ITER-India, Institute for Plasma Research
Block A, Sangath SKYZ, Bhat- Motera Road, Koteshwar, Ahmedabad 380005 Gujarat,India.

www.iter-india.org

Email: pws.group@iter-india.org

Minor Fabrication Work

ENQUIRY - LOCAL

OFFICE COPY

ENQUIRY NO : **Enq/MF/4/PWSP**
Date : **23/07/2021**
Due Date : **06/08/2021** by 5:00 PM (IST)

We invite your rate/s for the following item/s. The Instructions to bidders and Terms & Conditions are attached herewith.

Important Note :

1. Enquiry No., Date & Due Date should appear on the envelope otherwise your offer will be rejected.
2. ITER-India, IPR is entitled to avail concessional rate of GST @ 5% (2.5% CGST and 2.5% SGST) as per Central Goods and Service Tax (CGST) Notification No. 45/2017-Central Tax (Rate) dated 14th November, 2017, State Goods and Service Tax (SGST) Notification No. 45/2017 – State Tax (Rate) dated 15th November, 2017 and IGST @ 5% as per Notification No. 47/2017-Integrated Tax (Rate) dated 14th November, 2017 for supply of Goods. Therefore, please consider GST in your quotation accordingly.
3. Quote with complete technical details.
4. Vendor is mandatory to visit site before submitting the offer to take appraisal of site conditions / installation. Site address is PS lab, ITER-India lab, Institute for Plasma research, Bhat.
5. Quotation should invariably be submitted in the attached format (Quotation Format) ONLY else ITER-India may not consider your offer.
6. Required completion period is in accordance to Clause-12 of Annexure-A
7. Technical Specifications are given in the Annexure – A
8. It is a single part tender, the bidder shall submit their technical acceptance with price bid in single envelope superscribed with Enquiry Number, Date and Due date and shall be addressed to the Project Manager, Power supply ,ITER-India. The bid documents should reach ITER-India Office (refer enquiry header for full address) on or before the specified due date and time.
9. Refer to attachment for Detailed Scope of work & Technical Specifications.

Sr No.	Material Description	Quantity	Unit
1	Fabrication & Erection Services	1	NOS

Note:

(1) Quotations in hard copy should be addressed to Project Manager, Power supply Group only at above address. Email quotations are not acceptable

(2) Quote with complete technical details.

(3) Quotation should invariably be submitted in the attached format (Quotation Format) ONLY else ITER-India may not consider your offer.

(4) Technical Specifications are given in the Annexure – A

(5) Technical specification along with the compliance sheet shall be signed and stamped by the bidder and submitted along with the offer. This shall be considered as acceptance of the specification by the bidder

(6) Any clarification on this enquiry may be sought from pws.group@iter-india.org

(7) Technical specifications are appended herewith.

(8) Bidders must ensure that the sealed bids must reach the ITER-India Office on or before specified due date & time.

(9) Bids in sealed envelope superscribed with Enquiry No., Date & Due Date should be submitted to "The Project Manager, Power supply, ITER-India" otherwise offer will be rejected. To visit the site before submissin of bids may contact to Mr. Vikrant Gupta @9879360957.

Encl:- as above

Project Manager
(Narinder Pal Singh)
Power Supply
ITER-India

Note: This Enquiry is electronically generated and no signature is required.

TERMS AND CONDITIONS

1. The quotation and any order resulting from this enquiry shall be governed by our Conditions of Order and supplier quoting against this enquiry shall be deemed to have read and understood the same in total
2. Where counter terms and conditions have been offered by the Tenderer, the same shall not be deemed to have been accepted by ITER-India unless our specific written acceptance thereof is obtained.
3. Quotation: Your quotation superscripting our enquiry No., date, due date and brief description of item should be submitted in sealed envelope on or before the due date. Late/ Delayed/incomplete quotations will not be considered. Envelopes received without Enquiry number, date, due date and brief description of item may be rejected.
4. The quoted prices should be firm for a period of 30 days from due date of bid submission. ITER-India is not bound to accept lowest rate/s. Bidder shall submit the price bid/offer on Bidder's letter head with official seal and sign on each page.
5. The bid documents shall be prepared in English language only
6. All pages of the bid documents shall be numbered. Each page of the bid document shall be stamped and initialized.
7. In the event of any date indicated above is a declared Holiday, the next working day with the same time limit shall become operative for the respective purpose mentioned herein
8. In case of deviation in payment terms including demand of advance other than specified in payment schedule and accepted by ITER-India, prevailing Prime Lending Rate (PLR) of SBI will be loaded for price comparison purpose
9. ITER-India and their authorized representatives may visit the Contractor/Sub-contractors if required as part of technical evaluation process
10. ITER-India reserves the right to place order on one or more parties.
11. Specifications: Material should be offered strictly conforming to our specifications/drawings, if any. Deviation, if any, should be clearly indicated by the supplier in their quotation. The Tenderer should also indicate the Make/Type number of the materials offered and catalogues, technical literature and samples, wherever necessary should accompany the quotation. Clarification/s on specifications/drawings should be obtained from Purchaser before submitting quotation.
12. Terms of Prices : Quotation should be submitted on door delivery basis, duly packed without extra charge wherever possible.
13. Unit rate/s should be valid throughout the validity of Purchase Order for addition/deletion purposes. Break-up of price should be furnished. The quoted price should not be subject to price escalation for whatsoever reasons. The quoted price shall be firm, fixed and non-revisable during the validity/ extended validity of Purchase Order.
14. Prices are required to be quoted according to the units indicated in the tender form/Enquiry. When Quotations are given in terms of units other than those specified in the tender form, relationship between the two sets of units must be furnished.
15. Tender should be free from Correction and Erasures. Corrections, if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amounts quoted in words and figures, amount quoted in words shall prevail. Unsigned quotations will summarily be rejected.
16. ITER-India shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portion of the quantity offered and the tenderers shall supply the same at the rates quoted. ITER-India also reserves the right to split the order at its sole discretion
17. Delivery Date/Period: Delivery period is essence of the Order. Supplier must indicate the firm delivery date by which the materials will be dispatched / delivered by them from the date of our order.
18. Inspection: Materials on its arrival at ITER-India will be inspected by our Engineer/Stores In-Charge, and his decision in the matter will be final. However, where the items are required to be inspected at the Suppliers Premises, Supplier has to give advance notice to the Purchaser regarding readiness of the material to enable Purchase/Stores section to depute his representative for inspection.
19. Payment: Payment will be arranged for accepted materials only within 30 days from the date of acceptance of materials at ITER-India and receipt of error free bills in our accounts section, complete in all respects.
20. No correspondence will be entertained within 30 days from the date of receipt of material and bills, whichever is later.
21. Warranty: The Stores/Items offered should be guaranteed for a minimum period of twelve months from the date of acceptance, against defective materials, design, workmanship, operation or manufacture. For defects noticed and communicated during the Guarantee period, replacement/rectification should be arranged free of cost within a reasonable period of such notification. In case where our specifications call for a guarantee period more than 12 months specifically, then such a period shall apply.
22. The Contractor/Supplier shall at all times indemnify the purchaser against all claims which may be made in respect of the stores for infringement of any right protected by Patent, Registration of design or Trade Mark and shall take all risk of accidents or damage, which may cause failure of supply from whatever cause arising and the entire responsibility for sufficiency of all means used by him for the fulfillment of the Order.
23. Successful tenderer will have to furnish in the form a Bank Guarantee or in Indemnity Bond form as called for by the Purchaser towards adequate security for the materials/property provided/issued by the Purchaser as Free Issue Material for the due execution of the Order. Insurance for the Free Issue Material shall be arranged by the Supplier/Contractor at his risk and cost.
24. Non-compliance to tender specifications and/or tender scope and/or tender terms and conditions are liable for rejection. Decision of ITER-India in respect of non-compliance shall be final and binding on the bidders.
25. Canvassing in any form with regard to this tender will lead to rejection of the bid.
26. The Project Director, ITER-India reserves the right to accept or reject any quotations fully or partly or to cancel the enquiry without assigning any reasons.
27. This enquiry is not a commitment and the Purchaser reserves the right to reject or cancel any or all offers.
28. Jurisdiction: The Order shall be governed by the Laws of India for the time being in force. The Courts of Ahmedabad/Gandhinagar only shall have jurisdiction to deal with and decide any legal or dispute arising out of this Order.
29. Unsuccessful bidders will not be intimated about the results of the enquiry/tender.
30. Purchase will not be responsible for payment of any interest to the Supplier, in case of delay in releasing payment.
31. The price evaluation shall be carried out on Landed price including taxes, duties and all other applicable charges.

