Before lining-up, the weld ends shall be cleaned to remove all foreign particles. Fit - up and tack welding shall comply with the welding procedures.

10.08 Protection of pipe ends during fabrication.

The equipments and pipeline shall always be closed at all times with protective caps or blinds except during the actual performance of the work on the joint. Circular tight PVC cap provided by BARC shall be used to cover the open ends of the piping and shall be placed on the line at the end of each

day's work to prevent entry of foreign material. Caps shall not be removed until commencement of the following day's work. All open ends of pipe are to be capped off and sealed once installation is completed. Carbon steel blinds shall not be used

10.09 Tolerances on dimensions.

Unless otherwise specified on the drawings, the tolerances given in **ASME/ANSI B 31.3 Code for process piping and appendix B** of this Specification, whichever stringent shall be applicable. The tolerances on linear dimensions (intermediate or overall) are illustrated on sheet 1 and 2 of **appendix B**. These tolerances are not accumulative. Angularity tolerances across the face of flanges, weld end preparation and rotation of flanges shall be as stated in sheet 1 and 2. Closer tolerances on weld end preparations than stated in sheet 1 and 2, may be specified in the relevant welding specification for the material in question, and shown on the fabrication isometric(s). When closer tolerances other than those given above are required, these shall be as specified on the isometric drawing in question. Pipeline shall be made with the minimum feasible number of joints. The contractor shall shop fabricate subassemblies of piping etc, to the maximum extent feasible.

Quality Surveyor shall inspect all piping before assembly. Complicated assemblies shall be achieved in stages. Bolt holes on flanges shall straddle the horizontal or vertical lines or plant north/south centre lines when orientation is not given on drawings. Misalignment beyond acceptable tolerances in straight pipe runs shall not be permitted. Seam orientation of welded straight pipe and pipe to fittings shall be such that at circumferential welds, the longitudinal welds shall be staggered over the top of the centre line, preferable 30° left and 30° right of the Centre line. The minimum distance between the staggered joints shall be 50mm or six times the thinnest pipe wall thickness measured between heat affected zones, whichever is greater. Care shall be taken to ensure that longitudinal welds clear branch connections.

10.10 Pipe fit-up tolerances.

All joint fit up shall not exceed the tolerance limits specified in **ASME/ANSI B 31.3 Code for process piping /Table A1 of Appendix E** of this specification, which ever stringent. Before fitting up the weld joint, the profile and dimensions of the weld end preparation shall be checked. If the specified tolerances are exceeded this shall be corrected either by machining or grinding. All fit ups shall be examined by the Quality control inspector prior to welding the root pass.

10.11 Branch connection welds

All welded branch connections shall be jointed to the header with full penetration welds only. Stub-in connections shall be set-on type. Set-in type is not acceptable. Reinforcement pads or saddles required by specifications and drawings if any shall be of the same material as the main pipe and shall be formed and contoured to provide a good fit to both main and branch pipe. Whenever found essential, branch reinforcement pads should be provided before fitting onto pipe with a minimum 3.0 mm drilled and tapped hole prior to fitting to the pipe, so ensuring leak detection, and venting.

10.12 Progress control

Progress control and planning documentation shall be maintained to plan, control and report all facets of the piping spool fabrication and shall include but not be limited to the following:

- a Preparation of piping spool drawings
- b Material availability per spool
- c Surplus and/or shortages per spool
- d Shop fabrication progress per spool
- e Inspection
- f Testing of spools
- g Non-destructive examination
- h Weld repair and rework
- i Revisions to isometric drawings
- j Cleaning reports
- k Procedures and documentation for the control, reporting and recording of spool fabrication shall be submitted to the company for approval prior to commencement of the work.

10.13 Cold bending.

Pipe shall be bent only where cold bending is indicated on the piping drawings. Unless otherwise specified butt weldable fittings shall be used depending on the piping class. Cold bending shall be carried out using pipe bending machines or presses provided that dies are employed to prevent flattening. Unless otherwise noted, the centre line radius of bends shall be five (5) nominal pipe diameters. Bending shall not reduce the pipe wall thickness below the minimum wall thickness required for the design temperature and pressure plus any corrosion allowance. All bends shall be smooth, free from cracks and surface defects, without buckles and they shall be within tolerance limits specified in the drawing. Bend curvature shall be uniform and the surface shall be free from bulges, wrinkles, tooling mark and other injurious defects. The use of any filler material during bending is prohibited. Hot bending is not permitted. Minor correction by hot bending shall be permitted only as directed by the engineer. Usage of bending lubricant is prohibited.

At any section of the formed pipe, the wall thickness shall be not less than 87.5% of the nominal wall thickness, and the difference between the major and minor outside diameters shall not exceed 8% of the normal pipe diameter.

Liquid penetrant examination shall be carried out on 10% of the total bends. Random wall thickness of 4% of bends shall be checked by ultrasonic gauging technique as per **ASTM standard E213**. Contractor shall prepare sample pipe bends for each size and minimum specified bend radius for the size using the material specified and the proposed fabrication procedure and tooling.

Samples shall be examined by the methods specified for production of bends and by sectioning.

All the bends shall be visually inspected in presence of the quality surveyor or his representative and his approval obtained for fabrication.

10.14 Pipe or fitting imperfections.

Imperfections in the pipe or fittings detected by non-destructive testing shall be reported to the Quality Surveyor.

10.15 Dents on piping.

All dents which affect the curvature of the piping at the seam or at any girth weld shall be removed. All dents which exceed a maximum depth of 1/16" in pipe NPS 4" and smaller, or 1/8" in pipe sizes greater than NPS 4 shall not be permitted and brought to the notice of quality surveyor.

10.16 Flange connections

Flange covers shall be retained on all flange connections to valve or equipment, until ready to connect the mating piping. Flanges connecting to strain sensitive mechanical equipment e.g. vacuum pumps, vacuum compressors, etc shall be fitted-up in close parallel and lateral alignment prior to tightening the bolting to line or interconnecting system of lines.

With the piping flange fitted and prior to bolting-up the joint, the following tolerances shall be maintained.

Bolting shall move freely through accompanying bolt holes at right angle to the flange faces. There shall be a clear gap between two flange faces before gasket installation. There shall be sufficient flexibility to install and replace gaskets.

Flanged connections shall be tightened sequentially diagonally opposite in a clockwise or anticlockwise order so that an even gasket seating results. Flanged spools mating with equipment flanges shall be site fitted for correct alignments to ensure that no stress or load is placed on the equipment and the spool flange shall then be fully welded in accordance with the requisite welding procedure. Before flanged pipe spools are connected to pressure vessels and flanged spools, inspections shall be carried out by loosening up to 10% of flanged joints

to the equipment to ascertain that no stress is placed on equipment due to misalignment. Pipe misfit tolerances shall be as given in **Appendix B** sheet 3 of this specification. The surface of flange gasket face shall be free from rust, weld spatter, scars, paint, dents, arc strikes, corrosion pitting and other imperfections.

10.17 Flange bolting.

The bolting-up requirements for pipe and pressure vessel flange joints in all ratings for ANSI-B16.5 and vacuum flanges are specified herewith. Bolting materials shall be of stainless steel material complying with the relevant standards.

Bolt torques for utility valves shall be in accordance with the supplier's recommendations. ASME/ANSI B31.3, class 150, recommended torque for bolted flange connections shall be consulted for details regarding tightening of utility flanges.

Calculation of the required bolt tension value for process and vacuum flanges shall be in accordance with DIN Standard 2505.

All flanged stud bolts shall be progressively controlled to equalize bolt pressure on the gasket. Nuts and bolts shall have their grade marks visible after installation. Excessive tightening of flanges may result in uneven stress distribution in bolting and uneven gasket seating pressure and deformation of the flange and its facing, thus increasing the tendency to leak. Hence only torque wrenches shall be employed for bolt tightening of bolts in process and vacuum flanges. However, ANSI – B16.5 class flange joints shall be made up by hand using ring spanners of appropriate dimensions. Lengthening of spanners by means of pipe, crowbars or similar is prohibited. A minimum of three and a maximum of five complete threads shall protrude from the top of nut after completion of tightening. The contact faces of the flange shall bear uniformly on the gasket, and the gasket shall be properly compressed in accordance with the design principles applicable to the type of gasket used. Usage of any lubricants for bolt is prohibited.

When bolting vacuum flanges, the gasket shall be uniformly compressed to the minimum torques as per table below.

RECOMMENDED BOLTING		
Flange	Bolt Size	Torque(N m)
CF 16	M4 X 30mm	5 – 8
CF 35	M6 X 40 mm	10 – 12
CF 65	M8 X 60 mm	12 – 14
CF 100	M8 X 80 mm	14 – 16
CF 150	M8 X 100mm	16 – 18
ISO 200	M10 X 80 mm	18- 20
ISO 320	M12 X 80 mm	20 – 24

Note: If any or in case torque for bolts of certain flanges is not available in the table, the torque / data shall be decided in consultation with EIC.

10.18 Flange inspection and preparation

Check the condition of the flange faces, especially vacuum flanges for smoothness, scratches, dirt, scale, and weld spatter protrusions. Deep scratches, dents or combinations of defects are to be cut and re welded with a new flange. Check alignment of mating flanges. Use of force to achieve alignment is prohibited. All threads and bearing surfaces shall be free from sand, chips or any other foreign material which may influence the torque during tightening. Flange bolt holes shall be inspected for any entrapment of dye penetrant material or passivation paste and if found shall be thoroughly cleaned before installation.

10.19 Piping supports structures and pedestals

10.19.01 The contractor shall procure raw materials, fabricate and supply conventional supports, special supports as per **relevant drawings/ASME code B 31.3, chapter 2 for all the piping under his Scope**. The material for piping supports shall conform to IS 2062 Steel for general purpose Application-Grade A. Where piping supports are directly welded to stainless steel pipes, a pad of same thickness and material and profile of pipe shall be stitch welded to the pipe first with argon purging. Then the mild steel supports shall be welded to the pad.

10.19.02 Piping shall be supported, guided and anchored, as per the piping and support detail drawings/ **ASME code B 31.3, chapter 2**. Temporary supports are permitted to facilitate piping installation provided they shall be completely removed upon completion. Attaching temporary supports to pipes by welding is not permitted. All pipe supports fabricated both at shop and site shall be cleaned and coated with a primer coat plus two finishing epoxy coats prior to installation which is subject to approval by the engineer. The provision of embedded bolts is essentially limited to the installation of special equipment. The remaining supports are to be fastened by means of anchor fasteners.

10.19.03 Precautions shall be taken during piping erection in close vicinity of carbon steel piping. carbon steel blinds, spades and caps shall not be used for stainless steel pipe and components. Stainless steel clamps and U-bolts shall be used for supporting stainless steel piping. GI clamps may be used provided they are properly isolated with neoprene sheets of adequate thickness. Neoprene or Viton spacer strips of adequate size and thickness shall be installed in areas where stainless steel piping rests on carbon steel supports.

10.19.04 Fabrication and Installation of Pressure vessel.

All pressure vessels items shall be fabricated and erected according to the requirements of ASME Code Sec VIII Div I. The required material will issued as a purchaser for fabrication. Where ever Sheet Rolling/bending operation exists will be in the scope of contractor shall will be formed as per drawing and technical specification, also the to procure raw materials and fabricate supports, as per relevant drawings for all the equipment will be provided by purchaser as and when required. All equipment piping shall be installed up to a break point between the nearest pipe support and the equipment. The remainder of the piping shall be site measured, fabricated and properly fitted between the equipment nozzle and its break point. It is essential that this be done accurately in order to avoid any external loadings on the equipment connections. Piping shall be disconnected from the equipment after installation to demonstrate that no stress has been transferred from piping to equipment, and then reinstalled.

11.01 Welding.

11.02 **Generally** all welding procedures shall be qualified according to **ASME Sec IX Welding and Brazing Qualifications and to this Specification.** WPS shall be established for all welding which will be used in the fabrication of piping systems. No welding is permitted in cold worked areas. Contamination of weld bevels and surrounding areas with low melting point metals such as Copper, Zinc, etc. are not acceptable. No welding shall be done on surfaces, which are wet or exposed to rain of excessive draft. Surfaces to be welded shall be free from paint, rust, oil, grease, dust or any other contamination. Clothes used for cleaning shall be lint free with trimmed edges. Welds shall be cleaned between passes to remove all traces of oxides and flux before successive beads or layers are deposited. Completed weldment shall be cleaned to the same extent by stainless steel wire brushes.

11.03 Any craters at the starting and stopping points of each individual bead shall be carefully examined and any defects shall be removed by suitable method. Tools used shall be iron free to avoid contamination. Grinding of weldment during root run is strictly prohibited so as to prevent the entry of burrs into the pipe section. Peening shall not be permitted.

- 11.04 All dams used in purging shall be placed in such a position that they can be removed intact. The burning out of dams will not be permitted. Contaminations on inside surface of pipelines due to poor quality dams are not acceptable. Any contamination on inside surface of pipelines shall be removed with suitable solvent. Dams shall be numbered, signed on it and recorded, to eliminate the possibility of leaving them in the system. Installation and removal of dams shall be properly documented and witnessed by quality surveyor. Deteriorated and damaged dams shall be destroyed in the presence of quality surveyor. All the dams in use shall be inspected for quantity and quality once in seven days.
- 11.05 Inspection and quality surveillance shall not be limited to examination of finished weld. All aspects of the fabrication procedures and examination procedures used, that could affect the quality of the finished weld, shall be subject to the approval of engineer. The equipment to be used shall be suitable for the quality of work specified and the technique employed shall be based on methods which are known to produce good results and which have been verified at site by actual demonstration.
- 11.06 The welding techniques and the arc manipulation shall be controlled to ensure the following
- i Full penetration and fusion into the preceding bead or layer.
 - ii Full fusion into the base metal without undercutting along the sides of the weld.
 - iii Uniformity of surface in both single run passes and beaded layers.
 - iv Floating all slag, oxide and gases to the surface behind the advancing arc.
 - v Delay in electrode travel until base metal fusion at the starting point is assured, and until the crater is well filled at the completion of the weld.
- 11.06 Haphazard striking of the electrode on the base metal in establishing the arc shall not be permitted. The arc should be struck either in the joint where the metal surface will be fused into the weld or on a starting tap shall be of same material or a material compatible with the base metal being welded. When inadvertent arc strike occurs, the area affected shall be ground flushed and then examined by liquid penetrant method. **High frequency arc starting devices shall be used for GTAW welding which shall be in the contractor's scope of supply.**
- 11.07 Care must similarly be taken while stopping the arc to avoid crater and cracks. The following techniques are to be used for stopping the arc.
- a. The arc should be drawn off to the side of the joint and stopped on the beveled surface of the joint while extending the arc length rapidly.

- b. In GTAW welding the machine should ideally be equipped with a foot or hand control to permit a gradual decrease of current. Alternatively, the arc shall be extinguished as in Para 'a'.

A stinger bead technique shall be used with a slight oscillation if necessary to avoid entrapped slag and to minimize the number of beads to fill a joint. It is necessary to take some precaution to reduce distortion. Skip welding, back-step welding or effective tack welding before hand are the methods to be followed. The method adopted shall be stated in the welding procedure. The width of the deposited pass shall not exceed two and half times the electrode size. On pipes over 12" diameter welding shall be done whenever possible, by two welders working simultaneously and both sides of the pipe. The electrodes must be correctly shaped, pointed for. The electrode extension beyond the gas cup tip should be kept as shortest with the joint being welded. The welding torch shall be inclined slightly in the forehand welding position and the filler metal added carefully to avoid contact with and consequent contamination of the tungsten electrode. If contamination does occur, tungsten electrode shall be cleaned and redressed. Similarly, if the tungsten electrode comes into contact with the weld pool the operator shall break the arc and grind out the tungsten deposit. All parts to be joined by welding shall be adequately supported or held in their proper position by appropriate tables, jigs, and/or fixtures. Line up clamps shall not be removed nor shall the pipe be moved until the root and the second pass have been completed. The method of depositing weld metal shall be chosen to minimize warpage. Complete penetration welds shall be used for all process piping. All complete penetration welds made from one side without backing or back gouging shall be qualified by test using production welding techniques and welders.

- c. To enable weld inspection of root pass contour on pipe size 2" NPS and above two inspection windows of approximately 1" in length opposite to each other shall be left. After root visual inspection the windows shall be closed by welding.

11.08 **Weld quality control.**

Weld quality control shall be the responsibility of the contractor. As a minimum, the Contractor shall perform inspection and testing of each weld joint prior to welding, during welding, and after welding as specified in this section and as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

- 11.08.01 The QC inspector employed by the contractor shall be the duly designated person who is experienced in Stainless steel piping fabrication and quality control at least for a period of five years and acts for and on behalf of the contractor for inspection, testing, and quality related matters for all welding.



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The QC inspector shall be responsible for quality control acceptance or rejection of materials and workmanship. The QC inspector shall monitor and shall be responsible for signing all reports and shall inspect and approve joint preparation, assembly practice, welding technique, and the performance of each welder, and tack welder to make certain that the applicable requirements of the code and the approved WPS are met. The size and contour of all welds shall be measured using suitable gauges. Visual inspection for cracks in welds and base metal and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this specification may be used when approved by the engineer. Quality assurance (QA) is the prerogative of the Engineer.

- 11.08.02 Engineer may direct the contractor to perform NDT that is in addition to the visual inspection or NDT specified in the codes and this specification if deemed necessary.
- 11.08.03 Required repair work to correct welding deficiencies, whether discovered by visual inspection or NDT, or by additional NDT as directed by the engineer, and any associated delays or expenses caused to the contractor by performing these repairs, shall be at the contractor's expense.
- 11.08.04 The engineer shall have the authority to verify the qualifications or certifications of any welder, QC inspector, or NDT personnel to specified levels by retests or other means. A sufficient number of QC inspectors shall be provided to ensure continuous inspection when any welding is being performed. Continuous inspection, as a minimum, shall include (1) having QC inspectors continually present on the shop floor or project site when any welding operation is being performed, and (2) having a QC inspector within such close proximity of all welding operations so that inspections by the QC inspector of each operation, at each welding location, shall not lapse for a period exceeding 30 minutes. Inspection and approval of all joint preparations, assembly practices, welding techniques, and the performance of each welder, and tack welder shall be documented by the QC inspector on a daily basis for each day that welding is performed. The QC inspector shall confirm and document compliance with the requirements of code criteria and the requirements of these special provisions on all weld joints before welding, during welding, and after the completion of each weld. When joint details that are not prequalified by the applicable codes are proposed for use in the work, welders using these details shall perform a qualification test plate using the approved WPS variables and the joint detail to be used in production. The test plate shall be the maximum thickness to be used in production. The test plate shall be mechanically or radiographic tested as directed by the Engineer. The period of effectiveness for a welder shall be a maximum of 3 years for the same weld process, welding position, and weld type. A valid qualification at the beginning of work on a



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contract will be acceptable for the entire period of the contract, as long as the welder's work remains satisfactory.

11.08.05 The qualified welder shall further demonstrate a performance trail on test pad same as actual job, for full penetration nozzle joints. However, for 3/4" process header tubes an actual performance trial similar to position 6GR of API Code 1104 shall be done on daily basis. The welder shall be allowed to weld production joints only after satisfactory completion of performance trail.

11.09 **Welding quality control plan.**

11.09.01 The quality control inspector shall be responsible directly to the contractor for the quality of welding, including materials and workmanship, performed by the contractor.

11.09.02 The QCI shall be the responsible for submitting, receiving, and approving all correspondence, required submittals, and reports relating to quality, to and from the Engineer.

11.09.03 Prior to submitting the Welding quality control plan (WQCP) required herein, a meeting between the engineer, contractor, and any entity performing fabrication for this project, shall be held to discuss the requirements for the WQCP. The contractor shall submit to the engineer 3 copies of a separate WQCP for each item of work for which welding is to be performed. No welding shall be performed until the WQCP is approved in writing by the engineer.

11.09.04 An amended WQCP or any addendum to the approved WQCP shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS, additional welders, changes in NDT firms or procedures, QC or NDT personnel, or updated systems for tracking and identifying welds.

11.09.05 Work affected by the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. Each WQCP shall include the applicable portions of the following, as determined by the engineer:

- A. The name of the welding firm and any required NDT inspection personnel or firms.
- B. A manual prepared by the NDT inspection personnel or firm that shall include equipment, testing procedures, code of safe practices, the written practice of the NDT inspection personnel or firm, and the names, qualifications, and documentation of certifications for all personnel to be used.