FORMAT FOR SUBMISSION OF QUOTATION

Enquiry No. : **Enq/MF/4/PWSP**
Name Of Party : **OFFICE COPY**
Quotation No. & Date :
Due on : **06/08/2021** by 5:00 PM (IST)

Sr No.	Material Description	Qty	Unit	Rate	Total
1	Fabrication & Erection Services	1	NOS		
				Grand Total	

COMMERCIAL TERMS & CONDITIONS *

Sr.No	Description	Bidder's Compliance [Comply Yes/No (In case of No Please provide details)]
1	Payment: ITER-India payment terms will apply (Refer Sr. No. 19 of Terms and Condition)	
2	Validity Period (Refer Sr.No. 4 Of Terms and Condition)	
3	Delivery period (As per clause-12 of Annexure-A)	
4	Warranty (Refer Sr.No. 21 Of Terms and Condition)	
5	GST (5% extra as per sr. no 2 of Note in enquiry document)	
6	GST No. (To Specify)	
7	SAC Code (To Specify)	
8	Udhyog Aadhar No. & Category (Micro/Small/Medium Enterprise)	
9	Discount(if any)	
10	Remarks	
11	HSN/SAC Code	
12	HSN/SAC No.	
13	HSN/ SAC Code (To specify)	
14	HSN/ SAC Code (To specify)	
15	HSN/ SAC Code (To specify)	
16	Payment: Payment will be arranged after the inspection & final acceptance of the works carried-out by the contractor, within 30 days from the date of final acceptance by ITER-India and receipt of error free bills in our accounts section, complete in all respects.	
17	GST Extra (Specify)	
18	Delivery Basis: Free Door Delivery	
19	Payment: Payment will be arranged after the inspection & final acceptance of the works carried-out by the contractor, within 30 days from the date of final acceptance by ITER-India and receipt of error free bills, complete in all respects.	

* Fill in the applicable details

Place: Authorised Signatory:

Date: Company Seal

Vendor List for enquiry : Enq/MF/4/PWSP

Ganesh Engineers	Plot No. 4913, Phase-IV, GIDC B/h Indo German Room, Vatva Ahmedabad 382445	RFQ Data
TRUMECH ENGINEERS	A-1 New Tapashwi Appartments Nr.Musco Hotel Railway station AHMEDABAD 380008	RFQ Data
Shell-N-Tube Pvt Ltd.	W-5 MIDC Wai Industrial estate, Wai M I D C Road, W A I 412803	RFQ Data
SHELL-N-TUBE PVT. LTD.	3, Gulmohar Orchids, 29/37, Sahney Sujan Park LULLA NAGAR PUNE 411040	RFQ Data
Bhakti Engineering Services	304, Aishwarya Sankul, S. No. 30/3, Nr. Zil Collage narhe, Pune 411041	RFQ Data
Mitesh Engineers	A/55, Kailesh park society, NR Bhaktinagar, Vastral Road, Ahmedabad 380026	RFQ Data
ABHAY ENGINEERS	C-2, Arvalli Appartment, B/h, Bank Of India Gali, NR,Railway Station, Maininagar, Ahmedabad 380008	RFQ Data

Annexure-A Technical Specification for Supply, Fabrication, Erection of Hydraulic Circuit for MHVPS

1. **Abbreviations**

ASME-American Society of Mechanical Engineering
SCH-Schedule
LPE-Liquid penetration examination
DM- Demineralized water
TC-Test certificate
DN- Nominal Diameter

2. **Scope:**

This scope covers

- Submit 2d (CATIA /AUTO CAD/.PDF) fabrication and erection drawings for approval.
- Procurement of all raw material and Submission of require T.C. before fabrication.
- Fabrication of spools and its supports according to **(as Sr. no. 9) Spool fabrication drawings.**
- Supply and erection at site with suitable supports.
- Cleaning according to **(Annexure-B)**
- Leak testing after erection at site &LPE according to **procedure Attached.**
- Erected cooling circuit shall be integrated with the present system with the help of flexible carbon free hoses (shall be provided by client) with the help of threaded joints.

3. **Application note:**

Hydraulic Circuit shall be used for cooling heat loads utilizing Demineralized (DM) water.

4. **Applicable standards:**

Applicable code for hydraulic circuit is AMSE B31.3.