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- C. The name of the QCI and the names, qualifications, and documentation of certifications for all QC inspectors and assistant QC inspectors to be used.
- D. An organizational chart showing all QC personnel and their assigned QC responsibilities.
- E. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including
 1. All visual inspections.
 2. All NDT including radiographic geometry, penetrometer and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports.
 3. Calibration procedures and calibration frequency for all NDT equipment.
- F. A system for the identification and tracking of all welds, NDT, and any required repairs, and a procedure for the re inspection of repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld, 2) placing all identification and tracking information on each radiograph, 3) a method of reporting nonconforming welds to the engineer, and 4) a method of documentation of repairs and re inspection of nonconforming welds.
- G. The WPS, including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness.
- I. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness.
- J. After final approval of the WQCP, amended WQCP, or addendum, the contractor shall submit copies to the engineer of the approved documents.

11.09.06 It is expressly understood that the engineer's approval of the contractor's WQCP shall not relieve the contractor of any responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications. The Engineer approval shall not constitute a waiver of



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any requirement of the plans and specifications nor relieve the contractor of any obligation there under; and defective work, materials, and equipment may be rejected notwithstanding approval of the WQCP.

- 11.09.07 The following items shall be included in a weld inspection documents that is to be submitted to the engineer following the performance of any welding
- A. Reports of all visual weld inspection reports and other NDT methods.
 - B. Required NDT reports.
 - C. Documentation that the Contractor has evaluated all other nondestructive tests and corrected all rejectable deficiencies, and all repaired welds have been reexamined by the required NDT and found acceptable.
- 11.09.08 Reports regarding NDT shall be signed by both the NDT technician and the person that performed the review, and then submitted to the QCI for review, signature obtained prior to submittal to the engineer. Corresponding names shall be clearly printed or typewritten next to all signatures.
- 11.09.09 The engineer will review the welding report to determine if the contractor is in conformance with the WQCP. Except for noncritical weld repairs, the engineer shall be notified immediately when welding problems, deficiencies, base metal repairs, or any other type of repairs and proposed repair procedures to correct them. No remedial work shall begin until the engineer approves the repair procedures in writing.
- 11.09.10 The QCI shall sign and furnish to the engineer, a certificate of compliance of the standard specifications for items for which welding will be performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans, the standard specifications, and special provisions if any.

11.10 **Welding process.**

All piping shall be welded using Gas tungsten arc welding either manual or automatic and for structural welding shielded metal arc welding shall be used. Manual GTAW process in the uphill progression only. Special care shall be taken to protect the weld area from any draught, both externally and internally. For welding of all grades of steel alloys by GTAW process, a 2% thoriated tungsten electrode conforming to AWS A 5.12-EW Th-2 classification shall be used.

Any other welding process, if proposed by the contractor, shall require specific approval of the engineer.

11.11 Welding techniques.

The welding technique and arc manipulation shall be controlled in all process piping weld joints to ensure,

1. Full penetration
2. Full fusion (without undercuts)
3. No porosity
4. No tungsten inclusion
5. No cracks
6. Free from all defects detectable by radiography
7. Leak tightness better than 1×10^{-9} mbar.lit/sec. of Helium

Note: For utility piping all the above requirements except point 7 shall be applicable.

11.12 Welding Procedure Specifications (WPS).

11.12.01 Detailed welding procedure shall be established and qualified in accordance with QW 291 of ASME section IX, part QW-201. No production welding shall commence until the appropriate procedure tests have been completed and approved. Repair welding procedures are to be established and, where necessary, qualified. A written welding procedure specification together with test certificates indicating mechanical properties and chemical analyses of both base materials and welding consumables shall be submitted to the engineer for preliminary approval. No procedure qualification tests shall be performed until the procedure specification has been granted preliminary approval by the quality control inspector.

11.12.02 Welding procedure specifications shall contain the following "applicable parameters" with all explanatory details necessary (see also ASME Section IX, part QW-250):

- a. Material specification of base metals
- b. Welding process
- c. Wall thickness and diameter range used for procedure qualification (chemical analyses and mechanical properties of the base material and welding consumables used for the procedure tests shall be included in the welding procedure qualification record).
- d. Geometry of welding grooves showing allowable tolerances.
- e. Root gap showing allowable tolerances.
- f. Welding position and direction.
- g. Filler metal classification.
- h. Gas shielding - flow, mixture, composition (to include back purging).
- i. Number and sequence of the important passes (indicate stringer or weave beads).



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- j. Welding current range, voltage range and polarity.
- k. Travel speed or electrode run out length for each pass and range.
- l. Heat input range.
- m. Preheat and inter pass temperatures.
- n. Method of cleaning, cutting and machining if applicable.

When any changes in these parameters are made, the welding procedure qualification shall be set up as a new WPS, and shall be completely re-qualified.

11.13 **Welding Procedure Qualification (WPQ).**

11.13.01 A qualified welding procedure specification is one which is tested to and has achieved the requirements of Code and has been witnessed and approved by the quality control inspector and the certifying authority. A guide for welding procedure qualification to be followed at BARC, Mysore is given in **Appendix – C**. The contractor shall conduct the tests required to qualify each procedure and tests shall be witnessed by the quality control inspector and the Certifying Authority. The charges for qualification of welding procedure specification, Welder performance qualification shall be borne by the contractor including mechanical test and NDT. **Procedure qualification tests shall be performed at site and shall be witnessed by the quality surveyor of BARC.** Complete weld preparation (inside diameter, alignment on inside diameter, root-opening, wall thickness etc.) shall be as defined in the procedure qualification. No work shall start on prefabrication or installation of piping until the procedure qualification tests for the particular type of welding has been accepted by engineer and the procedure have been distributed to the parties concerned. Procedures shall be available at actual work location at all times. The contractor shall deposit with engineer copies of each qualified and accepted procedure for his use and retention.

11.13.02 All tests specimens shall be properly tagged and preserved for the duration of the piping contract. The deposition of the test specimen shall be directed by the engineer. The party undertaking piping work shall verify the actual requirements of the code and shall qualify any additional procedures required.

11.13.03 All services in connection with the establishment of welding procedures, welder's performance qualifications, related tests and additional corrosion tests shall be done by the contractor. Qualification of a welding procedure is restricted to the contractor where the test weld was produced.

11.14 **Procedure Qualification Record (PQR).**

The specific facts of the WPS and test results shall be recorded in the procedure qualification record PQR, signed by the responsible QCM.

11.15 Mechanical testing of procedure qualification test welds.

Mechanical testing shall be performed as specified in ASME Sec IX. The results of both retest specimens shall meet the specified requirements. Dimensions of the weld samples shall be sufficient to provide for the required test pieces as defined in ASME code Sec IX.

11.16 Welder Performance Qualification.

11.16.01 All welders shall have passed the performance qualification tests prescribed in ASME section IX of the ASME boiler and pressure vessel code. The performance qualification tests shall be performed at site and the qualifying authority shall be quality surveyor. The quality surveyor shall have the right to call for further qualification from time to time from any welder who, in the quality surveyor's opinion is not producing finished welds in accordance with his requirements, or who has discontinued welding by the particular process for more than six months. The contractor shall ensure that qualified welders are employed during fabrication only on welding the type, process and position of weld for which their qualification tests so qualifies them. A welder may also be required to re-qualify if inspection during fabrication reveals that repairs are necessary due to unacceptable defects. The contractor shall maintain an accurate record of the performance of each welder which should show the repair rate. The repair rate should be indicated as a percentage of the total length of weld produced.

11.16.02 Jigs and fixtures for testing as well as arrangement with external agencies for radiography / tensile testing of specimen welds shall be in the scope of the contractor.

11.16.03 The quality surveyor shall have the right to call for repeat qualification from time to time for any welder. A separate mock up test for pigtail tubes shall be done on daily basis before starting of pigtail production joints even after obtaining performance qualification. Repeated weld defects made even after qualification will call for immediate disqualification of the welders.

11.17 Welder competency.

Only welders having experience in similar piping and who were earlier qualified (relevant documentary evidence to be produced) shall be permitted to take up the performance qualification test. Proven previous qualifications shall be submitted to engineer for acceptance which shall be in accordance with ASME Sec. IX Boiler & Pressure vessel code. Only the welders who qualify shall be permitted to take up actual welding.

11.18 Retests.



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Retests are only considered after consulting BARC representative.

11.19 **Welder Qualification Record.**

11.19.01 A Welder's qualification record, which includes references or the corresponding WPS and the applicable parameters and the test results, shall be issued for each welder and for each test. For each welder a record card shall be maintained showing the procedure for which he is qualified. These cards shall note the date each procedure is used, the type of defects produced and their frequency. These records shall be reviewed once in a week by quality surveyor. When repairs are to be made, the welder whose work is defective shall have the nature of the defects explained to him. It is preferable if a welder can repair his own defective welds.

11.19.02 Each welder shall be assigned a letter, number or symbol. Each weld shall be clearly identified as to its welder either by maintaining a chart on which every weld is detailed by marking, by Vibroetching or by an electrolytic etching method on the pipe adjacent to the weld. If Vibroetching is used it should not infringe upon minimum wall thickness requirements and is subject to the approval of quality surveyor.

11.20 **Welding Consumables.**

The welding consumables issued by purchaser shall be used to a maximum extent and the wastage shall be limited to 10-15% (max) and same shall be accounted. Any wastage above the prescribed limit shall be chargeable to the contractor. All the used welding consumables shall be collected and returned to the QCI of BARC.

Electrodes which are in the scope of contractor shall be brought in fully sealed packages and stored in a dry storage room and handled according to the manufacturer's recommendations. All electrodes shall be properly identifiable up to the time of usage, each electrode being distinguished by proper coding. If the coding is destroyed by baking, handling, or other causes, the electrodes shall not be used.

11.21 **Storage of welding consumables.**

All electrodes/filler wire shall be stored in their original sealed container and under dry conditions (50 % max RH). The electrodes/filler wire shall remain identified until consumed. Electrodes/filler wire shall not be left at work locations whether in metal containers or otherwise. Electrodes, which have been exposed, to rain or which have been otherwise exposed to water shall be discarded. No re baking of such contaminated electrodes shall be permitted. Welding rods used for stainless steel shall not be stored in heating cabinets containing electrodes of other types. Wire spools shall be stored in cabinets

with supplier wrapping not removed and remain clearly identifiable up to the time of usage. Unidentifiable wire shall not be used. Each batch of wire shall be labelled with the information from the supply container. The labels with batch number shall be recorded for reference in relation to the actual welding work. Manual electrodes and wire shall be of the same type as those used in the procedure qualification tests. Welding approved currents and voltage shall be within the range specified in the welding procedure. All unidentifiable, damaged, wet, rusty or otherwise contaminated consumables shall not be used. Electrodes with visible stains as well as partially used electrodes shall not be used.

11.22 **Selection of welding consumables.**

The selection of filler metal for welding of piping shall be on the basis of **Appendix C1** of this specification. Electrodes for structural applications shall conform to **AWS A5.1** Series standards and shall be coated rods or wire of size and classification number as recommended by their manufacturers for the positions and other conditions of actual use.

11.23 The brands of electrodes to be used shall be submitted for approval by the engineer. For each batch of each approved brands, certificates showing compliance with the specification shall be secured and shall be submitted to the engineer before being released for use.

11.24 **Welding preparation.**

11.24.01 Internal and external surfaces to be welded shall be clean and free from paint, slag, spatter, oil, rust, scale, salt or other material that would be detrimental to either the weld or the base metal under welding conditions. Butt-weld end preparation is acceptable only if the surface is reasonably smooth, true and all slag from arc cutting and grinding is cleaned from surfaces. Discoloration which remains on surface shall be removed.

11.24.02 If the external surfaces of the two components are not aligned, the weld shall be tapered between the two surfaces. (Tapering 1: 4). When beveling on a weld (for instance to reduce misalignment) is obtained by weld reinforcement, this reinforcement must be subjected to a complete non-destructive examination.

11.24.03 Each bead shall be thoroughly cleaned of all scale, slag and other foreign matter by chipping, grinding and wire brushing prior to application of succeeding bead. Any piping material which is burned during welding shall be cut out and re-welded. If lamination or split ends occurs during welding the joint shall be trimmed to remove the defect. Any bevelled edge that has been damaged shall be repaired and DP-tested. Welds which do not meet the requirements of the welding procedure, which are burned or oxidised or otherwise found to be defective, shall be repaired or cut out at the direction of

quality surveyor. At each welding location, at least one electronic backing gas detector, ammeter & voltmeter and electronic temperature meter shall be present.

11.25 Marking of welds.

The welder shall clearly mark the pipe adjacent to his weld with the identification mark assigned to him in his qualification certificate prior to starting the root pass. Tack welding of components should not be marked. Marking shall be done by vibroetching. The use of stamps for marking the welds is not allowed. The welder who makes the weld shall write his code at the top of the pipe adjacent to the weld. However, if, two welders weld the root pass, each welder shall mark the top of the pipe with his identification code on the side on which has worked.

11.26 Weld profile.

All butt welds shall be full penetration welds. The external surface of the weld shall be free from undercuts, overlap and abrupt ridges or valleys. The weld metal reinforcement on the outside surface on the pipe shall not exceed the limits specified in **Table A1 of Appendix E** of this specification. The reinforcement shall be crowned at the centre and shall taper smoothly to the surface being joined. When components of different outside diameters are welded together there shall be a gradual transition between the two surfaces. The length of the transition may include the weld. The slope of the transition shall be such that the length to offset ratio shall be at least 4 to 1. Defects such as icicles, burn through, lack of fusion, lack of penetration etc shall be cause of rejection of the weld.

11.27 Welding of valve flanges.

Straight through plug valves of 3/4' size which is issued by department shall be welded with suitable flanges, by the contractor. In such cases all the spares like stem, seat, gaskets etc shall be removed from those respective valves and preserved with proper identification. This is to avoid damage to those parts while welding. Once the welding, NDT and Passivation are completed the accessories shall be reassembled to the valves from which they are removed. For any welding involved in this case welding joints shall be considered as per inch diameter basis under pipeline welding.

11.28 Weld attachments.

Attachments such as lugs, brackets, rings and other non pressure parts that are welded to the pipes to form an integral and permanent attachments shall be in accordance with the details shown on the drawing issued by engineer.

Temporary attachments such as clamps etc. required to retain fit up for welding shall be of material compatible with the material to which it is attached. All attachment welds shall be done by qualified welders and in accordance with the qualified procedures. When required, as in Appendix D attachment welds shall be completely examined by liquid penetrant method. Any defect revealed shall be repaired. Temporary attachments shall be removed in a manner that will not damage the parent material. The removal shall be done by grinding or sawing. The attachment may be reduced to very small cross-section and then the attachment knocked off. Knocking of full size attachment welds or tack is not permissible. The area from which the temporary attachments have been removed shall be dressed smooth and be examined by liquid penetrant method. Defects shall be removed and material re inspected to ensure their removal. If weld repairs are necessary, they shall be made using qualified procedures and welders shall again be examined by liquid penetrant method or radiography at the discretion of the quality surveyor.

11.29 Bead width, distance between welds.

The width of each weld bead shall be limited to three times the thickness of parent material welded. The number of welds shall be as small as possible. Piping butt welds shall be spaced a minimum of 2” or four times the thinnest wall thickness measuring between the heat-affected zones, whichever is greater. A straight run of pipe shall contain the minimum number of welds. They shall be properly sized to develop the full strength of the thinner of the two pipe components joined.

11.30 Tack welds.

All tack welds shall be fusion tacks made using a qualified procedure and qualified welders. The number and size of the tack welds shall be kept as small as is consistent with adequate strength and joint alignment. All tack welds shall be examined visually for defects and if found defective shall be removed completely. As the welding proceeds, the tack welds shall be fused so that they are satisfactorily incorporated into the final weld. All parts to be tack welded shall be adequately supported or held in their proper position by appropriate tables, jigs, and/or fixtures.

11.31 Seal welds.

Seal welding shall be done by the qualified welders and in accordance with the approved procedures. Threaded joints that are to be seal welded shall be made without the use of a thread lubricating compound. The surface to be welded shall be cleaned free from paint, grease, oil, rust, seal compound, etc. The threads shall be adequately prepared by grinding and entirely covered by seal weld. The surface of the seal weld shall merge smoothly into the component

surface and shall be suitable for the proper interpretation of the non-destructive examination of the weld.

11.32 **Socket welds**

Where socket weld fittings or valves are used pipe sections shall be spaced approx. 1.5 mm apart to avoid "bottoming" which can result in excessive weld stress. Approved welding procedures are to be adhered to.

11.33 **Backing strips.**

Backing strips shall not be allowed in any case.

11.34 **Shielding and backing gas.**

In order to avoid surface oxidation during welding process all pipes must be purged with 99.995 percent argon backing gas conforming to **AWS Standard A 5.32 welding shielding gases** sufficiently to remove all oxygen inside the pipe in the weld area. The usual way to achieve this is to seal off a minimum length of 10" on either side of the pipe on each side of the weld groove. This restricted volume is then purged with **six times the actual volume between dams** with argon gas, sufficient to remove all oxygen. The shielding and purging gas shall be Argon, and shall be maintained until the metal temperature is less than 250 °C. The rate of flow for shielding shall be established in the procedure qualification. Purging or backing gas shall be adequate enough to prevent any oxidation of weld during welding. Purging shall be maintained till the final weld pass is completed. Purging at a flow rate of approximately 10 cu.ft/hr subjected to maximum of 50 cu.ft/hr depending upon the diameter of pipe. In no case the initial purge be for less than 10 minutes. For system which have a small volume (upto ½ cu.ft) to be purged during welding, a flow rate of 2 to 5 cu.ft/hr is usually adequate.

Gas backing (purging) is not required on socket type welded joints, provided it is ensured that oxidation does not occur. The oxygen content of the backing gas directly before welding shall be determined with oxygen measuring equipment and shall be less than 100 ppm. All bottles containing shielding or backing gas shall have clear identification labels.

11.35 **Heat input.**

Heat input during welding should be kept low to reduce the danger of unwanted structures and precipitates. For this reason, the degree of dilution must be kept low. Two layers with little weld metal deposited are better than one layer with higher heat input and more deposited weld metal. A proper control on heat input for each welded joint shall be maintained. Voltmeter and ammeter shall be provided for each welder during welding to periodically check heat input of welds. The heat input for each pass shall not exceed 25,400 joules/inch. The heat input of welds performed by each welder shall be periodically noted down and recorded to ensure that the welds are done within the prescribed limits.

- 11.36 **Inter pass temperature.**
Welding of multi pass welds shall only be started after the joint has reached the maximum inter pass temperature. The inter pass temperature shall be measured within the joint bevel with suitable infra red temperature sensors. Crayon chalks shall be avoided for possible contamination of welds. The maximum inter pass temperature shall not exceed the maximum qualified or as mentioned in **Appendix C**.
- 11.37 **Weld surface finishing.**
When fabrication is completed, all welds shall be finished as indicated in the welding procedures or on the drawings to allow proper radiographic inspection and to remove all detrimental spatter, burrs, tack welds and other marks. Wherever required the damage shall be rectified in accordance with an agreed procedure. Welds shall not be treated with a torch or by any mechanical means outside the allowances of the welding procedure specification to change their appearance.
- 11.38 **Weld cleaning.**
During welding any part of the weld metal of parent plate exposed to the air at elevated temperature will become oxidized, the oxidation is ranging from light tinting to a black scale. Oxide shall be removed after each welding root. Otherwise preferential corrosion may result either from its difference in electrochemical properties or from its crevice action. Upon completion of each welding pass, the weld shall be cleaned of spatter, slag, oxides etc. After welding is completed, adjacent surfaces shall be thoroughly cleaned of all spatter and deposits. Finished welds shall present a clean appearance and surface restorations such as buffing with mechanized stainless-steel rotary wire brushes shall be made.
- 11.39 **Weld surface restoration.**
Once NDT evaluations are completed the weld, heat affected zone shall be passivated by a procedure approved by engineer. Barium sulphate or passivation paste shall be procured by the contractor and the same shall be submitted for the approval of the Engineer.
Barium sulphate shall be mixed with 1:3 Nitric acid and then applied on weld surface wherever chromium oxide layer is depleted adjacent to weld. The time duration shall be between 15 to 20 minutes. **The passivated area shall be a minimum of two inches on either side of the weld.**
- 11.40 **Weld /line numbering.**
In order to identify the spools and welds clearly all the spools shall be vibro etched as given below.
a. Weld joint number, welder number.
b. Pipe spool number



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- c. Line number
- d. Size of weld (nominal bore and wall thickness)
- e. Weld procedure(s).
- f. Base material type.

A weld is considered complete after visual inspection of the above.

11.41 **Repair and removal procedures.**

11.42.01 **Weld repairs**

a) Any weld repair/ rectification shall be subjected to the approval of the quality surveyor. All such rectification shall be carried out free of cost by the contractor. During repair, joints shall be purged with argon as it is done during the normal course of welding and the entire NDT procedure shall be repeated.

b) All repairs shall be executed by qualified welders according to approved procedures and all requirements of this Specification shall be met. The removal of weld metal or portions of the base metal may be done by machining, grinding or filing. High metal skin temperature shall be avoided and shall not exceed 150 deg C. The unacceptable portions of the weld shall be removed without substantial removal of the base metal and shall be done in such a manner that the remaining weld metal or base metal is not nicked or undercut. The grooves are to be free from scale and to have acceptable contours, and shall be visually and dye penetrant inspected prior to re-welding to ensure the defect has been completely removed. Additional weld metal to compensate for any deficiency in size shall be deposited using procedures as required in the making of the original weld. The surfaces shall be thoroughly cleaned before depositing the additional weld metal. Procedures shall be available at actual work location at all times. Each bead shall be thoroughly cleaned of all scale, slag and other foreign matter by chipping, grinding and wire brushing prior to application of succeeding bead. Any bevelled edge that has been damaged shall be repaired and repair welds which do not meet the requirements of the welding procedure, which are burned or oxidized or otherwise found to be defective, shall be cut out at the direction of quality surveyor. Whenever an imperfection is removed by chipping or grinding and subsequent repair by welding is not repaired, the excavated area shall be blended into the surrounding surface so as to avoid sharp notches, crevices or corners. The same area on a weld shall not be repaired more than twice. In the event of unsuccessful repair attempts or if the quality surveyor feels that the satisfactory repair is not feasible the joint shall be remade completely. Repair of any base material utilized in the fabrication of piping shall not be undertaken unless specifically permitted by the quality surveyor. Every possible care shall be taken with repairs to minimize welding stresses. If planar defects (cracks, lamellar tears, etc.) have to

be repaired, every effort shall be made to prevent propagation of the defect during its removal.

c) Where repair is selected, the following measures are required

Overlap or excessive convexity - remove excessive weld metal.

Excessive concavity of weld or craters, under sized welds, under cutting - prepare surfaces and deposit additional weld metal.

Excessive weld porosity, excessive slag inclusions, heavy metal inclusions, incomplete fusion or planar defects - remove unacceptable portions and re-weld.

11.42.02 **Re-examination of repair area**

The repaired area shall be reexamined by the methods specified for the original weld. Local repairs shall be inspected 100% by the method prescribed for the original weld with due regard to confirming that the original defect has been removed. Dye penetrant examination shall be used to check that the defect is completely removed prior to a weld repair.

11.42.03 **Welding quality control documentation.**

Each stage starting from the transfer of material identification marks, line identification marks, fit-up, root visual, root dye penetrant test, final visual, final dye penetrant test, and passivation shall be inspected and documented in weld inspection reports in the presence of quality surveyor. All the below mentioned records shall be approved by the Engineer and shall be in printed format.

Welding quality control records shall comprise the following.

a) Material identification report

b) Manufacturer's certificate for consumables supplies (argon gas, liquid penetrant etc.) attesting compliance with the specifications issued by the engineer.

c) Welding procedure specifications, procedure qualification records and welders qualification certificates

d) Procedures and methods for assembly, fabrication and handling

e) Procedures for repairs

f) Inspection and QC procedures

g) Procedure for Non-Destructive Examinations

h) Drawings indicating material and NDT locations

i) Qualification certificate of the personnel performing Nondestructive examination.

l) Results of radiographic examinations recorded on a standard reporting form, which shall be countersigned by the quality control inspector on completion of his examination.



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- m) Weld inspection reports.
- n) For each joint there shall be a record attesting that work was completed, examined and found to comply with all the requirements of this specification.

The above records shall be submitted in quantities as described in the BOQ. Chemical cleaning reports, weld inspection report and erection reports shall be of three copies each. All the original reports shall be submitted at the time of billing. Where only a single copy exists such as radiographs, this shall become the property of BARC on completion of the contract or earlier if so directed by the engineer.

11.43 Non-destructive examination

11.43.01 Examination method and requirements

11.43.01.01 General

All testing of weld joints and piping shall be executed by the contractor under the supervision of BARC. **The contractor shall arrange all the instruments, consumables and equipment needed for the testing.** The type and extent of weld examinations shall be as per **Appendix- D** of this specification. All non-destructive examinations shall be done to a detailed written procedure that has been qualified by actual demonstration as capable of detecting and locating discontinuities described in this specification as unacceptable or as required to be reported. The procedure shall comply with the requirements described in the relevant appendices of this specification covering the particular examination method. An adequate number of copies of the procedure shall be readily available to all applicable non-destructive examination personnel for reference and use.

11.43.01.02 Any non-destructive examination in which foreign material is applied to the surface; the surface shall be thoroughly cleaned in accordance with the applicable material or fabrication specifications. Cleaning shall be done immediately following inspection of the test in question.

11.43.01.03 All operating and supervisory personnel performing non-destructive examination shall be competent and knowledgeable of the application requirements and shall be qualified by BARC in the general technique and to the specific procedure. The quality surveyor shall have the right to require requalification or change of any person who in his opinion is not performing satisfactorily.

11.44.01 Test rig/facilities.

The contractor shall construct a suitable test rig for leak testing. The rig shall have all facilities for pneumatic testing and other Non-destructive testing

activities. Manpower for all testing, shall be arranged by the Contractor. The area shall be neatly maintained with good housekeeping practices.

11.45 Qualification of inspectors and NDT operators.

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the American society for nondestructive testing (ASNT) recommended practice No. SNT-TC-1A and the written practice of the NDT firm. The written practice of the NDT firm shall meet or exceed the guidelines of the ASNT recommended practice No. SNT-TC-1A. Only individuals who are certified as an NDT Level II, or Level III who hold a current ASNT certificate in that discipline are required to perform the interpretation. Level I/II technicians, shall perform NDT, level II inspectors shall review the results, and prepare the written reports. All personnel shall have sufficient experience in the respective field.

8.46 Visual Examination.

Visual examination is of the first order of importance. Its purpose is to ensure the conformity of the weldment with all provisions and requirements of the specifications and welding procedures..

Visual examination as called for in the alternative acceptance criteria Table A1 of **Appendix E** is only part of the visual examination requirements and shall extend to cover also the following steps

- a. Base metal identification.
- b. Base metal defects, if any, such as surface irregularities, cracks or laminations.
- c. Filler metal identification and verification of any defects.
- d. Edge preparation.
- e. Joint fit up
- f. Cleanliness
- g. Tacking
- h. Jigging
- i. Purge provisions.
- j. Engraving of pipeline, No, joint No, welder No, material identification No., and other relevant details.
- k. Root pass penetration and subsequent pass appearance.
- l. Cleaning between passes.
- m. Interpass temperature.
- n. Appearance of completed welds, their conformity with drawings and specifications and suitability for subsequent methods of examinations.
- o. Condition of base metal in the area adjoining the weldment.
- p. Excessive or unexpected distortion due to welding.



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Any deviations from the specifications and approved procedures shall be immediately reported to the Quality Control Inspector and his decision obtained prior to proceeding with the next step of the work.

11.47.00 **Liquid penetrant examination.**

Liquid penetrant examination shall be carried out in accordance with the minimum requirements of **Appendix F** of this specification. Liquid penetrant examination shall be done after root and final pass of welding. A written procedure for dye penetrant test shall be submitted by the contractor for the approval of engineer. The method followed shall be as per ASTM E165/ASME Section V Article 6. After the completion of test, all traces of the penetrant and developer shall be removed. Penetrant, developers and cleaning agents used shall be approved by BARC. The defect acceptance level shall be in accordance with ASME B31.3, Code for process piping, Chapter VI and **Appendix E** of this technical specification whichever stringent.

The penetrant, cleaner and developer shall be of good quality, which confirms to the requirements of the governing standards. The penetrant, cleaner and developer shall be tested and certified of having acceptably low halogen and sulphur content of each batch. The product shall be of reputed make and subject to the approval of the engineer in charge. The penetrant, cleaner and developer, which have lapsed the expiry date shall no longer be used and be discarded. Lint free tissue paper shall be used for wiping out the penetrant. Usage of cotton waste or any other clothes are prohibited. No other solvent other than approved penetrant cleaner shall be used for wiping the penetrant.

11.47.01 **Acceptance criteria**

The defect acceptance level shall be in accordance with ASME B31.3, process piping, chapter VI, and relevant appendices called in this specification unless more severe requirements are specified in the relevant drawings. Mere fulfillment of code requirements does not mean satisfactory completion of work. Hence the acceptance criteria stated in the appendices shall also be applicable.

Weld zones shall be visually examined on the inside and outside. The oxidation levels showing light brown-to-brown color are acceptable. Oxidation levels showing a narrow band of dark brown color and intermittent spots of blue color are acceptable. Darker or more extensive oxidation colors are not acceptable, and shall be removed.

12.00 **Piping installation**

12.01 **General**

Since the process requirements demand a high degree of cleanliness inside pipelines, leak tightness and strain free installation, it is essential that the following procedures are strictly adhered to by the contractor.

All structural welding for piping installation like piping supports shall be done by SMAW. The contractor shall use E 6013 electrodes. All piping shall be installed in accordance with the drawings. Flanges shall be installed such that installation removal or maintenance of equipment or valves can be done easily. Modifications to pipe routing may be necessary at site to avoid interference. These modifications shall be neat and possess good workmanship. Straight run pipe shall not be pulled through the pipe racks, unless supported on rollers.

Cold springing or forcing of piping for the purpose of joint make up is not permitted. Pipes passing through concrete walls or floors shall be passed through cast in sleeves or standard weight pipe having an internal diameter large enough to give 12mm radial clearance to the passing flange, including its lagging, where applicable, and shall have a light infill if air passage is to be restricted. Where piping passes through floor plate floors and grid mesh, a 75mm high collar having an internal diameter large enough to give minimum 25mm clearance to passing flange shall be welded to the floor plate/mesh to prevent chaffing and promote safety. A methodology statement shall be provided for site fabrication and installation of piping to the Engineer for approval.

All pipes shall be inspected before erection to ensure that they are free from loose contamination. Pipe work shall be erected on permanent supports designated for the line. Temporary supports shall be kept to an absolute minimum, but to an extent sufficient to protect nozzles and adjacent piping from excessive loads during the erection. Pipe work shall be fitted in place without forcing to avoid undue stressing of the line or strain being placed on a vessel or item of equipment, etc. All temporary pipe spools and supports that are an aid to erection, testing/flushing, etc. are to be specially marked for removal identification.

12.02 Valves and online mounted instruments erection work.

Valves shall be installed with stems orientated as indicated on piping drawings. Hand wheels and valve operating levers shall be easily accessible for operation from grade or platform. Valves shall not be installed with their stems projecting into walkways. Before installation of all right angle valve for process applications it shall be ensured that they are MSLD tested and certified by the quality surveyor. Valves which do not conform for leak tightness shall not be installed at any cost. The knife edges of all valve flanges shall be inspected for damages. Inside surface of all the right angled valves shall be inspected for any foreign particles. Foreign particles if found shall be thoroughly cleaned with acetone and lint free tissue papers.

12.03 Pipe support installation

All structural support drawings shall be prepared by the contractor and shall be approved by the engineer. Pipe support drawings shall be checked for dimensions and completed for construction details including bolting. Piping

shall not be forced to fit with support locations in such a manner that additional stress is introduced. The original approved drawing shall be submitted along with the bill. Any mild steel structure fabricated by the contractor shall be paid in tonnage basis and shall be as described in schedule of quantities.

All supports shall be installed such that piping system is fully and properly supported. Each support shall be capable to and actually carry the load for which it is designed. Epoxy painting shall be done on the supports and the color shall be same as for the adjacent structural steel. Painting or repair painting of supports shall not affect stainless steel piping. Piping shall be isolated with neoprene sheets of adequate thickness and shall never be in direct contact with the mild steel supports during installation.

12.04 Visual examination, repair of pipe, pipe fittings etc. before erection.

The contractor shall visually examine all materials being erected or being used in the fabrication and shall report any defects to the engineer. Defects in pipes, pipe fittings etc. involving loss of material up to 12.5% shall be merged smoothly by grinding or filing. Material loss greater than 12.5% and less than 33% shall be repaired by welding and inspected by any suitable non-destructive testing recommended by the quality surveyor. Material loss in excess of 33% shall be rejected. Any repair of materials shall be carried out as per the engineer's instructions.

The areas from which temporary attachments have been removed from equipment shall be dressed smooth and shall be examined by liquid penetrant method. Defects if any shall be removed and the material shall be re-inspected to ensure that the defects have been removed. If weld repairs are necessary, they shall be made using qualified welding procedures and qualified welders and shall be examined by liquid penetrant method or by radiography as the engineer may direct.

gaskets, bellows, seals etc of DN 8 bellow sealed valves shall be removed before welding of valve and the same shall be re assembled by the contractor under the supervision of engineer as welding may damage them.

Prior to field erection of fabricated sub assemblies inside surface shall be subjected to flushing with oil free compressed air and visually examined for foreign particles. The same shall be witnessed by quality surveyor, entered in register with contractors and QS signature.

12.05 Procedure for installation.

1. Prior to installation all spools and piping components shall be checked for damage and absence of any dirt inside.
2. Valves and on-line items shall be checked for loose internals or foreign matters.

3. All components shall be identifiable; pipe spools shall be clearly labeled and piping items shall be tagged.
4. All flange facings, especially gasket areas, shall be checked for damage.
5. All piping and pipe spools shall be installed without imposing excessive stresses.
6. Where flanges do not meet, additional field welds shall be made.
7. No excessive pulling or jacking to force a system in position is allowed.
8. BARC shall have the right to check potential stress in piping by unbolting or otherwise.
9. Flange connections to equipment shall be individually checked for stress-free assembly and alignment.
10. Manufacturer's/engineer's instructions shall be adhered to for equipment's and machineries.
11. Pipe supports shall be installed together with the piping system. Wherever required temporary supports could be used as per engineer's instruction.
12. Pipe supports shall be fabricated and installed per the code specifications/engineer's instruction.

Inspection before piping installation

Inspection on prefabrication shall guarantee as a minimum, the following items:

- a. Check on use correct materials and adherence to material control procedures.
- b. Check records of visual examination materials before use
- c. Check records on pipe cleaning
- d. Visual records of examination fit-up before welding
- e. Inspection of records on welding as per specifications
- f. Check records of visual examination after welding
- g. Inspection records on dimensions (both dimensions from drawing as fabrication-results (square, straddled, straight, etc.)
- h. Check non-destructive testing history
- i. Conformance with applicable documents including as built drawing
- j. Visual check on strain-free installation of piping

12.06 Discrepancies and field changes

Any discrepancies in, or omissions from drawings, specifications or other documents, or any doubts arising as to the meaning or intent of any part thereof, shall be referred to the Engineer. The Engineer will then issue written instructions or explanations.

All dimensions shown on the drawings which are related to installed equipments or pertinent embedded parts shall be verified by the contractor by field measurements before the fabrication of relevant pipelines are started. The



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required dimensions of closing pieces of piping as indicated on the detailed drawings must be established by direct field measurements.

Whenever the contractor is unable to comply with the engineer's requirement, be dimensional, technical or whenever field changes are inevitable for any reason, the contractor must obtain the appropriate authorization from the engineer. This authorization shall be in one or more of the following forms

- a. Amendments of applicable specifications.
- b. Revision of applicable drawing.
- c. Approval of design concession request (DCR).
- d. Approval of non-conformance report (NCR).

12.07 **Safety requirement**

The contractor shall be fully responsible for the personnel employed by them. The department will be represented by a safety surveillance Officer. He shall have full authority to take necessary action if any safety violations are noticed during fabrication activities.

Only approved welding, cutting, pressure reducing valves and allied equipments shall be used. All safety equipments such as helmets, hand shields, safety goggles etc. shall be provided for the personnel working. Proper protective clothing, safety shoes, hand gloves, cuff less pants, etc shall be provided for the working personnel. For personnel working beyond a height of four meters safety belts shall be provided.

All safety requirements during fabrication shall meet the latest edition of following standards

1. ANSI Z 49.1 Safety in welding, cutting and allied process.
2. ANSI Z 87.1 Practice for occupational and educational eye and face protection.
3. US occupational safety and health administration standards.

12.08 **Pneumatic testing.**

12.08.01 **General.**

The contractor as per ASTM E 515 shall do the pneumatic testing of all the utility and process circuits. Acceptance criteria shall be in accordance with ANSI B31.3, chapter VI, code for process piping and **Appendix- I** of this specification. All weld joints shall be tested for leak tightness under the supervision of quality surveyor of BARC using halogen free soap solution. This test shall be carried out on spools before erection and after the final erection. If any leak detected, the joint will be rejected and the contractor shall have to repair / rectify and retest the joint to the satisfaction of the quality surveyor. The test pressure shall, unless otherwise specified, be in

accordance with ASME B31.3. Testing shall not take place with system temperatures 4°C or less or where the ambient temperature during test falls by 5°C or more, nor during rain or fog unless under suitable cover. All necessary test gauges, instruments and soap solution will be supplied by BARC.

All defects found during leak testing shall be repaired or defective materials replaced as per the directives issued by the engineer.

12.08.02 Flushing.

The initial flushing of individual spools shall be carried out with pressurized moisture free air prior to pressure testing. Procedures for flushing shall be developed prior to start. The minimum velocity air used shall be 35m/s. Flushing of piping connected with system, valves, etc are prohibited unless approved by engineer. Procedure covering all safety aspects shall be established.

12.08.03 Preparation for testing.

12.08.03.01 BARC will provide all the required facilities like oil free compressed air, pneumatic hoses, calibrated pressure gauges, pressure regulator, valve, fittings, blind flanges, adaptors, bolts& nuts. However, labor assistance for carrying out testing and supervisory staff for overseeing the testing activities shall be in the scope of contractor.

12.08.03.02 All joints in a test section shall be accessible during tests and shall not be painted, insulated, or otherwise covered until satisfactory completion of testing in accordance with this specification. All vents and other connections, which can serve as vents, shall be open during filling so that all air is vented prior to applying test pressure to the system. Test vents shall be installed at high points. Equipment which is not to be subjected to pressure test shall be either disconnected from the piping or blocked off during the test. Safety valves and control valves shall not be included in site pressure testing. All control valves shall be removed or replaced with temporary spools or blinded off during pressure testing.

12.08.03.03 Minimum of one gauge shall be positioned at the highest point and one recorder to be positioned at the lowest point. Piping joints and welds shall not be insulated or physically covered until satisfactory completion of testing in accordance with this specification. All piping shall be adequately supported before the pressure test. Unless otherwise noted, all valves are to be through body tested. All instruments shall be isolated or removed before the test.

12.9.00 Testing



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- 12.9.01 Test medium shall be dry nitrogen or clean and dry oil free air which will be supplied by BARC. The sequence of test pressuring installed systems shall be as follows:
- 12.9.02 A pressure of 0.5 bar g shall be introduced in the system and a leak test performed. The pressure shall gradually be increased to 50% of the specified test pressure and kept for minimum 10 minutes to equalize strain. The pressure shall then be increased in steps of 10% of the specified test pressure, until the specified test pressure is reached. At each step, the pressure shall be kept for 10 minutes' minimum to equalize strain. □The specified test pressure shall be kept as mentioned in Appendix H. The piping systems shall not show any sign of leakage.
- 12.9.03 After completion of test: The tested systems shall be depressurized by opening the de-pressurizing valve in the test rig. After depressurization, all vents shall be opened and the system shall be thoroughly emptied.
- 12.9.04 Preservation with nitrogen if recommended by Engineer shall be done to keep the pipe system completely dry and to avoid condensation. Other alternatives are subject to agreement. Reinstallation of the system shall be performed in accordance with the test procedure.
- 12.9.05 Ends of pipes and nozzles shall be fully protected against the ingress of foreign material by the use of caps, plugs or plate blinds sealed with gaskets.
- 12.9.06 Pressure test shall be considered complete when:
All defective welds, defective materials, flange leaks, valve gland leaks or other such defects have been corrected and accepted by the quality surveyor.
All documentation and 'test section' information is complete and accepted by the quality surveyor.
Sealing materials shall not be used to correct leaks at joints. Valve glands shall not be tightened to the extent that the valve cannot be operated. If necessary, valves shall be replaced.
Piping systems vents shall be opened while draining to avoid a vacuum.
- 13.00.00 **Test records.**
A pneumatic test report shall be prepared and submitted to the engineer for verification. Contractor shall prepare a printed format for pneumatic test after approval from engineer. The report shall include date of test, spool number, acceptance criteria, deviation if any; signature of contractor and quality surveyor, etc. and the reports shall be retained in the job records.
- 13.00.01 **Safety during pressure testing.**



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All necessary precautions shall be taken to ensure that the pressure test is done in a safe manner. It should be kept in mind that a considerable amount of energy is present in the test medium under high pressure. Only personnel with appropriate safety and personal protective equipment's and those who are directly involved in the test shall be permitted in the vicinity. Systems filled with Nitrogen if any shall at all times be clearly marked with appropriate warning signs.