5. **Hydraulic Circuit (suggestive bill of material): Table-1**

Sr. No	Particulars	Material	Applicable Standard	Qty. (nos.)
1.	**1 ½" SCH 40 pipe (DN40)**	**SS304**	**ASTM A-312 TP 304L**	**~70m**
2.	**1 ½" T-joints SCH 40 (DN40)**	**SS304**	**ANSI B16.28**	**As required**
3.	**1 ½" SCH 40- 90°- long radius elbow (DN40)**	**SS304**	**ANSI B16.28**	**As required**
4.	**1 ½" dummy plate, ϕ70mm, 10thk**	**SS304**	**ANSI B16.9**	**As required**
5.	**Flow control ball Valve DN40 class# 150 threaded**	**SS304**	**ASME B16.34**	**2 Nos.**
6.	**½" female socket, SCH 160 (DN15)length-28mm**	**SS304**	**ASTM A-312 TP 304L**	**As required**
7.	**1 ½" weld neck flanges class 150**	**SS304**	**ANSI B16.9**	**As required**
8.	**3/4" female socket, SCH 160 (DN20)length-50mm**	**SS304**	**ASTM A-312 TP 304L**	**As required**
9.	**Pressure gauge (0-30 bars) glycerin filled ,end connection threaded type**	**Make**	**Forbes Marshal/HGURU/Equivalent**	**2 nos.**
10.	**Ventured type flow meter for DN40 pipe fitting with flow rage (0-200lpm & pressure range (0-15 bars)**	**Make**	**Wika/Siemens/Equivalent**	**2 Nos**
11.	**Temperature Gauge dial reading**	**Make**	**Forbes Marshal/HGURU/Equivalent**	**2 Nos**
12.	**DN40 class# 150 ball valve with end thread**	**SS304**		**5 Nos.**

≠Note: All pipe and accessories must be seamless. Advised to use Standard pipe lengths to be utilized for fabrication purpose.

6. Hydraulic Circuit fabrication:

Fabrication of Hydraulic circuit shall be done as per approved drawings; tests including

- weld visual,
- LPE
- Hydrostatic test

7. Welding Design

7.1 Welding of female socket of ½" (DN15) and ¾" (DN20) with inlet/Outlet header (socket Joint) (Figure-1)

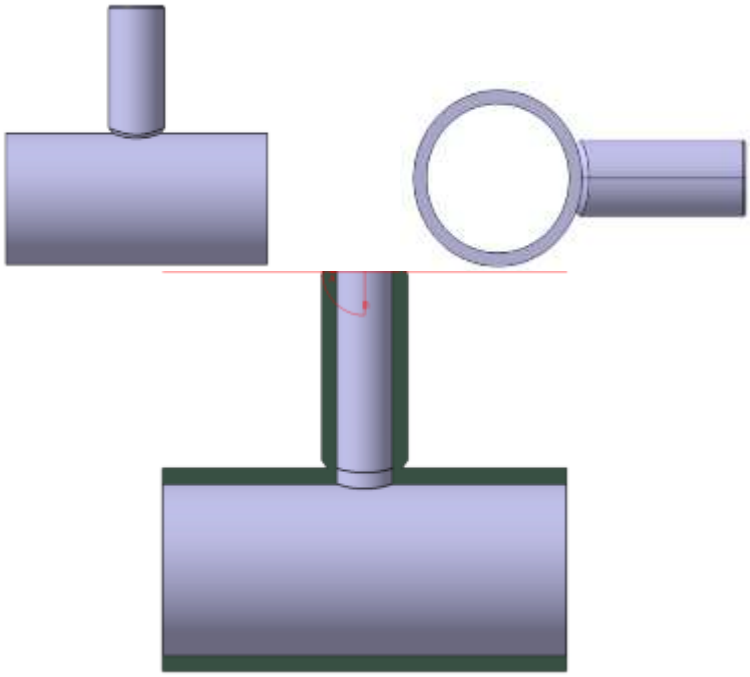


Figure-1 welding of socket with running pipe

7.2 Welding of all DN 40 Pipe Butt joint (Figure-2)

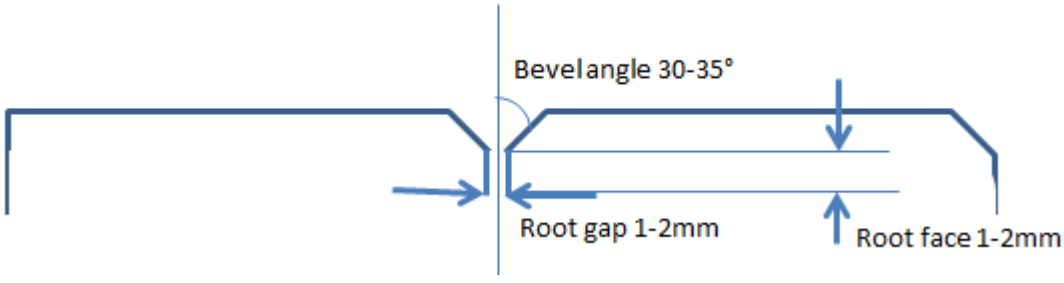


Figure-2 welding of pipe with running pipe

7.3 Maximum Socket length (after welding with headers) (figure-3)

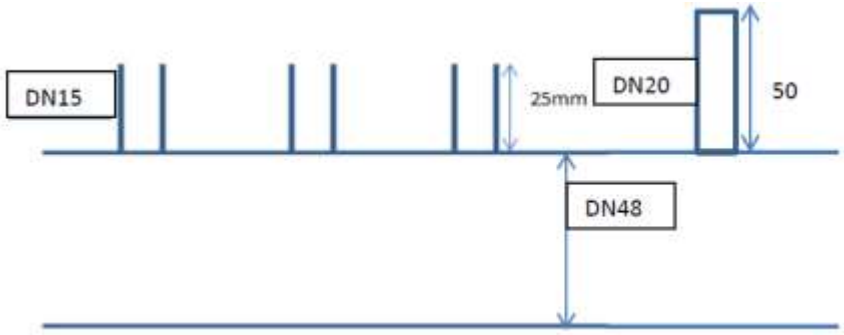


Figure-3 maximum outlet length of sockets after welding

Maximum limit on socket length/height must be restricted to allow for insertion in the key holes of HV racks

7.5 Dummy plate (figure-4), DN15 (figure-5) and DN20 (Figure-6) Female socket

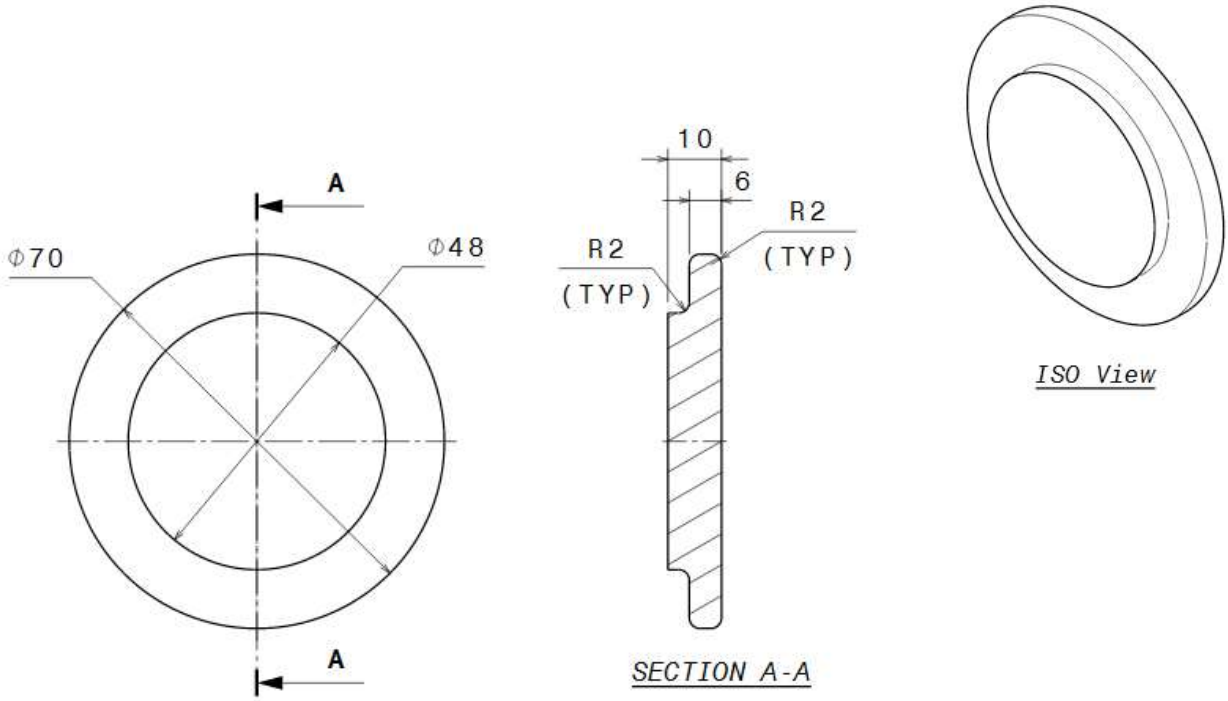


Figure-4 drawing of dummy plate

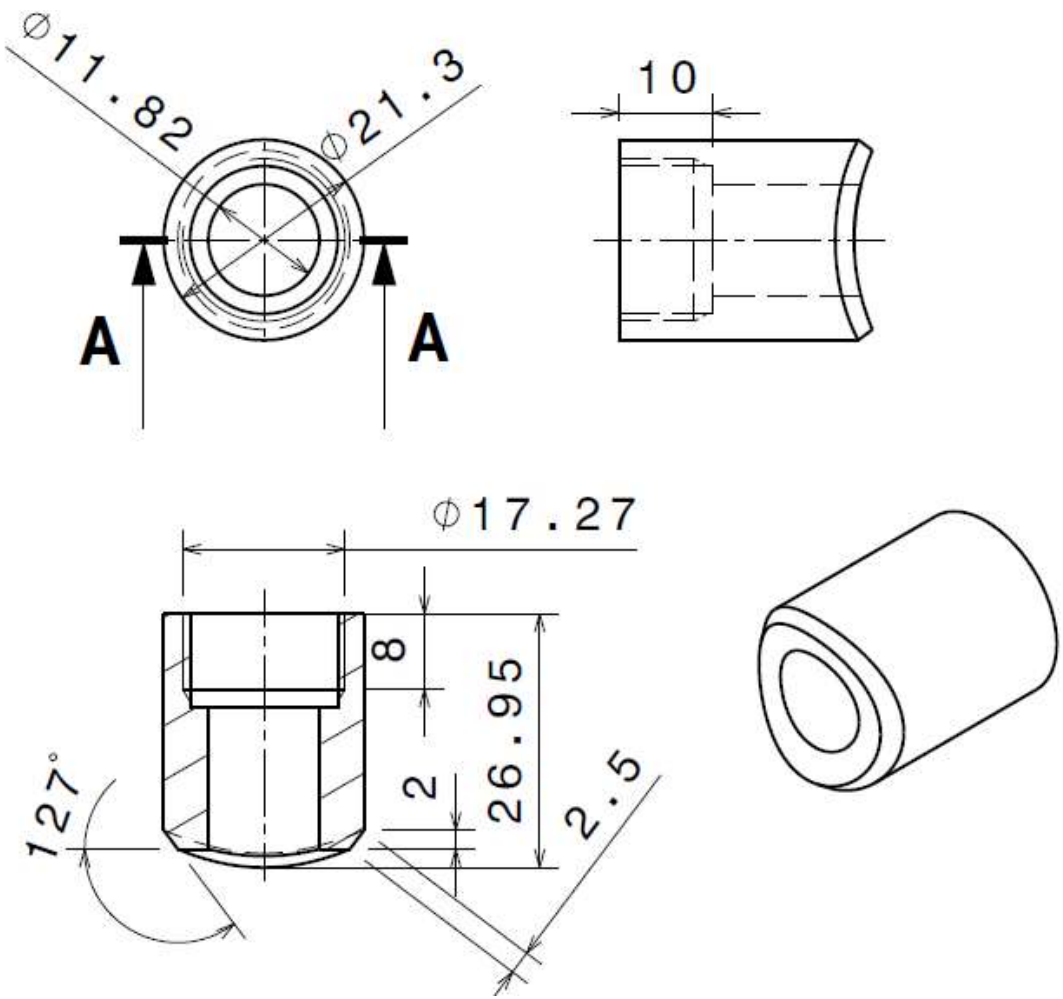


Figure-5 Drawing of ½" pipe with 3/8" female socket thread with adoptability to 3/8" male adaptor