14 **Helium leak testing.**

- 14.01 All weld joints shall be tested for leak tightness by using Helium mass spectrometer leakdetectors as per ASTM E 498. The necessary equipment as well as expertise shall be provided by the BARC. However, the contractor shall provide the necessary assistance including labor for the same.
- 14.02 This test shall be carried out on spools before erection and after the final erection. If the leak rate of any joint including flanges exceeds 1×10^{-9} mbar.lit/sec. of helium, the joint will be rejected and the contractor shall have to repair / rectify and retest the joint to the satisfaction of the Quality Surveyor at no extra cost.
- 14.03 For convenience of testing a system will be subdivided into various circuits. The contractor shall provide any isolation of system and blinding of spools as and when required by the quality surveyor.

The test acceptance criteria are stated in **Appendix I**.

15.00 **APPLICATION OF PAINT**

15.01 **GENERAL**

- 15.01.01 General requirements for surface preparation, methods of surface preparation, quality of paint material, methods of application of paints, etc. are covered in these specifications and shall be adhered to. The application of paint is limited to mild steel structures like mezzanine platforms and piping supports made of mild/carbon steel. Parts fabricated with stainless steel material shall not be painted. Should any deviation from these specifications, standards and practices become necessary, the alternative shall be at least equivalent or better and shall have to be approved by the BARC. There shall be two coats of epoxy primer with two coats of epoxy paint of approved color. The final coat of epoxy painting shall be done after final testing and boxing up.
- 15.01.02 All mezzanine structural works including ladder, platform, saddles, skirts, base plates etc shall be painted in accordance with the specification.

15.02 **SURFACE PREPARATION.**

Metal surfaces prior to painting shall be cleaned from previous painting, if any and scale, rust, grease, dust etc.



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15.02.01 Greasy spots are removed from metal surfaces with clean waste cloth or wire brushes or with organic solvents (white spirit, benzene or special alkaline compounds).

15.02.02 METHODS TO BE FOLLOWED FOR SURFACE PREPARATION OF DIFFERENT MATERIALS

15.02.03 Surface preparation

Prior to painting all structural steel, surfaces requiring painting shall be cleaned to remove grease, oil, old paint etc. or by hand brushing, if required, to remove dust, scale, rust etc.

15.02.04 Solvent cleaning

Contractor may use appropriate solvent for removing grease, oil, old paint, dust, scale, rust etc.

Application

15.03.01 Paint shall be applied only after necessary surface preparation as per this specification is achieved and in accordance with the manufacturer's instructions. Each coat of paint shall be completely cured before applying further layer of coating.

15.03.02 All items shall receive primer and finishing paints as stated in this specification, unless otherwise mentioned in the drawings or in schedule of painting. Paint may be applied with brush or by spray painting (with air/ airless) according to manufacturer's standards.

15.03.03 Surfaces that become inaccessible after assembly shall be painted before assembly. Primed or undercoated work shall not be left in an exposed or otherwise unsuitable position for unduly long period before completing the painting process.

15.03.04 Surfaces which cannot be painted but require protection shall be given a coat of rust inhibitive grease. If more than 50% of the shop painted surface of an item require repair, the entire item shall be mechanically cleaned and new primer coats shall be applied followed by new finishing coats.

15.03.05 Except for site fabricated items, surface preparation and painting of all shop-assembled/ shop-fabricated supply items shall be done in the shop unless otherwise specified. However, for shop fabricated steel structures, pipe section etc. only primer painting and one epoxy coat of painting shall be applied before despatch to site.

15.03.06 For site-fabricated items, primer shall be applied after assembly and erection of an item is completed. Finish paint shall be applied after completion of testing. Where site welding is to be carried out for shop-coated items, the shop-coat of paint shall be kept clear of surfaces to be welded.



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15.03.07 Parts of steel structures embedded in concrete shall be made free from dust, rust, scale, grease, oil etc. after fabrication of the part is completed and shall be applied with a protective coat of port land cement slurry immediately.

16.00 COMMISSIONING SERVICES

16.01 The contractor shall provide necessary assistance for the following:

- a) Prepare plant equipment and piping for pre-commissioning checks trial runs and start-up.
- b) Assist in pre-commissioning checks trial runs start-up and commissioning of plant & equipment and piping.
- c) Assist in preliminary acceptance (PAT) and final acceptance test (FAT).

16.02 The contractor shall be required to clean up the equipment and surrounding area and prepare it for trial runs and operation.

16.03 Clean-up dirt, remove any protective coating applied by the manufacturer, clean ventilating openings and remove all the visible foreign bodies from the plant equipment and piping erected.

16.04 All structural bolting, flanges, inlet and outlet connection etc. shall be checked for tightness.

16.05 Valves glands and gauges glands shall be checked for sufficient rings or packing and tightness of packing gland draw up units. Pump, compressors, and inlet and outlet connections shall be checked for tightness of joints initially and till satisfactory commissioning. Connections requiring gaskets shall be checked all round to ensure equal stress over the entire gasket area.

16.06 All packing, glands and flanged joints shall be checked and tightened as necessary during trial run and commissioning.

16.07 Blow down of all piping systems.

16.08 Cold trial runs

Cold trial runs will be carried out at the end of erection by BARC to determine functionality and the readiness of equipment to operate the plant erected without production. The plant will be tested in all its functions and checked for proper performance. The contractor, at his cost, shall remedy any irregularities of fabrication and erection found during cold trials.

APPENDICES

Appendix - A of Section IV

Chemical cleaning procedure for stainless steel

- a. General Cleaning including wiping, degreasing, scrubbing and mechanical cleaning in process water.
- b. Soap cleaning (DDB based liquid soap, 25% active content and free from halogen and sulphur) using nylon brush and cleaning in running water.
- c. Pickling using 15 % HNO₃, 5% HF acid and 2% acetic acid bath at room temperature for 20 minutes. [Acids shall be supplied by BARC]
- d. Rinsing in process water.
- e. Passivation in dilute 15-20% HNO₃ for 20 minutes.
- f. Rinsing in process water.
- g. Rinsing in DM water.
- h. Ultrasonic degreasing, vapor degreasing using solvents like trichloroethylene (for only small components like top blocks, knife edge flanges, etc.).
- i. Drying in oven at about 150°C for 60 to 90 minutes.
- j. Packing with polyethylene sheets/caps after cleaning.

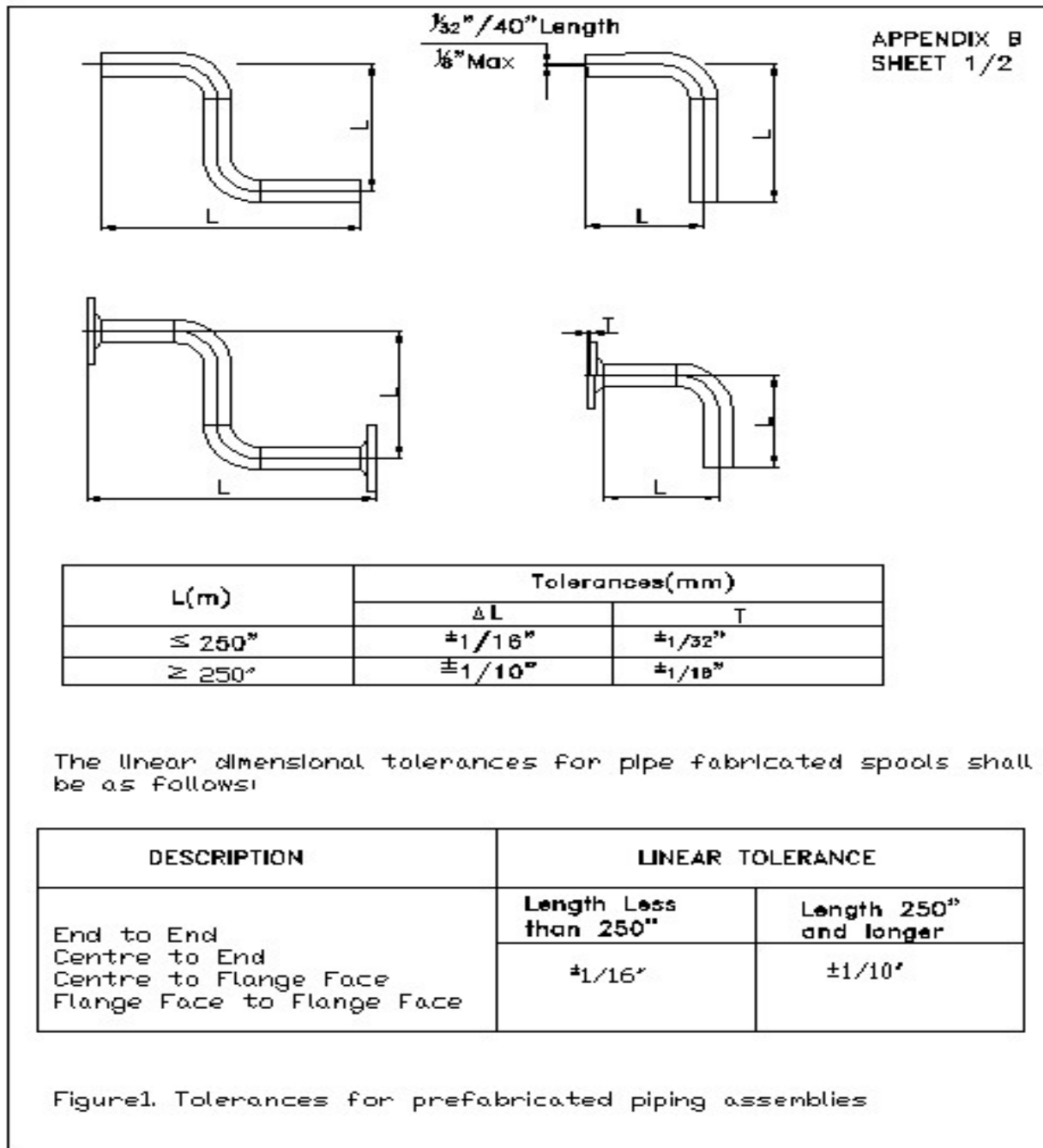
Note: The above procedure is applicable for all piping and equipments including SS 304L materials. After the procedure is completed all pipelines shall be checked with litmus paper for traces of any acids before packing.

Appendix - A -1 of Section IV

Chemical cleaning procedure for Monel 400 items

1. Cleaning with ordinary water using wire brush.
2. Soap solution cleaning by soaking and brushing in about 5% solution of liquid soap, which is free from halogen and Sulphur.
3. Washing with water using water jet.
4. Pickling shall be done in solution containing 266 gm NaOH, 67 gm of KMNO₄ in one liter of water at about 95°C to 100°C for 2-12 minutes depending upon the state of items.
5. Water cleaning using water jet.
6. Passivation shall be done in a solution containing 100cc of H₂SO₄ and 132 gm of sodium dichromate in one liter of water at temperature of 20°C to 40°C for 5 to 10 minutes.
7. Water cleaning using ordinary water and then with DM water.
 8. Checking with PH value paper for presence of any acid contents.
 9. Drying in oven, at 140°C, for about 45 min. to 60 min.
 10. Checking with tissue paper by wiping for proper cleaning.
 11. Properly covering with polythene sheet after cleaning.

Appendix B of Section IV
Tolerances for prefabricated piping assemblies



APPENDIX B
SHEET 2/2

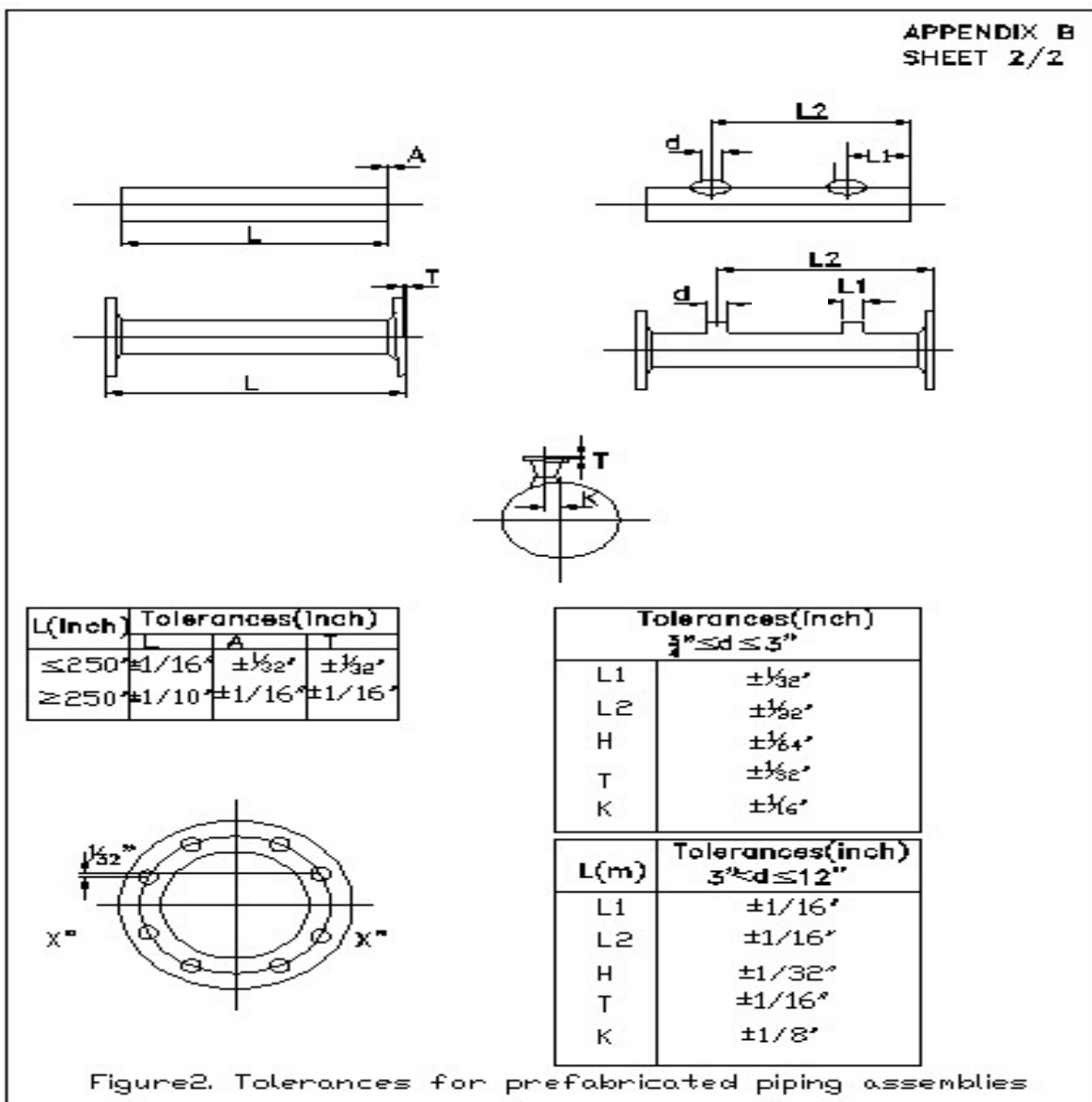


Figure 2. Tolerances for prefabricated piping assemblies

Appendix B of Section IV
Pipe Misfit Tolerances

NPS (inches)	Misfit Variation In Any Directions (inches)														
	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.20	1.40	1.60	1.80	2.00
1/2	5.5	7.8	9.5	11.0	12.3	13.5	14.5	15.6	16.5	17.4	19.0	20.6	22.0	23.3	24.6
3/4	6.1	8.7	10.6	12.3	13.7	15.1	16.3	17.4	18.4	19.4	21.3	23.0	24.6	26.1	27.5
1	6.9	9.7	11.9	13.8	15.4	16.9	18.2	19.5	20.6	21.8	23.8	25.7	27.5	29.2	30.8
1 1/2	8.3	11.7	14.3	16.5	18.5	20.3	21.9	23.4	24.8	26.2	28.6	30.9	33.1	35.1	37.0
2	9.2	10.1	16.0	18.5	20.7	22.6	24.5	26.2	27.7	29.2	32.0	34.6	37.0	39.2	41.4
2 1/2	10.2	14.4	17.6	20.3	22.7	24.9	26.9	28.8	30.5	32.2	35.2	38.1	40.7	43.2	45.5
3	11.2	15.9	19.4	23.4	25.1	27.5	29.7	31.7	33.7	35.5	38.9	42.0	44.9	47.6	50.2
4	12.7	18.0	22.0	25.5	28.5	31.2	33.7	36.0	38.2	40.2	44.1	47.6	50.9	54.0	56.9
6	15.4	21.8	26.7	30.9	34.5	37.8	40.9	43.7	46.3	48.8	53.5	57.8	61.8	65.5	69.1
8	17.6	24.9	30.5	35.2	39.6	43.2	46.6	49.8	52.9	55.7	61.0	65.9	70.5	74.8	78.8
10	19.7	27.8	34.1	39.3	44.0	48.2	52.0	55.6	59.0	62.2	68.1	73.6	78.7	83.5	88.0
12	21.4	30.3	37.1	42.8	47.9	52.5	56.7	60.6	64.3	67.7	74.2	80.2	85.7	90.9	95.8

APPENDIX C of Section IV
Guide to Welding Procedure

Procedure No.	Base material and group		Welding process	Filler metal	Application
1.	Carbon Steel	P 1	SMAW	E 6013 / E 7018	Structural
2	Stainless Steel	P 8	GTAW	ER 308L	Vacuum System Process System
3	Monel Inconel	P 42	GTAW	ER Ni Cu 7	& Utility System
4	Carbon steel	P 43	GTAW	ER Ni Cr 3	Process systems
5	to Stainless steel	P 1 To	GTAW	ER 309L	Process system
6.	Stainless steel to Monel	P 8 To P 42	GTAW	ER Ni Cr 3	Piping supports Process system

APPENDIX C-1

Selection of filler Metal

Material To be Welded	P Group	Arc Welding Covered Electrodes/ Welding Rods & Bare Electrodes			Interpass Temperature
		AWS Spec	AWS Classification	F No	



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Carbon Steel (Structural Steel)	P 1	A 5.1	E 7018, E 6013	F 6	250° C
Austenitic Stainless Steel TP 304L	P 8	A 5.9	ER 308L	F 8	125° C
Monel 400	P 42	A 5.14	ER Ni Cu 7	F 12	150° C
Inconel	P 43	A 5.14	ER Ni Cr 3	F 13	150° C
Carbon steel to Austenitic stainless steel	P 1 to P 8	A 5.9	ER 309L	F 7	125° C
Austenitic stainless steel to Monel 400	P 8 to P 42	A 5.14	ER Ni Cr 3	F 13	125° C

APPENDIX – D of Section IV

Inspection, examination and testing schedule for different types of welds

Systems	Butt welds		Nozzle welds		Seal weld		Socket weld		Structural welding	Support welding
	Root pass	Completed weld	Root pass	Completed weld	Root pass	Completed weld	Root pass	Completed weld		
Group-2	100% V +	100% visual +	100% V +	100% V +	----	----	----	----	100% V	100% V
	100% S	100% S +	100% S	100% S +						
		10% R +		10% R +						
		100% P +100% H		100% P +10						



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Note: V- Visual examination R- Radiographic test, S- Supplementary examination (Liquid Penetrant), P-Pneumatic test & H- Helium leak test.