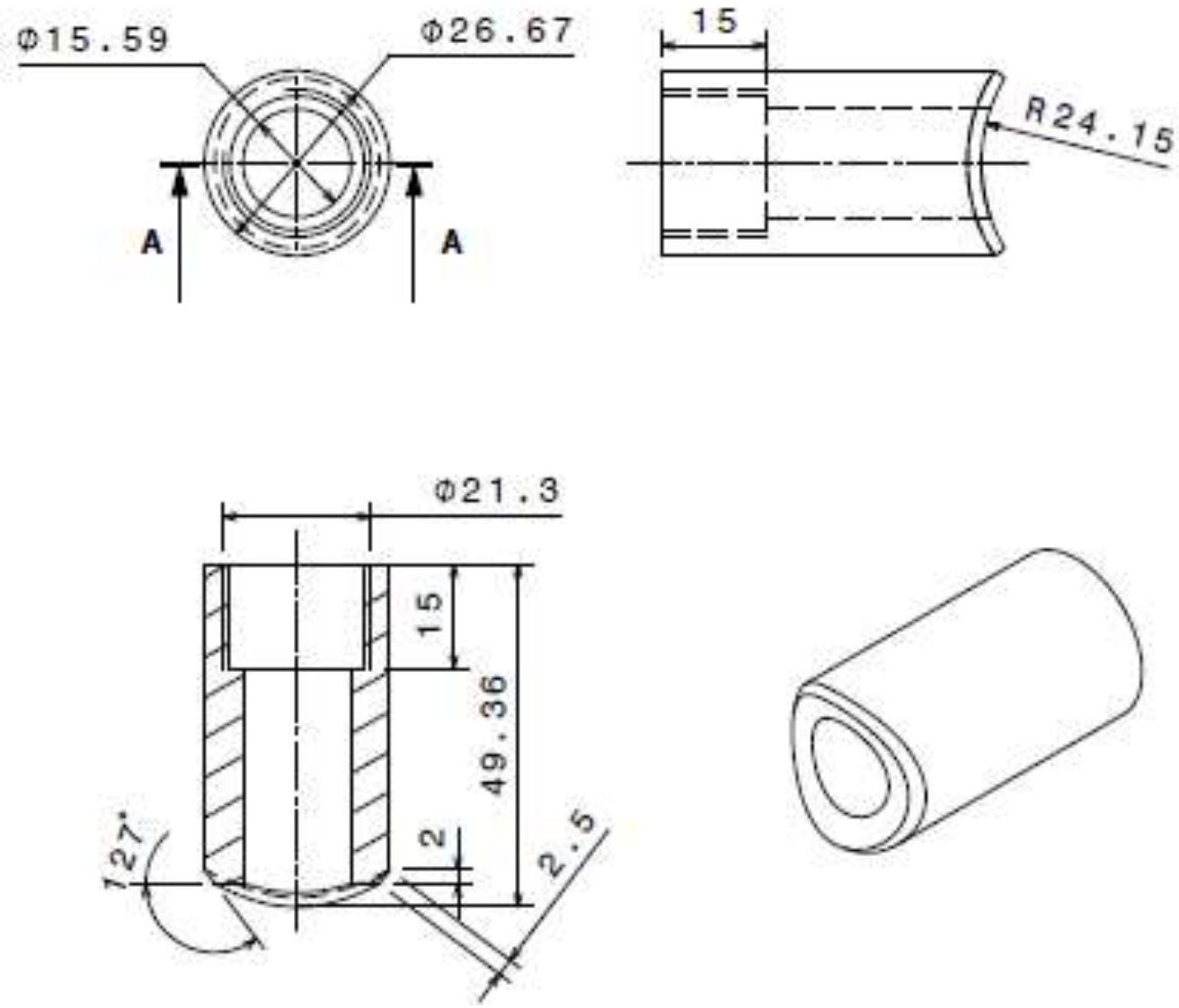
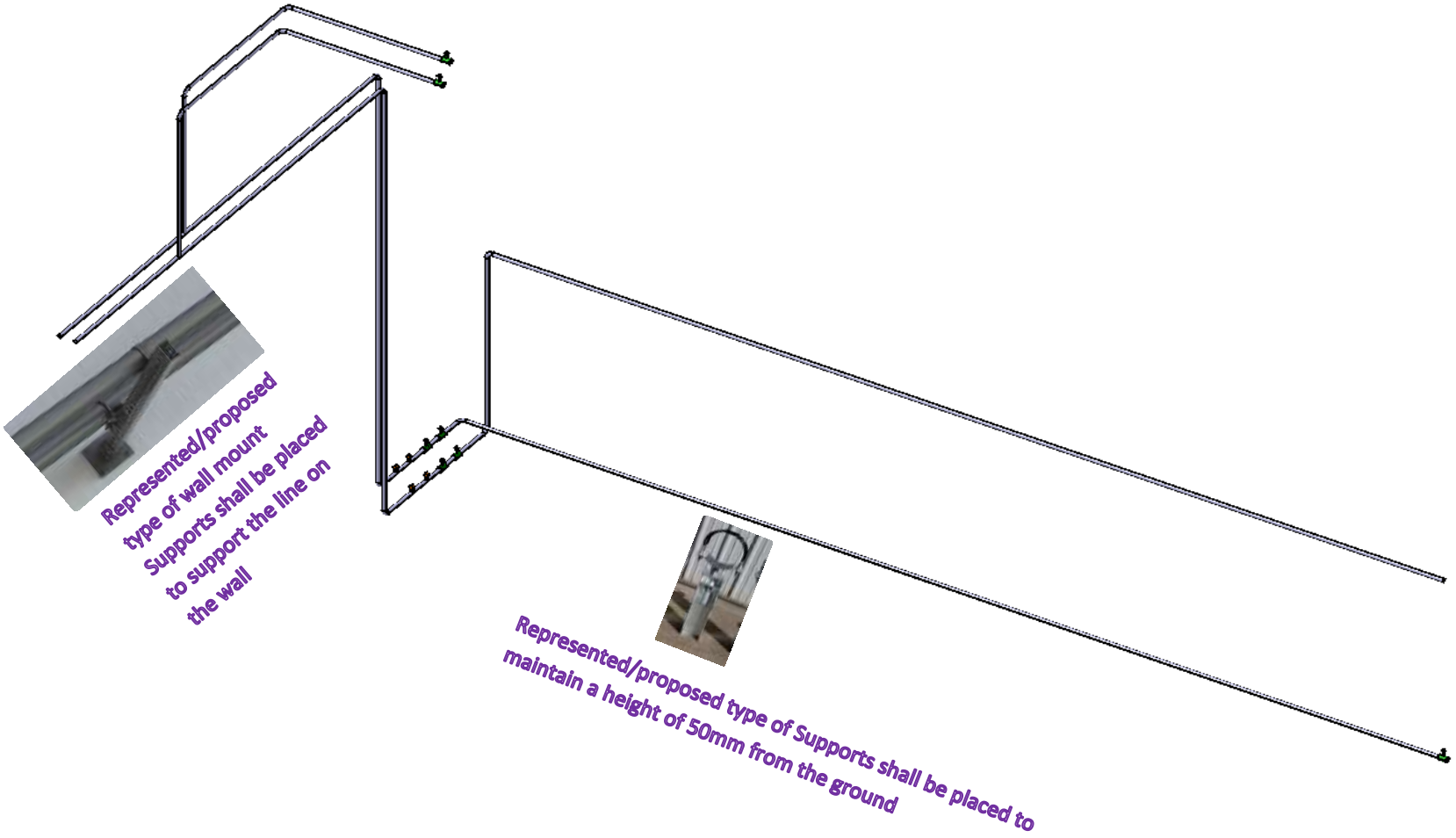
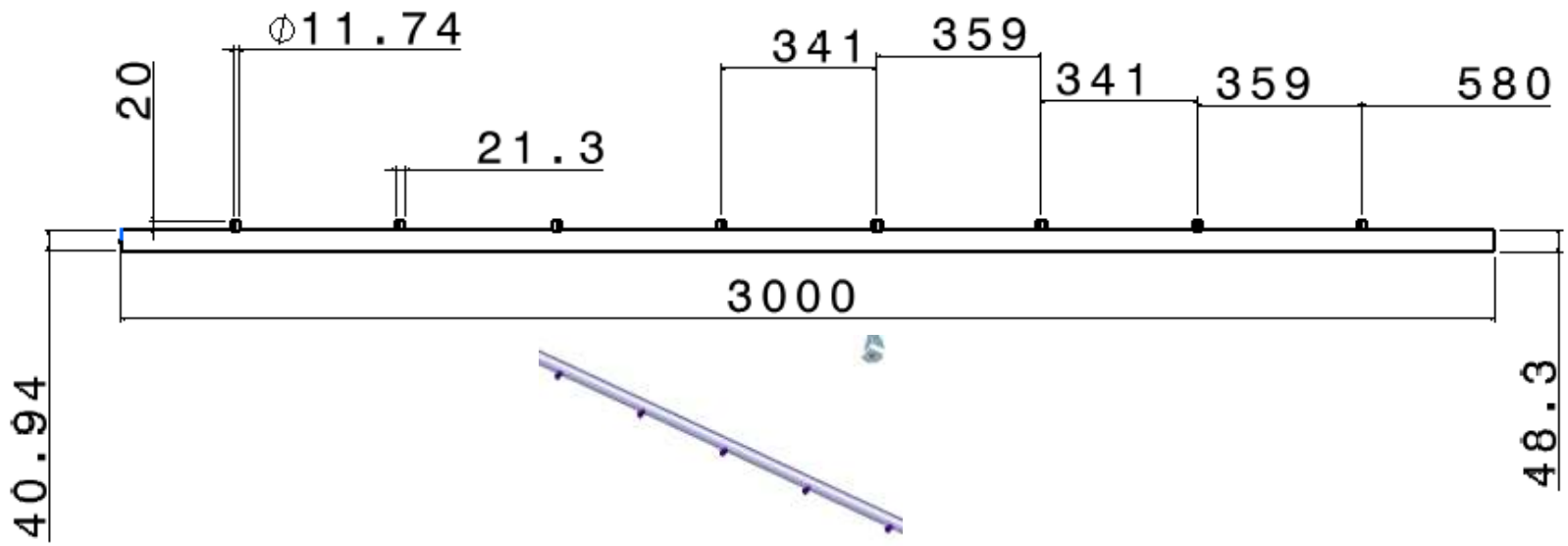


Figure-6 Drawing of 3/4" pipe with 1/2" female thread with adoptability to 1/2" male adaptor of gauges

8. Proposed Pipe Layout in the Building



9. Fabrication drawing of Spool



There are total 04 nos. of fabricated spool of DN-40 of Sch-40. The fabricated spool is equipped with DN-15 nipple of SCH-160 with an extrusion of 20mm from the spool as shown in figure-05.

10. Execution of work

The manufacturer shall prepare the fabrication and erection drawings of spools & supports and submit to ITER-INDIA, after approval of drawing shall procure all raw material. All spools shall be fabricated and leak tested at fabrication shop and delivered to ITER-INDIA Lab. All of the approved/accepted fabricated spools shall be installed from a height of ~9m at the site with appropriated support (All of the supports are of Mild steel and painted). Anchoring shall be performed with HITLI (Suggest size is M10) anchor only. After successfully erection at site the erected pipe line and welding shall be tested for DPT and Leak test according to attached procedure. And finally, the erected cooling circuit shall be integrated with the present system with the help of flexible carbon free hoses **(shall be provided by client) with the help of threaded connection** and test for leak

11. Packaging and delivery:

Manufacturer shall dispatch the hydraulic circuit/fabricated spools only after the acceptance from ITER_INDIA with proper packaging to avoid transit damages.

12. Delivery Schedule:

Manufacturer shall offer hydraulic circuit/fabricated spools for inspection/testing to the purchaser within 2weeks from the date of final drawing approval.

Only after successful testing, delivery shall be made to I-I lab, IPR, Gandhinagar.

Erection will be completed within 10 days after receiving material at I-I lab and offered for final site inspection. Final documents will be handed over after final cleaning and testing at erection site.

13. Documents to be submitted by Supplier before initiating fabrication works

- Fabrication and Erection drawings
- TC of Raw material
- Acceptance to the all provided documents.

14. Integration/Testing:

- Hydraulic circuit shall be erected as per approved erection drawing at Iter-India Lab building IPR, Gandhinagar and to be tested in accordance with given approved procedures.
- The design pressure of the hydraulic circuit is 9 bars and hydrostatic test will be conducted at 13.5 bars for the erected hydraulic circuit supplied by the party.

15. Documents to be submitted by Supplier after fabrication and erection works

- Fabrication and Erection drawings
- Raw material certificates for listed purchased items.
- Fabrication and inspection reports
- Final cleaning, inspection and all test reports

ITER-India will accept the supplied, erected job only after the above documents found in agreement with given procedures

16. General requirements

- DN-15, female socket threading should match with flexible hose pipe (Shall be provide by ITER-INDIA).
- All welding shall be free of any visual foreign material, rust, dust, burr etc.
- All flange joint to be bolted with appropriated size of gaskets.
- All bolting shall be proper.
- All welding works to be performed with proper purging.
- Welding of socket to be performed with minimum root gap and maintaining the welding current ~ 50-55A to control heat affected zone (inter pass temperature <120deg.cent)
- During the erection of hydraulic circuit at site, proper gradient to be maintained to support gravity drain
- Temporary headers and equipment as required for hydrostatic static test and cleaning to be provided by the party
- Cutting and rejoining of present cooling line to create space for erection or testing.

17. Essential clause to bid:

1.The bidder must be MSME registered Firm (Submit Certificate).
2.The bidder must visit the working site in presence of ITER-INDIA representative, to comprehend the site condition and packaging requirement of the component at the actual site. The bidder has to submit the below site visit certificate duly filled and signed along with the bid, failing which the bid shall be summarily rejected.

Site Visit Certificate

Date:

Enquiry / Bid No.	
Date	
Item Description	
Due Date for Bid submission	

This is to confirm that

Mr.

of Messrs.

has / have visited the site at ITER-India Lab, Institute for Plasma Research on

				2	0		

to understand the scope of supply, work, technical specifications and get acquainted with the tender requirements related to above mentioned enquiry / tender.