In case of inaccessible joints in pipes and fitting of less than or equal to 1“visual examination shall be substituted with Boroscopic examination

APPENDIX-E of Section IV

Table A1 - Acceptance criteria for Visual inspection and Penetrant Testing

Type of defect	Group 1 and Group 2
Cracks	Not acceptable
Lack of fusion	Not acceptable
Incomplete penetration	Not acceptable
Undercut	"t" less or equal to 1/16” – Not Acceptable
	"t" greater than 1/16” - Shall not exceed 1/32 in. and shall not encroach on the minimum required section thickness. Max length of individual flaw is t/2. Max accumulated length in any 300 mm of weld is t.
Exposed slag/Oxidation	Darker or more extensive oxidation colors are not acceptable
Concave root surface (suck-up)	The weld thickness including reinforcement to be greater than the wall thickness.
Excess Root Penetration	For wall thickness $\leq 1/16$ ”: 1/32” and smooth transition For wall thickness 1/16” to 1/4” : 1/16” and smooth transition For wall thickness $> 1/4$ ” : 1/8” and smooth transition
Misalignment of butt welds (Fig. A2)	Max. Misalignment (M) 1/4 t or max. 1/16” whichever is the smaller.
Symmetry of	"a" less or equal to 1/4” - Max difference, b - h: 1/32”



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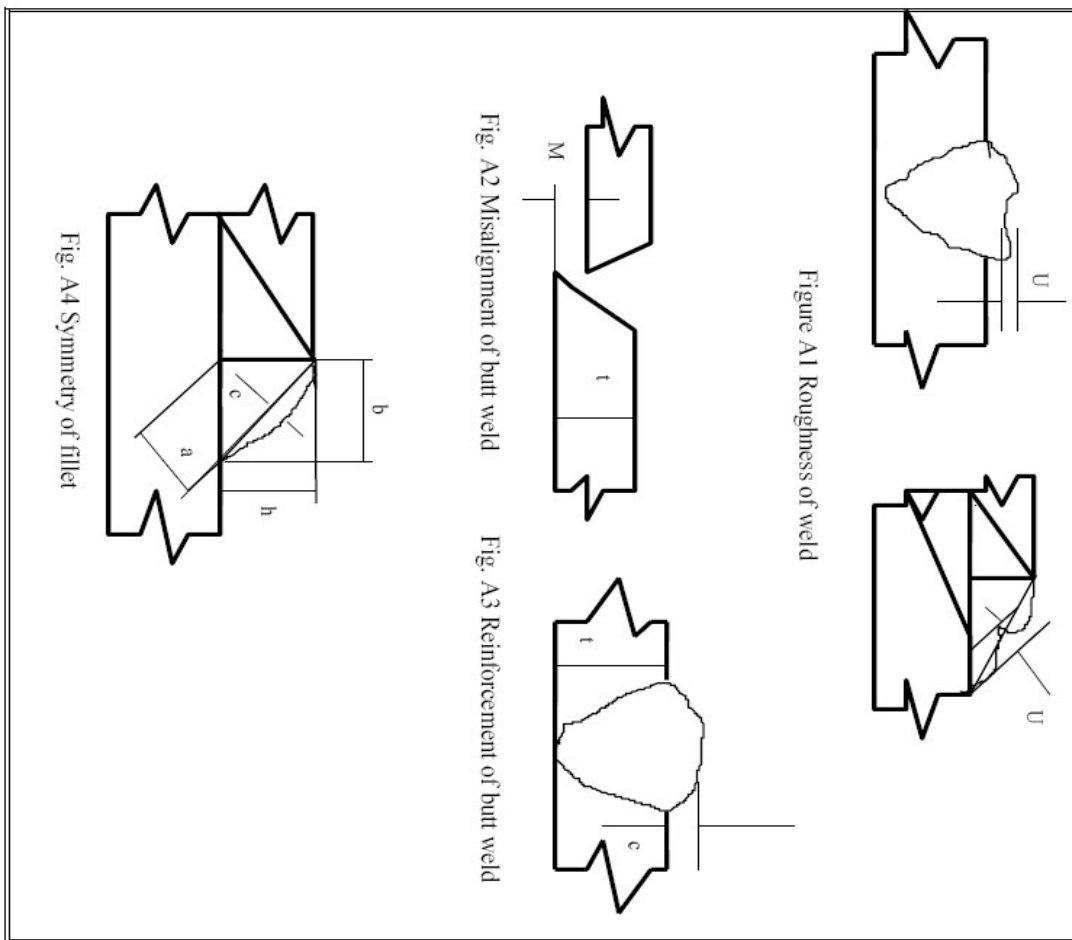
fillet welds (fig. A4)	"a" greater than 1/4", up to 1/2" - Max difference, b - h: 1/16"
Grinding arc strikes etc. and removal of temporary attachments	Grinding of base material shall not exceed 7 % of the wall thickness or max. 1/8". Repair welding and inspection shall be performed if removal of the base metal exceeds the specified requirements
Sharp edges	Minimum 1/8" radius.
Reinforcement of butt welds (fig. A3)	"a" less or equal to 1/16" max reinforcement "c" 1/32"
	"a" greater than 1/16" up to 1/4" Max reinforcement "c" 1/16"
	"a" greater than 1/4" up to 1/2" Max reinforcement "c" 1/8"
Reinforcement of fillet/partial pen welds (fig. A4) (Note 1)	"t" less or equal to 1/4" Max reinforcement "c" 1/32"
	"t" greater than 1/4", up to 1/2" Max reinforcement "c" 1/16".
Roughness of weld (fig. A1)	"U" shall be less than 1/32". Weld surface shall be smooth, without sharp transitions. The bottom of roughness in butt welds shall not be below the base material surface.

Notes:

Temporary attachments shall be flame cut min. 1/8" from the base metal and ground smooth. The ground area shall be visually inspected and DPT shall be performed in accordance with the inspection category in question.

t = wall thickness

Figure A



Weld joints depicting mis alignment, re-inforcement and undercut.

APPENDIX F of Section IV

LIQUID PENETRANT EXAMINATION

The specification contained herein describes method that shall be employed whenever liquid penetrant examination is specified and shall be substantially in conformance with ASTM standard E-165. Methods of liquid penetrant inspection and reference to this specification may be made for additional details to be included in written procedure required herein.

Method

Visible dye penetrant – solvent removable method is specified. Other methods shall require specific approval of the Engineer in charge.

In order to avoid stress corrosion, the halogen and sulphur contents of various agents used in liquid penetrant testing, sulphur and halogen contamination shall be restricted to 25 ppm in the solution at the concentration used in the examination.

Method requirement

Surface preparation

- For Surface irregularities, which mask the indication of defects, grinding or machining of the surface, will be required.
- Prior to liquid penetrant examination, the surface to be tested and any adjacent area within at least 1" of the surface to be tested shall dry and free of any dirt, grease, lint, scale, welding flux, spatter, oil or any extraneous matter that would obscure surface otherwise interfere with that test.
- Solvent cleaning agents shall be used for removing surface contaminates. Vapour degreasing and ultrasonic cleaning methods may also be used.

Drying

Drying of the surface to be tested, after cleaning, can be accomplished by normal evaporation. A minimum period of time shall be established and included in the written procedure to assure that the cleaning solvents have evaporated prior to the application of the penetrant. When employing the non-volatile solvents, it is recommended that forced hot air be used to accelerate drying.

Penetrant application

The penetrant shall be applied by dipping, brushing or aerosol spray cans. The penetration time shall be at least ten minutes, but this minimum time may have to be extended under certain conditions where there are finer and tighter discontinuities. The temperature of the surface of the part to be processed shall not be below 60 ° F, or above 125 ° F throughout the examination period. Penetrant shall not be allowed to become tacky. If a long penetration is required, fresh penetrant shall be regularly applied to the surface to ensure that the surface is wet at all times.

Excess penetrant removal

After the penetration time specified in the procedure has elapsed, any penetrant remaining on the surface shall be removed. Care shall be exercised to limit the removal of penetrant from any defect to as little as possible.

Excess penetrant, in so far as possible, shall be removed by using clean, dry clothes or lint free observant paper. The operation should be repeated until most traces of penetrant have been removed. A cleaned lint free observant paper shall then be moistened with solvent and the surface shall be wiped lightly in a uniform direction until all remaining traces of excess penetrant have been removed. Flushing the surface with solvent is prohibited.

Developing

The developer shall be applied as soon as possible after the penetrant removal operation and the interval shall not exceed the time established during procedure qualification. In sufficient application or excessive application of developer shall be avoided. The liquid developer shall be thoroughly agitated before the application of developer. The quality of

the developer and the method of application in a fine and uniform manner are important and shall be demonstrated to the satisfaction of the quality surveyor.

Examination

Interpretation shall be made as per allowing the penetrant to bleed out for a minimum of seven minutes to a maximum of 30 minutes. If the test surface is sufficiently large to preclude complete testing and examination within the prescribed time, the surface shall be tested and examined in suitable increments. The developer should form a more or less uniform white coating. Adequate illumination of 1000 lux approx shall be provided for examination.

Evaluation of indications

Any indications which believed to be non-relevant shall be regarded as a defect until the indication is either eliminated by surface conditioning or it is demonstrated as non-relevant. Relevant indications are those, which result from mechanical discontinuities. Linear indications are those in which the length of indication is equal to or more than 3 times the width. Rounded indications are indications in which the length is less than 3 times the width and are circular or elliptical.

Repair of defects.

All repairs shall be made in accordance with the requirements for the particular product form, including welds. Whenever the defect is removed and subsequent welding is not required, the affected area shall be blended in to the surrounding surface so as to avoid sharp notches, crevices or corners.

Procedure requirement

The contractor shall certify that the required written procedure is in accordance with applicable requirements of this specification. The required written examination procedure shall record in detail at least the following information.

- a. Brand name and specific type
- b. Detail of method of pretest cleaning and drying including cleaning materials used and time allowed for drying.
- c. Details of method of penetrant application, the length of time the penetrant remains on the surface and the temperature of the surface and the penetrant during the examination.
- d. Details of method of removing excess penetrant from the surface and of drying the surface before applying the developer.
- e. Details of the method of applying the developer and the length of developing time before inspection.
- f. Method of post test cleaning.

Procedure requalification

Requalification of procedure is required

- a. When any prior processing which may affect the penetrant test is changed.
- b. When a change or substitution is made in the precleaning materials or methods.



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- c. When a change or substitution is made in the penetrant material or in the processing technique.

Table A 2 –Acceptance criteria for radiographic testing

Type of defect	Group 2
Crack	Not acceptable
Lack of fusion	Not acceptable
Incomplete Penetration	Not acceptable
Porosity/ Tungsten Inclusion/ Slag inclusion	Max Single pore size $T/3$ or $1/16''$ whichever is least.
	Accumulated pore diameters in any area of $1/2'' \times 6''$ not to exceed $1/4''$.
Concave root surface (suck up)	Remaining weld thickness including reinforcement shall exceed the wall thickness
Burn Through	Not Acceptable

t = wall thickness

APPENDIX G of Section IV

Radiography examinations of weld joints

The guidelines contained herein describe radiographic examination methods and shall be employed whenever radiography examination is specified. Radiographic Examination shall be conducted in accordance with the examination methods of ASTM E 94/Section V, Article 2 except as they may be modified by the requirements of this specification.

1. Equipment and materials

a. Radiation source

Radiation source may be either X ray equipment or radioactive isotopes.

b. Films

The film shall conform with class I or II of ASTM E 94.

Film characteristics are shown below

Film type	Speed	Contrast	Graininess
I	Low	Very high	Very low
II	Medium	High	Low

c. Screens

- a) Intensifying screens may be used, except the fluorescent type screens. Screens shall be of commercially available type, made of pure Lead or an alloy of 6% Antimony and 94% Lead.
- b) Screens shall be free from surface streaks of lower atomic number materials and from wrinkles, dirt, grease, lint and scratches.
- c) Screens shall be in intimate contact with both sides of the film during exposure.

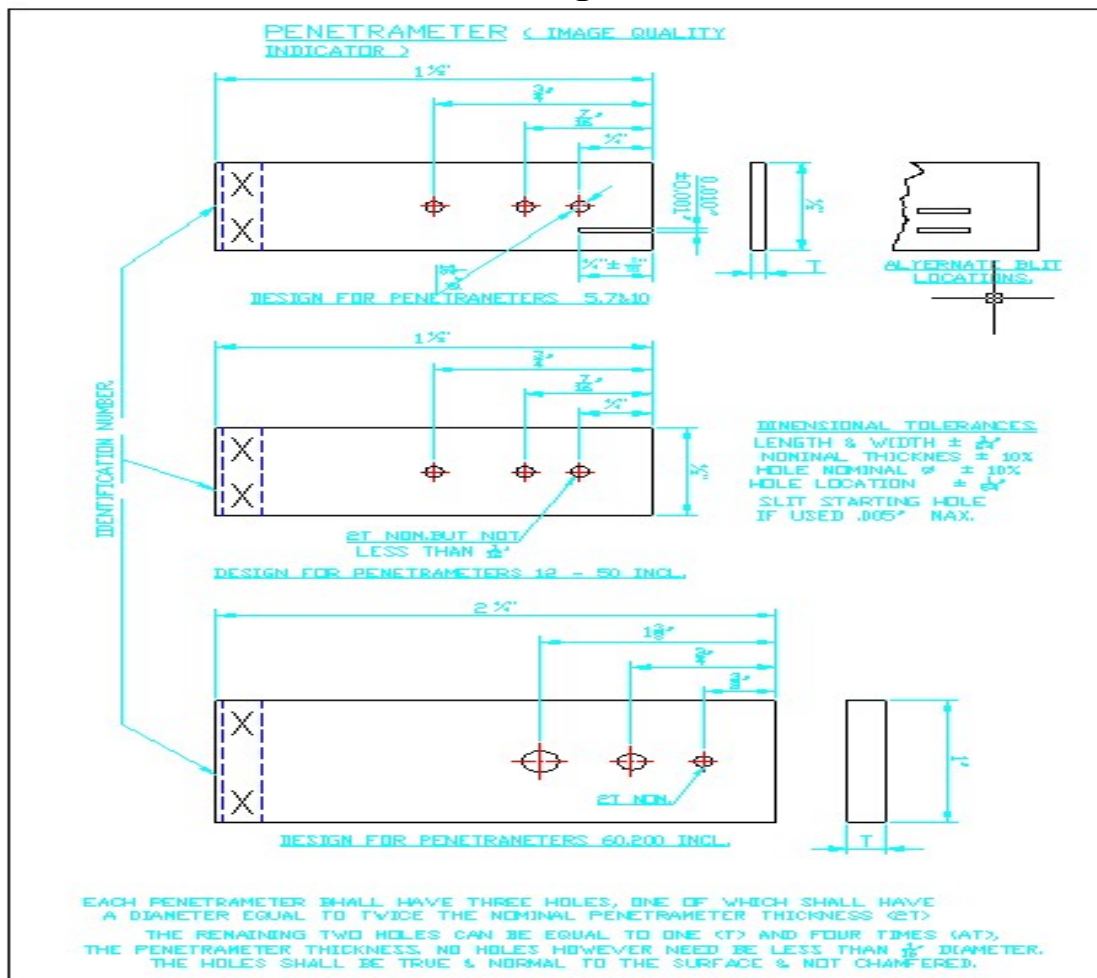
d. Filters

Objectionable scatter radiations shall be reduced by suitable filtrations with lead screens or other high atomic number metals placed between the radiation source and the specimen and between the specimen and the film.

e. Penetrameter

- a) Penetrameters for radiography of welds shall be of materials that are radiographically similar to or radiographically less dense than the base material and or the weld metal on which they are used. Radiographically similar materials refer to materials or alloy which have approximately the same radiation absorption as the material being radiographed. The identical alloy, by chemical analyses is not usually required for example, carbon and alloy steel are considered to be radiographically similar materials but radiographically less dense than materials such as copper or nickel base alloys.
- b) Penetrameter shall be in accordance with ASTM E 94 with the additional requirement that Penetrameters 5, 7 and 10 shall also contain a slit ¼” long by 0.010” wide as indicated in the figure 2 of this Specification.
- c) Each Penetrameter shall be further identified by marking its material or principal composition into the surface of the Penetrameter in a suitable manner.
- d) Penetrameter shall be identified by permanently attached Lead numbers at least 3/32 “high indicating penetrameter thickness in accordance with the tables at Figure-2 of this appendix.

Figure-2



f. Film processing

All film shall be processed in accordance with ASTM E –94.

2. Technique for radiographic examination of welded joints.

a. Weld surface condition

The weld ripples or weld surface irregularities, on both the inside and outside, shall be removed by any suitable mechanical process to such a degree that the resulting radiographic contrast due to any irregularities cannot mask or be confused with the image of any objectionable defect.

b. Radiography quality level

Radiography shall be performed with a technique which will have sufficient sensitivity to indicate the features of penetrator. The image of the identifying numbers, of the penetrator outline, and of the 2T hole are all essential indices of image quality on the radiograph, and they shall appear clearly on the radiograph. For penetrators 5, 7 and 10 either the 2T hole or the slit shall appear clearly (Ref

figure-1) of the radiograph. In the remaining penetrameters and for all film side penetrameters at least one hole, the 2T or a smaller hole shall appear.

c. Radiographic exposures

i. Single wall viewing

Except as permitted below, radiographic examination of circumferential butt welds in items such as pipe fittings and nozzles shall be performed with single wall viewing only. The radiation may pass through one or both walls. Only that portion of the weld that is adjacent to the film and readable on the film shall be considered to have been examined. Where the source is located outside, a minimum of four exposures separated by 90° is required for single wall viewing. The penetrameter thickness shall be based on the single wall thickness. Single wall radiography shall be used when practical.

ii. Double wall viewing

Welds joining pipes with an outside diameter of 3 ½ “or less may be radiographed using a technique in which radiation passes through two walls and the weld in both walls is viewed for acceptance on the same film. The penetrameter shall be placed on the source side. The angle of offset of the radiation beam from the plane of the weld centerline shall be the minimum required to separate the images of the source side and film side portions of their welds so that there is no overlap of the areas to be interpreted. A minimum of two exposures taken at 90° to each other shall be made for each weld joint.

For nozzle welds, single wall radiography shall be done and the technique shall be subjected to the engineer in charges approval. The weld shall be divided into a sufficiently large number of parts to ensure adequate sensitivity to each part.

d. Penetrameter application

The thickness of a penetrameter for a given weld, thickness shall be in accordance with **table-1 of Appendix-I**. Penetrameter placement for welds shall be in accordance with the table -1. The radiography quality shall be evaluated by the image of a properly located penetrameter. The penetrameter shall be placed on the side nearest to the radiation source. Where it is physically impossible to do this, a penetrameter can be placed on the film side of the joint but its thickness shall be as shown in the tables 1 and a Lead letter “F” at least ½ “ high shall be placed adjacent to the penetrameter.

At least one penetrameter shall be used for each exposure, to be placed so that the plane of the penetrameter is normal to the radiation beam. Additional penetrameters shall be used on circumferential welds in accordance with the table 1. Each penetrameter shall represent an area of essentially uniform radiographic density as judged by density comparison strips or a densitometer. If the film density through the weld varies through more than - 15 or + 30% from the density

through the penetrometer, then an additional penetrometer is required for the exceptional area or areas. If the requirements are met by two penetrometer, one a penetrometer appearing in the lightest area of film, and the other in the darkest, the intervening density and the film shall be considered acceptable. It is not necessary these additional penetrometers be normal to the radiation source at their location. The film density through acceptable weld metal shall be 2.0 minimum for single viewing and 2.6 minimum for composite viewing of double film exposures, each film of a composite set to have a minimum density of 1.3.

The penetrometer shall be placed adjacent to the weld seam except in instance when the filler metal is not radiographically similar to the base material, in which case the penetrometer shall be placed over the filler metal. If the weld reinforcement is not removed a shim of radiographically similar material to the filler metal shall be placed under the penetrometer. The shim thickness shall be selected so that the total thickness being radiographed under the penetrometer is the same as the total weld thickness.

Where more than one film per exposure is used, a penetrometer image shall appear on each film except, where the source is placed on the axis of the object and the complete circumference is radiographed with a single exposure at least three uniformly spaced penetrometers shall be employed.

When radiation passes through one or two walls and it is impractical to trace the penetrometer inside the pipe the penetrometer may be placed on the film side.

e. Film quality requirements.

All radiographs shall be free from mechanical, chemical or other processing defects that could interfere with proper interpretation of the radiograph such as

- a) Fogging
- b) Processing defects such as watermarks or streaking.
- c) Scratches, finger marks, crimps, dirtiness, static marks, smudges or tears.
- d) Loss of details due to poor screen to film contact, false indication due to defective screens or artifacts caused by defective films.

f. Film identification

1. Location markers, the image of which will appear on the film, shall be placed adjacent to the weld on the part, not on the film of film holder, and their location shall be marked on the surface near the weld in such a manner that a defect appearing on a radiograph may be accurately located, and in such a manner that it is evident on a film that complete coverage of the weld has been obtained.
2. Radiographs shall include all the information shown in the **Figure 3**.
3. The radiograph shall not be used for marking the defects of the joints. A tracing of the radiograph shall be used for this purpose.

g. Source to film distance

Radiography shall be performed with a geometrical unsharpness of a maximum of 0.020” for material thickness up to 4” and 0.050” maximum for thicker material. Under no circumstances will an unsharpness exceeding 0.070” be acceptable. Geometrical unsharpness equals source size times thickness over objective source distance.

$$U_g = f \times t / d$$

f- Source size (inches)

d- Distance from source to weld (inches)

t- Thickness of the weld (inches). Otherwise thickness of the weld or object + the space between film and the weld or object.

h. Object to film distance

The object to film distance shall be the minimum possible and when practical the film shall be shaped to the contour of the object.