Bidder's
Signature:
Date:

Coordinator, ITER-India, IPR

Signature:
Date:

To be submitted with bid (Compliance sheet)

Sr No.	Component	Material	Standard	Ask Qty.	Accepted Yes/No	Remark
1	1 ½" SCH 40 pipe (DN40)	SS304	ASTM A-312 TP 304L	~70m		
2	1 ½" T-joints SCH 40 (DN40)	SS304	ANSI B16.28	As required		
3	1 ½" SCH 40- 90°- long radius elbow (DN40)	SS304	ANSI B16.28	As required		
4	1 ½" dummy plate, ϕ70mm, 10thk	SS304	ANSI B16.9	4 Nos.		
5	Flow control ball Valve DN40 class# 150 threaded	SS304	ASME B16.34	2 Nos.		
6	½" female socket, SCH 160 (DN15)length-28mm	SS304	ASTM A-312 TP 304L	As required		
7	1 ½" weld neck flanges class 150	SS304	ANSI B16.9	As required		
8	3/4" female socket, SCH 160 (DN20)length-50mm	SS304	ASTM A-312 TP 304L	As required		
9	Pressure gauge (0-30 bars) glycerin filled ,end connection threaded type	Make	Forbes Marshal/HGURU/Equivalent	2 nos.		
10	Ventured type flow meter for DN40 pipe fitting with flow rage (0-200lpm & pressure range (0-15 bars)	Make	Wika/Siemens/Equivalent	2 Nos		
11	Temperature Gauge dial reading	Make	Forbes Marshal/HGURU/Equivalent	2 Nos		
12	DN40 class# 150 ball valve with end thread	SS304	ASME B16.34	5 Nos.		
13	Submission of all Drawing					
14	Delivery period					
15	Integration with exiting system					
16	Site visit					
17	MSME registration					

ANNEXURE-B

Procedure for cleaning of Hydraulic circuit after final erection at Site Inlet Header

- Fill the hydraulic circuit (inlet header) with tap water and check for leakage if any
- Circulate water inside the circuit for 1 hour
- Drain out the hydraulic circuit of filled water
- Take a tank of appropriate size according to the circuit volume, fill tap water and add HNO_3 to make solution of P^H value≤ 2-3
- Circulate the solution inside inlet header for 4 Hours
- Drain the solution out and preserve for disposal
- Take another tank of appropriate size according to the circuit, fill tap water and add Acetone to make solution of P^H value ≥7
- Circulated the solution for 2 hours
- Drain out the solution
- Fill the hydraulic circuit (inlet header) with tap water and continue to flush till observed P^H value becomes same at inlet and outlet points.
- Drain out tap water
- Fill the hydraulic circuit (inlet header) with DM water and circulate for 1 hour Drain out the circuit and isolate it with help of isolation valve.

Outlet Header

- To be followed in same manner as Inlet header

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	1 of 11

Table of Contents

Activity	Name	Signature	Date
Prepared by-	VIKRANT GUPTA		30.07.2016
Reviewed and Approved by- NDE Level III	P D Tamhankar	ASNT LEVEL III MT, PT, RT, UT PRAKASH D. TAMHANKAR 18744	30.07.2016

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	2 of 11

1.0 Scope

This Procedure covers the Liquid Penetrant Examination of base metal, weld metal in carbon steel, stainless steel, alloy steel and non ferrous materials for detection of discontinuities which are open to the surface, such as surface cracks, laps, seams, pin holes, porosity etc.

2.0 Purpose

The purpose of this procedure is to ensure that the Liquid Penetrant Examination is carried out as per the specified requirements.

3.0 Reference

ASME BPVC Section V Article 6 Edition 2015
ASNT SNT-TC-1A Edition 2006
ASME BPVC B 31.3 Edition 2014

4.0 Responsibility

Liquid Penetrant examination shall be carried out only by personnel qualified and certified in accordance with ASNT SNT-TC-1A guidelines. Liquid Penetrant Examination shall be carried out by a person certified to at least NDE PT Level I. Evaluation and reports shall be signed by atleast NDE PT Level II Certified Personnel.

Liquid Penetrant examination shall be carried out with a procedure approved by NDE PT Level III person.

The responsibility of controlling & monitoring of Liquid Penetrant examination, documentation & preservation of documents shall be with the QAC Head. The extent of Liquid Penetrant Examination shall be as per approved Drawing/QAP/ Weld Map.

5.0 Procedure Qualification

When procedure qualification is specified by the referencing Code Section, a change of requirement identified as an essential variable from the specified value, or range of values, shall require re-qualification of the written procedure. A change of a requirement identified as a nonessential variable from the value, or range of values, specified by the written procedure shall require revision of, or an addendum to, the written procedure (Refer Annexure 1 Table 1).

The liquid Penetrant examination procedure shall be demonstrated to the satisfaction of AI as per T 150 of ASME BPVC Section V and so certified by NDE Level III before applying the procedure on actual job, approval limited to essential variable demonstrated.

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	3 of 11

Documentation showing that the required examinations have been performed and the results are acceptable shall be made available to the Inspector.

6.0 Equipment & Material

Penetrant
Developer
Cleaner/ Remover
Light Source
Lint Free Cloth

7.0 Definition & Abbreviations

NDE Non Destructive Examination
PT Liquid Penetrant Examination

8.0 Calibration

Light meter (Lux meter) shall be calibrated at least once a year or whenever the meter has been repaired. If meter has not been in use for one year or more, calibration shall be done before being used.

9.0 Method

9.1 Technique Used
Color contrast solvent removable (Visible) Dye Penetrant with non aqueous solvent suspended developer shall be used.

9.2 Surface Preparation
Surface preparation by grinding, machining or wire brushing may be necessary where surface irregularities could mask indication due to discontinuities. Grit or Shot blasting is prohibited as a method of surface preparation.

9.3 Selection of Reagent chemical

The QAC Head shall obtain certification of contaminant content for all liquid Penetrant materials (cleaning agents, Penetrant, solvents, developers, etc) batch wise by reagent manufacturer used on nickel base alloys, austenitic or duplex stainless steel and titanium. These certificates shall include the Manufacturer's Batch No. and the test results obtained in accordance with mandatory Appendix II of ASME BPVC Sec. V, Article 6.

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	4 of 11

When examining nickel base alloys, all Penetrant materials shall be analyzed individually for sulfur content in accordance with SE 165. The sulfur contents shall not exceed 1% by weight.

When examining austenitic or duplex stainless steel and titanium all Penetrant materials shall be analyzed individually for halogens contents in accordance with SE 165. The total halogen contents shall not exceed 1% by weight.

The total halogen (Chlorine, fluorine, bromine and Iodine) contents shall not exceed 1% by weight.

The verification of the PT chemicals shall be done by NDE Level II on the basis of Manufacturer Test Certificate by review.