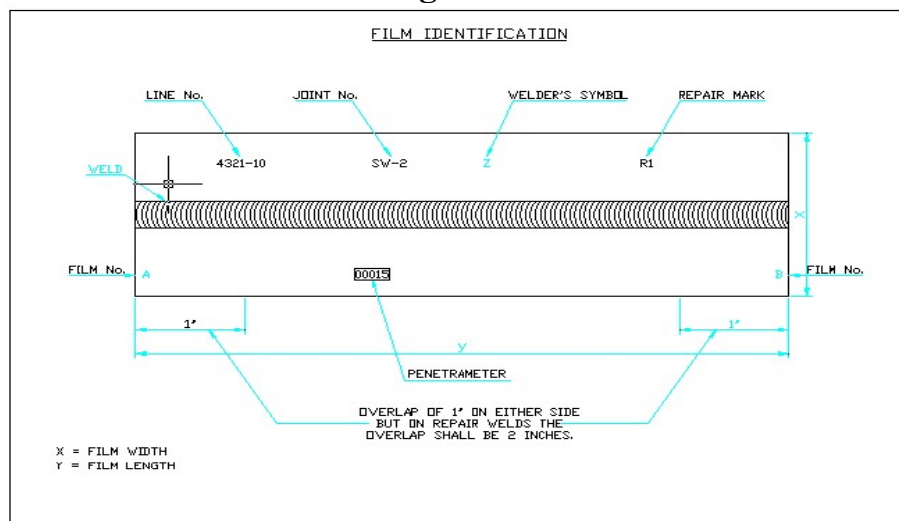
3. Procedure requirements

Radiographic examinations shall be performed in accordance with a written procedure to the requirements listed below.

The procedure shall be submitted for the approval of the engineer in charge and shall include at least the following information

- a. The type of material to be radiographed.
- b. The material thickness ranges to be radiographed.
- c. The type of radiation source, focal spot or source size, X ray machine voltage rating and manufacturer.
- d. Film brand, type and number of film in cassette. For multiple film technique state whether viewing will be done with superimposed films.
- e. Type and thickness of intensifying screens and thickness.
- f. Blocking or masking techniques if any.
- g. Minimum source to film distance.
- h. Exposure conditions, voltage, distance of film to object, geometric arrangements for the radiographs (sketch), orientation or location markers.
- i. Description of the welding procedure.

Figure- 3



4. Reports

Written reports of radiography examination shall be submitted for the approval of the engineer in charge on the form approved by the engineer in charge. Prior to submitting the entire radiograph to the engineer in charge the contractor shall examine and interpret all the radiographs and the written report shall be accompanied by such review reports and submitted to the third-party inspection agency authorized by BARC.

Penetrameter placement for welds

Diameter or pipe size * Inches	Wall through which radiation passes	Number of walls viewed for acceptance	Number and location of penetrameters for circumferential welds
3 ½ and under (Except fittings)	2	2	One penetrameter located on the outside surface of the pipe and the source side, along the centerline of the pipe and with the long axis perpendicular to the length of the weld
All sizes	2	1	Two penetrameters shall be selected in accordance with the table on page and placed as per 2.4(1)(D)**. One shall be located at each extremity of the area to be examined, or one at the center of the radiation beam, and one at the extremity of the area being examined. The penetrameter shall be placed with their long axis parallel to the length of the weld.
All sizes	1	1	

1. When the source is placed on the axis of the joint and the complete circumference is radiographed with a single exposure, at least three uniformly spaced penetrameters shall be employed.

** When an area no longer than 5" is inspected, one penetrameter is required

- a) This penetrameter shall be located at the extremity of the area to be inspected and shall be placed with the long axis parallel to the length of the weld at the discretion of quality surveyor or
- b) The penetrameter shall be positioned with the long axis parallel to the length of the weld and with the short axis at the centerline of the pipe at the discretion of the quality surveyor.

APPENDIX-H of Section IV

Table – 1

Thickness and identification of penetrameter required for given weld thickness

Thickness Range (inches)	Source side			Film side		
	Penetrameter thickness	Penetrameter Designation	Essential Hole	penetrameter thickness	Penetrameter Designation	Essential Hole
Upto ¼ inclusive	0.0050	5	4T	0.005	5	4T
Over ¼ thru 3/8	0.0075	7	4T	0.005	7	4T
Over 3/8 thru ½	0.0100	10	4T	0.005	10	4T
Over ½ thru 5/8	0.0125	12	4T	0.005	12	4T
Over 5/8 thru ¾	0.0150	15	4T	0.0075	12	4T
Over ¾ thru 7/8	0.0175	17	4T	0.0100	15	4T
Over 7/8 thru 1	0.0200	20	2T	0.0100	15	2T
Over 1 thru 1 ¼	0.0250	25	2T	0.0150	17	2T



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Over 1¼ thru 1 ½	0.0300	30	2T	0.0170	20	2T
Over 1 ½ thru 2	0.0350	35	2T	0.0200	25	2T
Over 2 thru 2 ½	0.0400	40	2T	0.0200	30	2T
Over 2 ½ thru 3	0.0450	45	2T	0.0250	35	2T
Over 3 thru 4	0.0500	50	2T	0.0300	40	2T
Over 4 thru 6	0.0600	60	2T	0.0350	45	2T
Over 6 thru 8	0.0800	80	2T	0.0450	50	2T
Over 8 thru 10	0.0100	100	2T	0.0600	60	2T
Over 10 thru 12	0.1200	120	2T	0.0600	80	2T
Over 12 thru 16	0.1600	160	2T	0.0800	100	2T
Over 16 thru 20	0.2000	200	2T	0.0800	120	2T



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APPENDIX – I of Section IV

MSLD and pneumatic testing details for equipment's and systems

I. No.	System	System description	MSLD Test	Pneumatic test pressure	Holding time
			<i>mbar lit/sec</i>	Kg/cm²	mins
01	Process systems	All fabricated vessels	$< 1 \times 10^{-9}$	05	60
		All metal vacuum valves	$< 1 \times 10^{-9}$	---	15
		Tenic vacuum valves	$< 1 \times 10^{-9}$	05	15
		Individual spools of process system	$< 1 \times 10^{-9}$	03	15
		Process piping	$< 1 \times 10^{-9}$	03	60
		Scrubber system	$< 1 \times 10^{-9}$	03	60
		Utility system	$< 1 \times 10^{-9}$	03	60
		Miscellaneous process piping	--	06	60
		Heat exchanger piping	---	06	60
		Unit cooling system	---	10	60
		Pneumatic system	--	1.5 times operating pr.	
		Miscellaneous utility piping			

Notes

1. Pneumatic testing shall be done with oil free moisture free compressed air.



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2. During pneumatic testing all joints (mechanical and welded) including valve glands and body shall be bubble tested. Pressure shall be held for 10 minutes before starting soap bubble examination.
3. Soap solution is subject to approval of engineer. No leakage indication is permissible.
4. All leaks found in MSLD testing and pneumatic test beyond the acceptable range shall be rectified by the contractor.
5. ASTM E 515 shall be the guideline standard for pneumatic test & ASTM E 498 shall be the guideline standard for MSLD test.

APPENDIX-J of Section IV

TYPICAL PROFORMA FOR QAP TO BE FOLLOWED DURING FABRICATION OF STAINLESS STEEL AND MONEL PIPING/EQUIPMENT

Legend

Project:	C – Check by BARC
QAP No:	W – Witness by BARC
Date:	R – Review by BARC
	RM – Random check by BARC
	TS- Technical specification

Sl No	Activity description	Reference document	Acceptance standard	Type of Inspection	Inspection by			Records to be submitted
					Contractor	Third party	BARC	
1.	Raw material							
a.	Identification with test certificate	Material Spec/ Ref Drg.	ASME Sec – II/ Ref Drg/T S					
b.	Welding consumables	Material Spec.	ASME Sec - II Part – C/TS					
c.	Welding consumables storage	Material Spec.	Manufacturers instruction/TS					
2.	Chemical cleaning	Approved Procedure	Approved procedure/TS					



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3	Welding							
a.	WPS/PQR	ASME Sec IX	ASME IX/TS	Sec				
b.	Welder performance	ASME Sec IX	ASME IX/TS	Sec				
3.	Fabrication							
a.	Conformity to the latest revised drawing	Ref. Drawing	Ref. drawing					
b.	Weld fit up	Drg./WP S	WPS/ TS					
c.	Welding of root & final pass	Drg./WP S	WPS/TS					
d.	Inter- pass temperature	Drg./WP S	WPS/ TS					
4.	Non destructive testing	TS/AST M Stds.	TS / ASTM Stds.					
a.	Review & approval of NDT procedures	TS/AST M E165	TS/ASME B 31.3					
b.		TS/AST M E94	TS/ASME B31.3					
c.								
d.	Dye penetrant testing	TS/AST M E515	TS/ASME B 31.3					
e.	Radiographic testing	TS/AST M E498	TS					
f.	Pneumatic							



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	testing							
	MSLD testing							
5.	Erection	Reference Drawing	Reference Drawing/TS					
6.	Final clearance	Reference Drawing	Conformity to TS					

Note: A detailed QAP shall be prepared by the Contractor for each activity and submitted for approval.

SAFETY NORMS

The general guidelines as stipulated in the “Building and other construction workers (Regulation of Employment & Condition of Service-) Central Rules-1998”, Atomic Energy (Factories) Rules, 1996, Construction Safety Manual for Works Contract by BARC, Mumbai and AERB Safety Guidelines for Works contracts shall be strictly adhered to with special emphasis on the following points.

1.0 SAFETY OBJECTIVES:

- To provide a safe working environment to all workers and supervisory staffs.
- To ensure safety at each and every level of the project as an integral part of the activities.
- To enhance the safety standards as a continuous effort.
- To complete project in an incident-free manner, without any damage to health

2.0 Safety Training:

The contractor shall ensure that each and every new worker attends initial safety induction training before reporting at respective place of work. The workers shall report to the safety officer first for receiving safety induction training and after successful completion of such training they shall report to respective site engineer. The safety officer shall intimate the workers about the probable hazards related to the work and shall explain and demonstrate the importance and use of PPEs to them. The medium of instructions shall be chosen depending on the language understood by the majority of the workers. He shall also explain to the workers the security restrictions to be followed inside BARC premises. The duration of such induction training depends on the type of worker and shall be decided by the Safety Officer in consultation with the department.



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3.0 Medical Fitness of Workers:

Medical Fitness certificate as stipulated in Rule 223 and Schedule VII of the BOCW Rules-1998 for hazardous jobs shall be strictly adhered to.

General medical examination: The contractor shall follow the guidelines of Rule 81 (iv), Schedule VII of BOCW Central Rules, 1998 for periodicity of medical examination of building workers.

High noise level: The contractor shall arrange for audiometric examination for workers exposed to high noise level as per Chapter IX, Rule 88, Schedule XI, Sub-Rule 3 (f) (ii) of AEFR, 1996.

High dust exposure: The contractor shall arrange for medical examination for workers exposed to high dust level as per Chapter IX, Rule 88, Schedule IV, Sub-Rule 9 of AEFR, 1996.

4.0 Housekeeping

a) It should be recognized that a proper place for everything and everything in its place is maintained for a good housekeeping.

b) The material required for immediate use only should be brought to the designated workplace and stacked properly and labeled suitably.

c) All work spots, site office and surroundings should all times be kept clean and free from debris, scrap, concrete muck, surplus materials and unwanted tools and equipment. A day-to-day collection and disposal of scraps/debris should be done safely at designated place.

d) Electrical cables, leads and hoses should be so routed as to allow safe traffic by all concerned. Cable should be preferably supported on the brackets fixed along the wall to maintain safe access. Wherever routing on the floor cannot be avoided, care should be taken to ensure mechanical protection of these cables and safe access is not disturbed.

e) No material on any work place should be so stacked or placed or disposed off as to cause danger, inconvenience or damage to any person or environment.

f) All unused scaffoldings, surplus/scrap materials and equipment/systems like temporary electrical panels etc. should not be allowed to accumulate and shall be removed from the premises at the earliest.

g) Accumulation of water/oil spillages on the floor or any other workplace should be avoided.

h) Proper aisle space marking should be provided in all workplaces.

5.0 Work Permit:

The contractor's Site Engineer shall seek work permit for all new activities to be taken up at site or any hazardous jobs and submit the form duly signed by him in quadruplicate to Safety Officer before commencement of the work daily. The Safety Officer will inspect the site and give the clearance to the concerned site engineer. One copy of the work permit shall be made available with the contractor's site engineer, site supervisor, safety officer and departmental staff each. No work shall commence at site without approved

work permit. In case of renewal of work permit, such noting shall be made on the work permit.

6.0 Personnel Protective Equipment:

Right type of PPE for the job has to be selected and the contractor should ensure that workman uses it and also PPE is correctly maintained.

- a) All personal protective equipment as considered necessary should be made available for the use of the persons employed on the site and maintained in a condition suitable for immediate use. Also adequate steps should be taken by engineer-in-charge to ensure proper use of PPE.
- b) All the PPEs in use should be as per relevant IS standards.
- c) All persons employed at the construction site should use safety helmets. Safety helmet should be with BIS mark and should have its headband with back support and chin strap.
- d) Persons engaged in welding and gas-cutting works should use suitable welding face shields. The persons who assist the welders should use suitable goggles. Protective goggles should be worn while chipping and grinding.
- e) Safety goggles should be of shatterproof type and with zero power.
- f) All persons working at heights more than 3.5 m above ground or floor and exposed to risk of falling down should use full body harness safety belts, unless otherwise protected by cages, guard railings, etc. In places where the use of safety belts is not feasible, suitable net of adequate strength fastened to substantial supports should be used.

7.0 Certification of Equipments & Power tools:

All the Earth moving equipments and vehicles shall be inspected /tested and certified by user/department safety staff periodically. (Minimum once in a month). Certification date shall be prominently visible on the equipment.

8.0 Safe Work Procedure:

Safe Work Procedure for all hazardous jobs shall be prepared and got approved from the Engineer in Charge before commencement of the work. Appropriate arrangements to be made to remove higher dust load in work area. Few are enumerated below as a guideline.

8.1 Work at Height

- a) Person to work at height should be medically fit and should have height pass issued by safety section. Safety training should be imparted before working at height.
- b) Safety work-permit system for working at height should be obtained from Safety Section.
- c) At elevated places, secure access and foothold should be provided. Adequate and safe means of access and exit should be provided at all work places for all elevations. Means of access may be portable or fixed ladder, ramp or a stairway. The use of crosses, braces or framework, as a means of access to the working platform should not be permitted.
- d) In case where „work at height“ is on asbestos roof, crawling board, roof ladder should be used to walk across the asbestos roof.



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8.2 Electrical Safety

- a) All electrical installations shall comply with the appropriate statutory requirements given below and shall be subject to approval of the electrical engineer and safety officer.
- i. The Indian Electricity Act, 2003
 - ii. The Indian Electricity Rules 1956 (as amended in 2000)
 - iii. The National Electricity Code 2008
 - iv. Atomic Energy (Factories) Rules, 1996
 - v. Other relevant rules of statutory bodies and power supply authority
 - vi. Relevant standards of BIS. In addition to the above statutory provisions, the clauses indicated in this document shall also be complied.
- c) The Application in appropriate format shall be submitted by the user for getting the temporary power supply.

8.3 Welding and Gas Cutting

- a) Welding and gas cutting operations should be done by qualified and authorized persons only.
- b) Safety work permit should be obtained (wherever necessary like presence of flammable or combustible material etc.) before flame cutting/welding is taken up.
- c) Welding and gas cutting should not be carried out in places where flammable or combustible materials are kept and where there is danger of explosion due to presence of gaseous mixtures. In case the requirement cannot be avoided, specific approval and procedure should be ensured and adequate precautions should be taken.
- d) Welding and gas cutting equipment including hoses and cables should be maintained in good condition and shall be inspected /tested and certified by user/department safety staff periodically. (minimum once in a month). Certification date shall be prominently visible on the equipment.
- e) Barriers should be erected to protect other persons from harmful rays from the work. When welding or gas cutting is done in elevated positions, precautions should be taken to prevent sparks or hot metal falling below on persons or combustible materials.
- f) Suitable type of protective clothing consisting of fire resistant gauntlet gloves, leggings, boots and aprons should be provided to workers as protection from heat and hot metal splashes. Face shields with filter glasses of appropriate shade should be worn.
- g) Adequate ventilation should be provided while welding, brazing and cutting the metals like zinc, brass, bronze, galvanized or lead coated material.
- h) Welding and gas cutting on drums, barrels, tanks or other containers should be taken up only after ascertaining that they have been emptied, cleaned thoroughly and made free of flammable material.
- i) Fire safety measures should be available as required near the location of welding/cutting operations.
- j) Flash back arrestor should be provided with gas cutting and gas welding sets.
- k) Double gauges should be used for all gas cylinders used for cutting/ welding. Pressure gauges/regulators should be in healthy condition.



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8.4 Rotary Cutters/Grinders

- a) All portable cutter/grinders should be provided with the wheel guard in position.
- b) Grinding wheels of specified diameter only should be used on all grinders in order to limit the prescribed peripheral speed.
- c) In pedestal grinder, the gap between tool rest and grinding wheel should be maintained less than 3 mm.
- d) Goggle/face shield should be used during grinding operation.
- e) No grinding wheel should be used after its expiry date.
- f) Ear muff/ear plug should be used during the welding/cutting jobs.
- g) Portable appliances, which are powered by single phase AC supply, shall be provided with three-core cable and three pin plug, otherwise the whole body should be double insulated.
- h) Safety work permit should be obtained (wherever necessary like presence of flammable or combustible material etc.) before grinding is taken up.
- i) Fire safety measures should be available as required near the location of grinding operations.
- j) All the equipments shall be inspected /tested and certified by user/department safety staff periodically.(minimum once in a month). Certification date shall be prominently visible on the equipment

9.0 MONITORING AND REPORTING:

The contractor shall monitor, measure and regularly evaluate compliance with applicable legal requirements. He shall recognize the importance of monitoring and reporting of hazards associated with site activities. He shall instruct his site engineers to monitor the unsafe conditions and unsafe acts regularly in order to record the observations so that remedial measures can be taken in time. The contractor shall not neglect or underestimate the near-misses occurred at site and shall establish a procedure to record all such near-misses since the lessons learnt from them can prevent recurrence of such incidents in future. The contractor shall report any accident occurred at site as per format of Injury Report for Contract/Casual Worker. He shall make available all the legal documents and records related to safety for internal as well as external audits from time to time.

10.0 Any requirement by safety official or engineer shall be complied.

11.0 Gas cylinders handling:

11.1 General precautions:

- a) Cylinders together with their valves and other fittings and identification colors shall be maintained in good condition.
- b) No lubricant shall be used in any fittings of the cylinders.
- c) No cylinder shall be subjected to any heat treatment or exposed to a high temperature or to the sun or stored with flammable or explosive material.
- d) Every cylinder containing compressed gas shall have its valve securely closed so as to prevent leakage. Valves fitted to the cylinders containing LPG and highly toxic gases

shall be provided with security nut on the outlet to act as a secondary means of safeguard against leakage of gas.

- e) If the leak in the valve cannot be rectified by tightening the gland-nut or the
- f) Spindle, the cylinder shall be removed to an open space where it is least
- g) Dangerous to life and property and the Filler shall be informed.

11.2 Handling and use:

- a) Cylinders shall be adequately supported during handling.
- b) Trolleys and cradles of adequate strength shall, as far as possible, be used when moving the cylinders.
- c) The cylinders shall be handled carefully and not be allowed to fall on one another or subjected to any undue shock.
- d) Sliding, dropping or playing with cylinders is prohibited.
- e) LPG cylinders and cylinders containing liquefied gas shall always be kept in upright position and be so placed that they cannot be knocked over.
- f) Cylinders used in horizontal position shall be so secured that they do not roll.
- g) Open flames, lights, lighting of fires, welding and smoking shall be prohibited in close proximity of any cylinder containing flammable gases except those in use for welding, cutting or heating.

11.3 Storage of cylinders:

- a) Cylinders shall be stored in cool, dry, well ventilated place under cover, away from boilers, open flames, steam pipes or any potential sources of heat and such place shall be easily accessible.
- b) The storage room or shed shall be of fire-resistant construction.
- c) Thin-walled cylinders such as LPG and cylinders of dissolved gas shall not be stacked in horizontal position.
- d) Cylinders containing flammable and toxic gases shall be kept separated from each other and from cylinders containing other types of gases by an adequate distance or by suitable partition wall.
- e) Cylinders shall not be stored under conditions that will cause them to corrode.
- f) Cylinders shall not be stored with any combustible materials.
- g) Empty cylinders shall be segregated from filled ones and care shall be taken that the valves are tightly shut.
- h) Specificity of gas cylinders: Gas cylinders designed and approved for filling a particular gas should not be used for filling with any other gas.

12.0 Other Statutory Provisions

Notwithstanding the clauses in the above subsections, there is nothing in these clauses to exempt the Facility from the provisions of any other act or rules in force in the Republic of India. In particular, all operations involving the transport, handling, storage and use of explosives should be as per the standing instructions and conform to the Indian Explosives Act, 1884 and the Explosives Rules, 1983. Handling, transport, storage and



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use of compressed gas cylinders and pressure vessels should conform to the Gas Cylinder Rules 2004 and Static and Mobile Pressure Vessels (Unfired) Rules 1981. In addition, The Indian Electricity Act 2003 and Indian Electricity Rules 2005, the Atomic Energy Act, 1962, the Radiation Protection Rules, 2004, the Atomic Energy (Factories) Rules, 1996, The Environment (Protection) Act, 1986 & all the Rules framed under it and AERB safety manual on „Radiation Protection for Nuclear Facilities“ (AERB/NF/SM/O-2) should be complied with.

References:

1. Construction Safety- a monograph (A report by AERB)
2. Construction Safety Manual for Works Contract, BARC, Mumbai
3. Building and other construction Workers (Regulation of employment and conditions of services) Central Rules, 1998
4. Atomic Energy Factory Rules -1996

SECTION-IV(a) (MATERIALS ISSUED BY PURCHASER)

- 1.0 All pipes and tubes (SS304L/Monel), pipe fittings, utility & vacuum flanges, gauges, SS bolts and nuts for flanged joints, valves, flange clamps, saddle rings, O rings, filler wire/rod, special gaskets, seals etc. will be issued to the contractor at free of cost.
- 1.1 All chemicals for the chemical cleaning of piping materials, safety gears for personnel protection during chemical cleaning, polythene sheets, cello tapes and PVC caps shall be supplied as free of cost.
- 1.2 Necessary Compressed air/DM water for carrying out hydrostatic and pneumatic test will be supplied as free of cost.
- 1.3 Leak testing shall be carried out using MSLD machine and the same will be provided to the contractor at free of cost.
- 1.4 SS /Monel/Inconel welding filler wires for TIG welding shall be issued by department.
- 1.5 Non- Free Issue Materials (To be arranged by contractor):
 1. TIG Welding set, Argon gas, Oxy-Acetylene cutting set with gases, Blow pipe for brazing, Grinding machines, drilling machine, concrete drilling machine, trolleys, pallet trucks, etc.,
 2. NDT chemicals and arrangements for Radiography test.
 3. Supply and fabrication of all structural mild steel materials like I beams, channels, angles, chequered plates, toe plates, hand rail pipes of all required sizes as per the drawing conforming to IS 226 / 2062.
 4. Miscellaneous items like pipe supports, purging dams, purging tapes, U-clamps, MS bolts, nuts, welding machine & Welding Electrodes for SMAW, etc..
 5. All equipments and machinery for piping fabrication including wire ropes, tools and tackles, etc.,

1.6 Issue of materials:

The contractor as per the procedure laid down by the plant authority shall draw the materials from stores after approval. The contractor shall verify the quantities in the drawings, before getting them issued.

The material issued by purchaser to the contractor for this work shall under no circumstances, be used for any other work either on temporary or on replacement basis. After the materials are issued, the contractor shall make his own arrangements for loading, transportation and stocking the materials.

1.7 Accountability of materials and stores:

The requirement of materials shall be worked out from the spool drawings, system wise by the contractor. The plant authority shall issue the materials based on written request from the contractor and based on the work bill already agreed upon.

Periodic accounting statement for the materials issued by department shall be submitted to the plant authority. No fresh material shall be made unless the previous materials issued are accounted for.

The contractor at the end of the work shall make a final statement indicating the material issued by the department, its consumption, excess material and scrap quantity, and shall be transported to the Main stores, BARC, Mysore for acceptance and approval after verification.

1.8 Unused and scrap materials:

The Unused and scrap materials out of the material issued by the department shall be returned to the Main stores of BARC, Mysore or shall be stored designated place identified by Engineer in charge.

1.9 Recovery of charges:

The cost of any equipment or material issued by department that are not accounted or wasted or damaged due to negligence shall be recovered from the contractor, at the rate 1.25 times of present market rate of the item or as decided by BARC.

1. The Pipes less than 0.5 meters will be considered as scrap & shall not exceed 5%. Salvageable scrap (i.e. 0.5 metre and above)
2. Pipes unaccountable scrap shall not exceed 2%.

In case of fittings, flanges and valves, 100% quantity shall be accounted.

SECTION-IV(b) IMPORTANT NOTES:

1.0 GENERAL NOTES:

- 1.1 The schedule of quantities (SOQ) is to be read for the purpose of pricing in conjunction with general rules and direction for the guidance of the tenderers, conditions of contract, safety code, Additional terms & condition, scope of work, technical specifications and all the relevant Annexure and Appendices of this tender document.
- 1.2 As indicated in Section – IV(a) of ATC material will be issued by purchaser as per schedule of completion of work. Issued by purchaser must be handled with utmost care and will be issued only before erection as per the schedule of work. **Any wastage/damage caused to material issued by purchaser due to improper handling by contractor shall be procured and replaced by the contractor/ the charges for the same at 1.25 times present market rate will be deducted from RA Bill as decided by the Engineer In Charge.** All Materials issued by purchaser are to be accounted and stock register card shall be maintained by the contractor.
- 1.3 Bill claim (Running Bill) shall be submitted every quarter of the year after completion of related works (welding, erection, etc). In case of any dispute in this regard, Engineer's decision is final and binding on the contractor.
- 1.4 The rates quoted by the bidders in the SOQR shall be fixed for the entire duration of the contract. **The prices quoted shall include all costs and charges. GST shall be included in the quoted price.** The rate shall also include all elements of labour and their welfare, draughtsman, supervision, office equipments like table chair, computer etc, safety PPE, consumable material, equipments, inspection, materials under Contractors scope as indicated in Section –IV technical specification of ATC, system testing, overhead and profits together with all general risks, liabilities and obligation set forth or implied in the documents on which the tender is to be based. The Engineer shall provide no foreign exchange to the contractor.
- 1.5 Payment will be made on the basis of quantities actually measured, for the completed items of work, in accordance with the specifications and Government rules.
- 1.6 All the items coming under the scope of supply of the contractor as indicated in Section –IV technical specification of ATC, shall be of good quality conforming to relevant standards from standard / reputed companies. Samples of all materials procured by contractor shall be offered to the project authority along with test certificates for approval before use. The Project authority have the right to reject and ask for replacement of any items he deems fit.
- 1.7 No separate payment will be done for materials (other than material issued by purchaser) to be arranged by the contractor for the work. This has to be taken care



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of by the contractor while quoting against items mentioned in Scheduled of Quantities and Rates (SOQR).

Works description for quoting rates in schedule of quantities & rates (SOQR) :

Sl. No. 1 of SOQ:

Pickling and Passivation of SS304L Pipes & Tubes and Pipe Fittings issued by purchaser shall be carried out as per the approved chemical cleaning procedure mentioned in Appendix-A under Section-IV Technical Specification of ATC. After transfer of heat number, material details to individual spools and completion of edge preparation, pipe and fittings shall be transported to Pickling and Passivation facility which is approximately 500 meters away from the actual area of work. After pickling & passivation pipes/tubes shall be dried in oven and offered for inspection and wrapped with polythene sheets and transported to fabrication area. Necessary manpower shall be arranged by the contractor at his own cost. Personnel working in the chemical cleaning area shall be provided with suitable chemical resistant aprons, helmets, goggles, shoes and suitable hand gloves, masks etc by the contractor at his own cost. The composite rates quoted by the contractor shall be inclusive of all the above activities.

Pickling and Passivation of SS Pipes and SS Fittings shall be calculated in Inch-Meter as follows:

Inch-Meter = Size NB or NPS of Pipe or Fittings in inches X Length in Meters pickled & passivated.

(Example: 1/2" N.B pipe X 2 meters Length =1 Inch-Meter).

Sl. No. 2 of SOQ:

The work involves shifting of pipes etc. from pickling & passivation shed to work site. General Cleaning shall be carried out i.e. wiping, and making visual inspection to ensure cleanliness. Using Manual Hydraulic dyes & bending machine or motorized bending machine), deform the pipes to required Bend angle (45deg, 90deg and 180 deg or suitable angle).Dye penetrate test shall be carried out on bend portion. After inspection & acceptance, the DPT material shall be cleaned & stored for further use. Payment for the same will be paid based on number of bends after inspection & acceptance.

Sl. No. 3a & 3b of SOQR:

The work shall be carried out in accordance with Section-IV technical specifications of ATC, which involves transportation of pipes, fittings, flanges, valves, etc from departmental stores to fabrication shed, Preparation and revision of spool drawings suiting to actual site conditions from GA drawing /P&I drawings issued by the department, getting approval of the drawing from Engineer, cutting of pipes as per approved drawings, transfer of marking to individual spools, Edge preparation, fit-up,

tack welding, cleaning, Inspection, movement and alignment of welding fixtures issued by department at work area, providing scaffolding for welding, manual TIG welding of joint by a qualified welder, Interpass cleaning, Visual inspection of Root & Final pass welding, Liquid penetrant examination (LPE) of Root and final pass, mechanical cleaning, weld passivation on two inch of either side of the weld and heat affected zone.

Rates for welding shall include supply of welding consumables such as 99.995% pure Argon gas(for shielding and purging), SS wire brush, cleaning solvent, lint free tissue paper, banian cloth etc, developer and dye conforming to relevant standards for liquid penetrant examination of weld joints and all other operations mentioned in this tender document. Payment for the approved weld joints will be made only after satisfactory completion and acceptance of weld joints by NDT examination.

The composite rates quoted by the contractor shall be inclusive of all the above activities.

Defective weld joints found during inspection such as cracks, oxidised root weld, lack of fusion etc shall be repaired/cut and re-welded as decided without additional cost by the contractor.

Payment for manual SS TIG welding will be calculated in Inch Dia as follows:

Inch Dia. = Outside diameter (O.D) of pipe or tube in mm \div 25.4 mm.

Example:

- 1) For 19.05 OD Tubes: $19.05 \text{ mm} \div 25.4 \text{ mm} = 0.75 \text{ Inch Dia.}$
- 2) For 2" NB Pipe (i.e. OD: 60.3mm): $60.3 \text{ mm} \div 25.4 \text{ mm} = 2.46 \text{ Inch Dia.}$

For computation of inch diameter w.r.t nozzle weld, nominal pipe size of branch pipe will be considered. Payment for such joints of branch pipe size 1" NPS & above will be made at 1.5 times the corresponding nominal pipe size of branch pipe.

Example:

- 1) For 2" NB branch pipe nozzle weld payment will be made as $2" \times 1.5 = 3.5 \text{ Inch Dia.}$
- 2) For 19.05 OD branch Tubes nozzle weld involving only single pass welding payment will be made as: $19.05 \text{ mm} \div 25.4 \text{ mm} = 0.75 \text{ Inch Dia.}$
- 3) As the weld joints are exposed to highly corrosive gases purging shall be done to the extent such that the level of oxygen inside header near weld joint reaches below 100 ppm. Hence purging of spools shall be done with 99.995% pure Argon at 6 times the volume between ends of header and tube which varies as per the design. The contractor shall consider the cost of Argon gas consumed while bidding and clarify any doubts regarding the same during pre bid meeting.



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Note: ER SS 308L welding rods required for TIG Welding of SS pipe/tubes joints will be issued by Purchaser.

Sl. No. 4 of SOQ:

The work involves transportation of sheets/plates/rolled plates, etc. from stores to fabrication shed, preparation, revision of GA and equipment drawings as per the actual site conditions, cutting of sheets/plates as per approved drawings, chemical cleaning of sheets/plates, edge preparation, fit-up, tack welding, Fillet/Butt welding (GTAW), cleaning, inspection, , visual inspection of root & final pass welding, LP examination of root and final pass, finish grinding, local passivation of welds and heat affected zones. Rates for welding Fillet/Butt shall include welding consumables, argon (for shielding and purging), LPE consumables, passivation consumables and all other operations mentioned in this tender document. The required filler wires shall be issued by purchaser. Payment for the approved weld joints will be made only after satisfactory completion and acceptance of weld joints by NDT examination. The quoted rates shall be inclusive of the drafting charges.

Sl. No. 5 of SOQ:

Erection shall be carried out in accordance with Technical Specification of ATC of this bid document. The work involves

- a) Assistance in carrying out pneumatic testing and Helium leak testing of fabricated spools using MSLD testing machine issued by department which also includes flushing of spools with moisture free air, blinding of spool ends with suitable blinds /adapter, connecting spools to pneumatic headers, cleaning of spools after test, etc.
- b) Transportation of pipes issued by purchaser from departmental stores & shifting of spools and erection of fabricated spools at various process facilities,
- c) Providing temporary scaffoldings for welding and erection, supports** for erection at elevated locations, alignment and erection of fabricated pipe spools on main structural supports / permanent / temporary supports, using proper tools & tackles, special gaskets, seals, O rings etc.

**Marking the location of anchors on RCC walls / floor / roof, drilling holes using hammer type / core-cutting type drilling machines, cleaning of holes and installation of Anchors of suitable sizes for making Pipe supports at specified locations as per manufacturer specification.

- d) Providing 3mm thick neoprene sheet isolation pads between supports 'U' Clamps and pipes as per drawing (approximately 25m² of 3mm thick neoprene sheet to be procured by the contractor along with proper size GI 'U' Clamps sets as per the site requirement), providing proper size clamps at each support & rigid clamping.

e) Necessary manpower assistance shall be provided by the contractor for Transportation of Vacuum valves, assistance for leak testing before erection at site using MSLD. Only those valves leak tested and certified by the quality surveyor of BARC shall be taken up for installation. Alignment and tightening of all the flanges using special gaskets, seals and O rings issued by purchaser.

f) Preparation of as built drawing and submittal for approval before submission of erection bill.

Composite rate shall include the necessary manpower assistance for the above and rate shall also include the cost of different sizes & quantity of GI 'U' Clamps sets used for rigid clamping of erected spools on supports & Neoprene sheet pads used between GI Clamps & SS Pipes to prevent their direct contact.

Pipe line erection shall be calculated in Inch-Meter as follows:

Inch-Meter= Size NB or NPS of Pipe or Fittings in inches X Length in Meters erected (Example: 1/2" NPS Pipe X 2 Meters Length =1 Inch-Meter).

The equivalent length for fittings shall be minimum 0.50 m and for valves, Flow meter and similar items it shall be 1.00 m of the same size. In case where the actual length of the fitting/item is more than the equivalent length, then actual length will be taken for measurements.

Sl. No. 6 of SOQ:

The work involves procurement and supply of virgin mild steel structural raw materials for from reputed manufacturers i.e. SAIL, TATA, JINDAL, VIZAG., The structural steel materials shall be supply as per **IS 2062:2011** and dimensional standard as per **IS 808:1989** to the latest revision. For Hollow steel sections as per **IS 4923:1997** to the latest revision from the reputed makes. The material supply shall be embedded/ marked with company stampings with respect to code, class and manufacturer etc.,

Procurement of other consumables including SMAW welding rods, epoxy paints and primers, etc will be in contractor scope. Submittal of test certificates, getting approval from BARC, preparation of drawing, cutting, grinding, bending, fabrication, drilling and welding by SMAW process by a ASME qualified welder and installation of MS structural steel supports for pipe spools, equipments, mezzanine structures etc as per approved drawings. Final welding shall be smooth and flush ground. The composite rate shall include, supply of above structural with relevant material test certificates, arranging machineries & welding rods for welding, cutting, flush grinding and installation. All Mild Steel structural shall be thoroughly cleaned by mechanical means after erection, shall be free from rust and painted with one coat of epoxy primer and two coats of grey epoxy paint.

Composite rate shall include supply, fabrication & installation of MS structural steel supports as per the above and necessary manpower assistance. Payment for the same will be paid on weight basis calculated in terms of Metric Ton of

inspected & accepted MS structural steel supports provided as per the approved structural steel supports drawing.

Sl. No. 7 of SOQ:

The work involves shifting/ transportation of SS/ Monel Equipments, etc. from stores to work spot, preparation of equipment installation layout drawings as per the actual site conditions and approval of the same shall be taken before installation of equipment. Using lifting and erection tools necessary arrangement shall be made for installation of equipments. Marking the location of anchors on RCC walls / floor / roof, drilling holes using hammer type / core-cutting type drilling machines, cleaning of holes and installation of Anchors of suitable sizes for making pedestal/supports at specified locations as per manufacturer specification. The equipments shall be installed as per approved SOP and following BARC safety norms/ procedures. Alignment of equipments shall be done with accuracy of ± 1 mm straightness or as specified in the drawing. All the machinery, tools and tackles, supports, scaffoldings etc. involved for executing this job shall be in the scope of the contractor.

Sl. No. 8 of SOQ:

The work involves dismantling of existing SS/Monel piping, equipment's, valves, existing structural supports for piping/equipment's involving gas cutting, un bolting, machine cutting and any other operation deemed necessary for the purpose of dismantling. The dismantled pipes, structures shall be segregated as per MOC, size and lengths of pipes and shall be suitably stocked at designated locations. After necessary clearance from the department, all the pipe fittings, flanges, valves etc. of the dismantled pipes shall be cut and stocked as per MOC and size for subsequent usage. All the machinery, tools and tackles, supports, scaffoldings etc. involved for executing this job shall be in the scope of the contractor.

Sl. No. 9 of SOQ:

The work involves collecting material issued by purchaser, cold forming (Bending/Rolling) of SS/Monel/MS/Inconel plate as per the approved drawing. Insurance policy & Indemnity bond shall be obtained at your own cost towards the cost of material issued by purchaser and transportation of material outside premises of BARC and also shall be valid till return of the material in formed condition. Material issued by purchaser shall be collected from Engineer-in-charge/Asst.Stores Officer, BARC, RMP, Mysuru, on receipt of acceptance letter of insurance policy & indemnity bond. The Scrap generated out of the material issued by purchaser shall be handed over to Engineer-in-charge, BARC, RMP, Mysuru. The rate quoted shall includes transportation, cold forming and any other



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charges incurred for carrying out the above work. Payment for the same will be paid on weight basis in terms of Metric Ton after inspection & acceptance at site.

Sl. No. 10 of SOQ:

The work involves Radiographic examination of 10% of Butt welds of process piping and 100% butt weld of in-house fabricated equipments, using X-Ray technique and shall be carried out in accordance with **Appendix - G of Section-IV** technical specifications of ATC. Radiography of welds shall be carried out using X-Ray machine only. However, Gamma Ray technique with acceptable sensitivity may be used in exceptional case due to field restrictions if any, with prior approval from department.

Composite rates shall include providing radiography equipment's, supply of X-Ray films, necessary skilled manpower as per the requirements of ASNT-TC-1A RT Level -I &II, radiation monitoring devices and PPE, consumables for processing films etc. Only radiographic films with required sensitivity will be accounted for billing purpose. Each processed & developed Exposure will only be considered for payment.

Sl. No. 11 of SOQ:

The work involves Supply of GI coated Anchor Fasteners (wedge type) of size M12 x 100, M16 x 100 & M20 x 150, Preparation of Material inspection report and offer for inspection. Payment for the supplied material will be made only after satisfactory inspection and acceptance of Anchor fasteners.

*****End of Section-IV*****



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Additional Terms and Conditions

Section-V: Proforma of Schedules, Eligibility Criteria / undertaking forms & forms of bank guarantee bond for Performance Security.

Proforma of Schedules		
Schedule-A (For Section-II)		
1	<p>Contact details for sending request for attending Pre-Bid meeting & visit to Buyers Premises</p>	<p>nrkrishna@barc.gov.in (0821-2406534) Indranil@barc.gov.in (0821-2406730) amberish@barc.gov.in (0821-2406460) Time & venue will be as mentioned in the bid document. However, bidders are not allowed inside the operating plant. Hence, relevant photographs of the site will be presented during Pre-bid meeting.</p>
2	Registration in Appropriate Class of Contractors /License / Certification(s) for eligibility.	PF & ESIC (if already registered)
3	Period for considering the minimum average annual financial turnover of the bidder	Financial years 22-23, 23-24 & 24-25
4	Required Turnover	Rs 35 Lakh
5	Period for considering the profit & loss of the bidder for five consecutive financial years.	Financial years 2020-2021, 2021- 2022 22-23, 23-24 & 24-25
6	a) Applicability of Solvency Criteria	Shall be provided as per ATC
	b) Amount of Solvency Required	Not less than: ₹. 14,00,000.00
7	Applicability of Profit & Loss Criteria	Bidder should not have incurred any loss in more than two (2) years during last five consecutive financial years
8	Similar Services/ Similar type of services that shall be considered applicable for the Years of Past Experience & Past Experience Criteria	The bidder must have successfully executed/ completed similar Services over the last three years i.e. the current financial year and the last three financial years (ending month of March prior to the bid opening): - a. Three similar completed services costing not less than the amount equal to 40% of Cost put to tender or b. Two similar completed services costing not less than the amount equal to 50% of Cost put to tender or c. One similar completed service costing not less than the Amount equal to 80% of Cost put to tender



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9	a) Applicability of Geographical Presence Criteria b) Locations	:NA :
10	Other additional eligibility criteria added by the Buyer	Similar work means of Having experience in “ <i>Fabrication of Stainless Steel or Monel piping which is welded using Gas Tungsten Arc Welding (GTAW) process and shall have experience in deploying qualified welders as per the requirements of ASME BPVC Section IX for either SS 304L or Monel 400 material of construction and carrying out NDT works.</i> ”
11	Additional instruction for the bidders regarding Financial Bids	: Refer Section II of ATC

Schedule-B (For Section-III)

1	Clause 1 Beneficiary details for Performance Security	: In favour of Pay & Accounts Officer, Bhabha Atomic Research Centre - Mysuru. Account Details: Account No. 30944909098, IFSC SBIN0003130 State Bank of India, Main Brach, Mysuru.
2	Clause 2 Period of Maintenance/ Guarantee /Warranty period to be considered for this contract, this shall supersede the standard period mentioned in the GTC.	: 02 months from the date of completion of work.
3	Clause 9 Applicability of "Time Schedule/ Phased delivery program /Milestones/With-Holding of payments in case of delay in achieving the milestones" Clause for this contract.	: Quarterly/ Two instances of missing commencement of services for 4 weeks; 1% of monthly value of contract will be penalized for non compliance.

Table of Mile Stone(s) (in case the clause is applicable):

SI No.	Description of Milestone	Time Allowed in days (from date of start)	Amount to be with-held in case of non-achievement of milestone
1	Two instances of missing commencement of services for	4 weeks	1% of monthly value of contract will be penalized for non compliance.
2			

4	Clause 10 Buyer right to increase or decrease the ordered quantity, as a percentage of the bid quantity	
	Schedule/ Group of Items	Percentage limits (of the bid quantity)
	Schedule of quantities (Lumpsum) for Entire Contract:	±25%
	Item wise :	±50%
5	Clause 11 Specific Payment Terms if any	Quarterly payment on pro-rata basis against bill through Measurement Book duly certified



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											by the Engineer-in-charge.
6	Clause 16 Price Variation Clause										
	Clause 16.2 Applicability					: (Not Applicable)					
	Clause 16.3 Applicability					: (Not Applicable)					
	Schedule of component of other Materials, Labour, P.O.L. etc. for Price Variation Clause 16.3 (If applicable)										
	Description of Component	Calculation of "W" (Cost of Executed Contract for which Price Variation is applicable) will be based Schedule/ Group of Items	% Component expressed as percentage of Schedule/ Group of Items based on which "W" was calculated			Nearest Material/Commodity for which All India Wholesale Price Index to be followed/Labour Rates					
	Not applicable										
7	Clause 19 Schedule of materials supplied by Buyer:										
	Sl. No.	Description of item	Approx. Quantity	Unit	Rates	Place of issue/Location of the Land					
	1	Material issued by Purchaser (SS/Monel Pipes, fittings & its appurtenant's, Equipments and Consumables like suitable filler wires)	Will be issued based on site requirements. Refer Sec IV(a) Tech. Spec. of ATC	-	-	RMP, Mysuru					
8	Clause 20.2 List of Materials, Machinery, tools & plants to be deployed by the Seller:										
	All required Tools, machinery and consumables for carrying out the welding, fabrication erection etc. for the scope mentioned in the tender. Refer Sec IV(a) Tech. Spec. of ATC										
9	Clause 20.5 List of Materials to be supplied by the seller at the rates mentioned/ determined by the Buyer:										
	Sl. No.	Description of item	Unit	Quantity	Rate	Amount					
10	Clause 20.6 List of Materials to be supplied by the seller at their quoted rates:										
	Sl. No.	Description of item	Unit	Quantity	Rate	Amount					
	1	Nil									
	2										
11	Clause 24 End use certificate Applicability					: (Not Applicable)					
12	Clause 26 list of Safety PPE's to be provided by the seller										
	SI No	Description of item	Unit	Quantity							



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All PPE's pertaining to the welding and fabrication like Goggles, safety shoes and gloves etc., are to be arranged by contractor.						
13	Clause 29 Whether Sub-Contracting is allowed			: (No)		
	Clause 29.2 In case Sub-Contracting is allowed, details of portions (s) of the Contract that can be sub-contracted			: Not Applicable		
14	Clause 31.1 Applicability (Whether the Seller is allowed to inspect (if mentioned in the Bid Document) the sample(s) of the Goods available with the Buyer)			: (Not Applicable).		
Details of Buyers Materials allowed for inspection by the Seller						
Sl. No.	Description of Materials	No of Samples	Deposit Amount	Remarks		
1						
	Clause 31.2 Applicability (seller has to submit advance samples before bulk procurement)			: (Not Applicable)		
Clause 31.2 List of Materials for which seller has to submit advance samples before bulk procurement						
Sl. No.	Description of Materials	No of Samples	Remarks			
15	Clause 35 Schedule for Electricity (Power supply), Water and Land to be supplied/provided by the Buyer.					
Sl. No.	Description of item	Approx. Quantity	Unit	Rates	Place of issue	
1	Electricity, water & Land (Site office).	Will be provided by Department without any charges		-	RMP, Mysuru	
2	Clause 35.7 of ATC	Not applicable for this services				
16	Clause 40 Other documentation required by the Buyer			: (Applicable)		
Clause 41.4. Minimum requirements (no, qualifications and experience) of such professional staff and labourers under Category-2						
Sl. No.	Minimum Qualification	Discipline (no applicable for labourers)	Designation	Minimum experience	Nos	Penalty in case of non-deployment (For more than 2 days.)
1.	Managerial Experience	Related to mechanical works	Site In-Charge (for all site works)	5 yrs	1	Rs. 1070/- per day*



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2.	Diploma	Mechanical	Sr. Engineer (QC) /Erection engineers	3 yrs	1	Rs. 980/- per day**
3.	ITI/ Hands on Experience	Mechanical	Draftsman	1 yrs	1	Rs. 980/- per day**
*Penalty amount considered 1.1 times of minimum wages of High skilled labour. ** Penalty amount considered 1.1 times of minimum wages of Skilled labour. Reference: Minimum wages of contract labour dtd. 09.05.2025						
Clause 44 Contractor's All Risk Policy (CAR : (Not Applicable)						
18 Policy)						

Eligibility Criteria / undertaking forms & forms of bank guarantee bond for Performance Security.

FORM – A
FINANCIAL INFORMATION

I. Financial Analysis - Details to be furnished duly supported by figures in balance sheet/profit and loss account for the last five years#duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Department.

Particulars	Financial Year				
	FY: 2020-2021	FY: 2021-2022	FY: 2022-2023	FY: 2023-2024	FY: 2024-2025
i) Gross Annual turnover (In Rupees Lakhs)					
ii) Profit / Loss (In Rupees Lakhs)					

Unique Document Identification Number (UDIN)

Signature of Chartered Accountant

Name of Chartered Accountant

Membership No. of ICAI

Date and Seal

Signature of the Bidder(s), with seal

Note: Refer Schedule-A for the Financial Year details.



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FORM - B

FORM OF BANKERS CERTIFICATE FROM A SCHEDULED PUBLIC / PRIVATE
SECTOR BANK

(To be given on Letter Head of the Bank)

This to certify that to the best of our knowledge and information that M/s /Shri. _____
_____ having marginally noted address, _____ as a customer of our bank
are/is respectable and can be treated as good for any engagement up to a limit of Rs.
_____ (Rupees _____).

This certificate is issued without any guarantee or responsibility on the bank or any of the
officers.

Signature & Seal of the bank officer

Date

Note:

1. Bankers Certificate should be on the letter head of the Bank.
2. The date of the certification shall be not older than one year from the bid end date
(excluding extensions, if any).



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FORM –C

(To be submitted on Letter Head of the Bidder)

Details of ongoing/completed contracts where similar services (as mentioned in **Schedule-A**) were provided by the Bidder during the period mentioned in the bid document. The contracts listed below shall be considered for the Years of Past Experience Criteria (both ongoing/completed contracts will be considered) and Past Experience Criteria (only completed contracts will be considered).

S.No.	Name of Contract and Details of the Client (Specify Whether Government/Government Autonomous Bodies/Public Value of Contract	Present Status (Completed or under execution)	Date of commencement as per contract	Stipulated date of completion as per contract	Actual date of completion (if completed)	Litigation /arbitration cases pending /in progress with details* or Whether any blacklisting was done against this	Name & Address / Phone No. of officer to whom reference may be made for verification.	Ref. no and date of client's completion certificate or similar documentary evidence certifying completion of the contract.(only for completed Contract)	Remarks		
1	2	3	4	5	6	7	8	9	10	11	12

*indicate gross amount claimed and amount awarded by the Arbitrator.

Note:

1. Bidder has to upload the following documents for each Contract:
 - a. The Scanned copies of the Contract Orders/ Work Orders/ Purchase Orders/ Agreements with bill of quantities and rates.
 - b. Completion Certificate or similar documentary evidence certifying completeness of Contract/ Work Order Purchase Order/ Agreement issued by client clearly indicating the name of Contract, WO/ PO/ Agreement no, commencement date, date of final completion, and actual final completion cost (only for completed contracts).
 - c. For contracts where the client is other than Government/ Government Autonomous bodies/ Public Sector Units; Certificate (in **FORM - D**) for bill wise payment received by the bidder, which shall be signed with seal by practicing Chartered accountant on letter head with Membership no & **UDIN**, and their respective TDS amount & TDS certificate number for the executed contracts.

Signature of the Bidder(s), with seal



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FORM -D

(To be submitted on Letter Head of Chartered Accountant)

Certificate giving details of bill wise payment received, TDS for contracts executed for clients other than Government/Government Autonomous bodies/Public Sector Units

Company Name	: M/s
Name of Contract	:
Contract Order no. / agreement no.	:
Contract Order / agreement date	:
Completion Certificate Number/ similar documentary evidence certifying completeness of Contract issued by client (Only for the Completed Contracts)	:
Client's Name, Address & Contact Details	:
PAN no. of client	:
PAN no. of bidder	:

Sr. No.	Bill No.	Bill Period	Rate of TDS	Bill Amount	TDS Amount	Details of TDS Certificate as per Form 26AS/Form 16 A/AIS Annual Information System relating to the work only	
						Date	TDS certificate Number.

I/We have obtained all the information from the bidder which is necessary for the purpose of certification. It is certified that the all information are correct to the best of our knowledge and belief. The certification process involves examining the supporting documents.

Unique Document Identification Number (UDIN)

Signature of Chartered Accountant

Name of Chartered Accountant



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Membership No. of ICAI

Date and Seal

Signature of the Bidder(s), with seal

Notes:

1. The number of rows may be increased to suit the requirement.
2. The above format shall be uploaded separately for each Contract.
3. Bidder shall take out the print of this format and get it filled and certified by Chartered Accountant under his signature and seal having membership no./FRN and **UDIN**.
4. Executed Value of the contract shall be commensurate with value of TDS certificate.
5. This form need to be supported with Form-26 as taken in HTML format or form 16-A.
6. In case of multiple contracts taken from a client, details of TDS/Form -26AS/AIS (Annual Information System) for each work need to be segregated and given separately.



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FORM –E

(To be submitted on Letter Head of the Bidder)

Details of the Bidder

Sr. No.	Particulars	Details		
1	Name of Bidder/ enterprise /company/Legal Entity			
2	Address/ Contact Details (Email/Phone No. if any)			
3	a) Place of incorporation b) Year of incorporation			
4	Type of organization	Proprietary firm Company Partnership firm/LLP Co-operative society Limited company Joint venture/Consortium PSU/Govt Entity/Autonomous Body		
5	Udyam Registration certificate details			
5.2	Udyam Registration certificate no			
5.3	Date of registration			
5.4	Type of enterprise			
5.5	Social category of entrepreneur			
5.6	Gender of entrepreneur			
5.7	Details of registered services	SN	NIC five digit code	Details of activity
6	Name of Contact Person(Email/Phone No. if any)			
7	PAN (Permanent Account Number)			
8	GST details of Bidder			
9	Labour Identification number			
10	Registration no of EPF (Employees' Provident Fund)			
11	Registration no of ESI(Employee State Insurance)			

Signature of the Bidder(s), with seal



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FORM – F

(To be submitted on Letter Head of the Bidder)

Bank Details of the Bidder for return/refund of EMD and other payments

To,
The Pay & Accounts Officer,
Bhabha Atomic Research Centre - Mysuru.

Sub:Bank Details for return/refund of EMD and other payments

Sir,

It is requested that return/refund of EMD and other payments may please be arranged through Electronic Mode. The details of our bank account are as under:

1. Account No:

2. Name of Bank:

3. Name of Branch:

4. Address of Bank:

5. IFSC CODE:

6. NEFT Code:

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for any reasons, I would not hold the user institution responsible and agree to discharge the responsibility expected of me as a participant under the scheme.

Signature of the Bidder(s), with seal



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FORM – G(a)

(To be submitted on Letter Head of the Bidder)

PARTICULARS OF MANAGERIAL / ENGINEERING PERSONAL
AND TECHNICIANS EMPLOYED AND IN SERVICE SINCE LAST FIVE (5) YEARS

SL.No	Name	Age	Qualification	Experience		Nature of work Handled	Previous Employment	Project Handled
				In Organization	Previous			
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)

Signature of Applicant(s)



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FORM – G(b)

(To be submitted on Letter Head of the Bidder)

DETAILS OF TECHNICAL & ADMINISTRATIVE PERSONNEL TO BE DEPLOYED
FOR THE WORK

Sr.No	Designation	Total Number of staff	Number of staff Proposed for this work	Name of the staff	Qualification	Professional experience and details of work carried out	Designation / responsibility proposed	Remarks
1	2	3	4	5	6	7	8	9

Signature of Applicant(s)

NOTES:

- 1) The key professional staff, listed in the offer, shall be available for the entire duration of the execution of the Assignment. These shall preferably be the permanent employees of the firm.
- 2) Proposed staff must have relevant educational qualification and experience, preferably under conditions similar to those prevailing at the locations of the Assignment.
- 3) No alternative to key professional staff may be proposed and only one curriculum vitae (CV) may be submitted for each position. The firm's key personnel shall have a good working knowledge of English/Hindi/Kannada.
- 4) Curriculum Vitae (C.V.) recently signed by the proposed key professional staff and countersigned by an authorized officer of the Contractor. Key information should include: years with the firm/entity and degree of responsibility held in various assignments during the last ten years.



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Undertaking-A

1. I/We have read and examined the General Terms and Conditions (GTC), Product / Service specific Special Terms and Conditions (STC), Product /Track / Domain Specific STC of Particular Service including its SLA(Service Level Agreement) and all other contents in the Bid document. I accept all the conditions.
2. I/We have neither concealed any information/document which may result in our disqualification nor made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.
3. No central/state government department/public sector undertaking or enterprises of central/state government have banned/suspended business dealing with us as on date.
4. List of ongoing/completed contracts submitted by us for the eligibility criteria have been carried out by us not on a back to back basis.
5. I/We undertake and confirm that in case of any default of bid conditions Buyer shall without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely.
6. I/We undertake and confirm that, I/We are not under liquidation, court receivership or similar proceedings and are not bankrupt.
7. If I/We, fail to furnish the prescribed performance security within prescribed period. I/We agree that the said Buyer shall without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely. Further, if I/We fail to commence the execution of the contract as specified, I/We agree that Buyer shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said bid security and the performance security absolutely. I/We agree that in case of forfeiture of bid security & performance security as aforesaid and in the event of deficiency, out of any other money due to Me/Us or otherwise. I/We shall be debarred for participation in the re-tendering process.
8. The person who has signed the tender/bid documents is authorized by the company/firm to upload the bid on its behalf. The Company is responsible for all of my acts and omissions in the tender/bid.
9. I/we confirm that the submission of bid shall mean absolute acceptance of the undertaking. In case of non-acceptance of the undertaking in part or full shall result in rejection of bid and forfeiture of bid security/performance security /retention money.

Signature of the Bidder(s), with seal



Government of India

Bhabha Atomic Research Centre Mysuru

FORM OF BANK GUARANTEE BOND FOR PERFORMANCE SECURITY

In consideration of the President of India (hereinafter called “The Government”) having agreed under the terms and conditions of agreement No..... Dated..... made between..... and (hereinafter called “the said contractor(s)”)For the work (hereinafter called “the said agreement”) having agreed to production of an irrevocable Bank Guarantee for Rs.....(Rupeesonly) as a security / guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We (indicate the name of bank) (hereinafter referred to as the “the Bank”) hereby undertake to pay to the Government an amount not exceeding Rs.....only) on demand by the Government.
2. We (indicate the name of the bank) do hereby under take to pay the amounts due and payable under this Guarantee without any demure, merely on a demand from the Government stating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs..... (Rupees.....only).
3. We, the said bank further undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.
The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.
4. We.....(Name of Bank)..... further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-Charge on behalf of the Government certified that terms and conditions of the said agreement have been fully and properly carried out by the said contractor(s) and accordingly discharges this Guarantee.
5. We.....(Name of Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without effecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor(s) and forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be



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relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This Guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).
6. We.....(Name of Bank) lastly undertake not to revoke this Guarantee except with the previous consent of the Government in writing.
8. This Guarantee shall be valid up tounless extended on demand by Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs..... (Rupees.....only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Signed and sealed

Dated theday offor..... (Indicate the name of the Bank)



Government of India

Bhabha Atomic Research Centre Mysuru

Additional Terms and Conditions

Section-VI: Check List. of Documents to be submitted or uploaded

- 1) List of Documents to be submitted at the address mentioned in Schedule-A before the due date.: 28.02.2025(tentative)

Sl. NO.	Name of the Document	Applicable/Not Applicable
1	Hard copy of original EMD as per the bid document (To be submitted in a Sealed super scribed envelope mentioning GeM Bid No.) OR Bidders seeking exemption from submitting the EMD (as per the GTC) shall have to upload scanned copy (no need to submit the hard copy) of valid supporting document for the relevant category as per GTC.	Applicable

- 2) List of Documents that are to bescanned from original & uploaded in the GeM Portal (Formats are given inSection V):

Sl. NO.	Name of the Document	Scan Copy to be Uploaded
1	Original EMD as per the bid document Or Bidders seeking exemption from submitting the EMD (as per the GTC) shall have to upload scanned copy of valid supporting document for the relevant category as per GTC.	Applicable
2	Certificates: a. Registration in Appropriate Class of Contractors / License / Certification as per the details mentioned in Schedule-A .	Applicable
	b. Certificate of Registration for GST.	Applicable
	c. PAN (Permanent Account Number) Registration	Applicable
	d. Document showing Labour Identification Number issued by Ministry of Labour & Employment.	Applicable
3	FORM –A: Financial Information.	Applicable
4	FORM – B: Solvency certificate from a Scheduled Public / Private Sector Bank	Applicable



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5	FORM – C: Details of ongoing/completed contracts where similar services (as mentioned in Schedule-A) were provided by the Bidder during the period mentioned in the bid document. Enclosures mentioned in FORM – B are also to be uploaded.	Applicable
6	FORM – D: Certificate giving details of bill wise payment received, TDS for contracts executed for clients other than Government/Government Autonomous bodies/Public Sector Units. Enclosures mentioned in FORM – C are also to be uploaded.	Applicable
7	FORM – E: Details of the Bidder.	Applicable
8	FORM – F: Bank Details of the Bidder for return/refund of EMD and other payments.	Applicable
9	FORM – G (a) & G (b): Particulars of Managerial / Engineering personal and technicians employee details to be uploaded.	Applicable
10	Documentary Proof for geographical Presence	Not Applicable

*****End of Section-VI &Additional Terms and Conditions document*****