The reagent chemicals shall be selected from the following material.

Material	Manufacturer (Dyeglo)	Manufacturer (Ferrochem)	Manufacturer (Magnaflux)
Cleaner/ Remover	CL01	FC 711/2	Spotcheck® SKC-S
Penetrant	RP81	FC 911/2	Spotcheck® SKL-SP2
Developer	RD01	FC 811/2	Spotcheck® SKD-S2

Note: Before using the above materials, each set of material needs to be demonstrated to the satisfaction of the Inspector.

Intermixing of Penetrant material from different groups or from different Manufacturer, within a group is not permitted.

9.4 Surface Cleaning and Application of Penetrant

9.4.1 Pre-cleaning

Pre-cleaning of the surface to be examined & adjacent areas within 25 mm shall be done to make it free of rust, scales, welding flux, spatter, grease, paint, oily film, dirt, lint etc. The cleaning agents shall meet the requirement of 9.3. The cleaning shall be done by wiping with cleaner and lint free cloth.

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	5 of 11

9.4.2 Drying after Cleaning
This shall be done in order to avoid any liquid residue hindering the entrance of the Penetrant in the discontinuity, which is accomplished by keeping the surface in ambient temperature for a minimum period of 1 minute to max 10 minutes.

9.5 Penetrant Application

9.5.1 After the surface has been pre-cleaned, cover the surface thoroughly and uniformly with Penetrant. The application of Penetrant shall be by spraying within 1" (25mm) area adjacent to the weld.

9.5.2 The temperature of Penetrant and surface area of part to be examined shall be neither below 5°C nor above 52°C throughout the examination period including drying period after pre-cleaning.

9.6 Dwell Time

The Penetrant dwell time shall be for a minimum period of 10 minutes, for temperature range 10°C to 52°C. The Maximum dwell time shall not exceed 2 hr. Regardless of the length of the dwell time, the penetrant shall not be allowed to dry. If for reason the penetrant does dry, the examination procedure shall be repeated, beginning with a cleaning of the examination surface. For temperatures from 5°C to 10°C, minimum dwell time shall be 20minutes. The area to be examined shall remain wet by the Penetrant throughout the entire dwell time.

9.7 Removal of Excess Penetrant

The excess Penetrant, after the required dwell time is removed using a clean lint free cloth wiping in one direction. The operation is repeated till the most traces of penetrant on the surface have been removed. Then a lint free cloth is moistened with solvent and the surface wiped in one direction until all remaining traces of penetrant are removed. To minimize removal of penetrant from discontinuities, care shall be taken to avoid the use of excess solvent. Flushing the surface with solvent, following the application of the penetrant and prior to developing is prohibited.

9.8 Drying

The surface shall be allowed to dry by normal evaporation at room temperature. The application of developer shall be within 5 to 20 minutes after drying the surface. The procedure needs to be demonstrated for above time interval. When examining long length of welds, removal of excess penetrant shall be done in steps to ensure complying with the maximum time interval stated above.

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	6 of 11

9.9 Application of Developer

9.9.1 Prior to applying the developer to the surface the developer must be thoroughly agitated to ensure adequate dispersion of suspended particles.

9.9.2 The developer shall be applied so that the coating thickness is sufficient enough to draw the penetrant out of discontinuities, but not too excessive which could cause the masking of indications.

9.9.3 With color contrast penetrant only a wet developer shall be used. The developer shall be applied by spraying to obtain a uniform thin coating over the surface. The developer may be applied as soon as practical after excess penetrant removal, but within the time limits of 9.8. Drying shall be by normal evaporation. The surface is to be closely observed during the application of developer to monitor the behavior of indications which tends to bleed out profusely.

9.10 Developing Time

Developing time for final interpretation begins as soon as a wet developer coating is dry.

9.11 Examination

Final examination shall be made not less than 10 min nor is more than 60 min after the wet developer coating dry. The light intensity, natural or supplemental white light source, shall be measured with a white light meter prior to evaluation. The Examination shall be started as soon as the developer is dry and shall be done with minimum white light intensity of 100 fc (1000 lx) on the test surface to ensure adequate sensitivity during the examination and evaluation of indication. A 7 watt LED bulb at maximum 200 mm (8") distance is demonstrated to provide above level of illumination within a circle of 8" diameter.

9.12 Evaluation of Indications and Interpretation

Relevant indications are those indications caused by discontinuities that are open to the examination surface. With a color contrast penetrant the developer forms a reasonably uniform white coating. Surface discontinuities are indicated by bleed out of the penetrant, which is normally a deep red color that stains the developer. Indications with light pink color may indicate excessive cleaning.

9.12.1 Only indication with major dimensions greater than 1.5 mm shall be considered relevant.

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	7 of 11

9.12.2 Linear indications are those indications in which length is more than 3 times the width. A rounded indication is one of the circular or elliptical shapes with the length equal to or less than 3 times the width.

9.12.3 Any questionable or doubtful indications shall be re-tested to verify whether or not they are relevant.

9.12.4 Discontinuities at the surface will be indicated by bleed out of penetrant however, localized surface irregularities due to machining mark or other surface conditions may produce false indications. These indications shall be regarded as imperfections unless it is shown by re-examination by the same method or by the use of other Non-Destructive methods and or by the surface conditioning, that no unacceptable imperfection is present.

9.13 Acceptance Standard

9.13.1 Acceptance Standard as per ASME BPVC B 31.3 Edition 2014

Liquid penetrant indications are caused by the bleed-out of a visible or fluorescent dye from a surface discontinuity in the area under test. However, all such indications are not necessarily imperfections, since excessive roughness, poor surface preparation, etc., may produce nonrelevant indications. Inadvertent evidence of penetrant not related to actual bleed-out is classified as a false indication. Indications shall be verified as being relevant, nonrelevant, or false. Additional surface preparation and/or other test methods may be used as needed to verify the relevance of an indication.
An indication of an imperfection may be larger than the imperfection that causes it; however, the size of the indication is the basis for acceptance evaluation. Only indications that have any dimension greater than 1.5mm (1⁄16 in.) shall be considered relevant.

(a) Indications

(1) A linear indication is one having a length greater than three times its width.
(2) A rounded indication is one of circular or elliptical shape with a length equal to or less than three times its width.

(b) Examination.

All surfaces to be examined shall be free of
(1) Relevant linear indications
(2) Relevant rounded indications >5.0 mm (3⁄16 in.)
(3) Four or more relevant rounded indications in a line separated by 1.5 mm (1⁄16 in.) or less, edge to edge

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	8 of 11

9.14 Repair Requirements

An unacceptable imperfection shall be removed completely or reduced to an imperfection of acceptable size. Re-examination with this procedure shall be made to assure complete removal / reduction to acceptable size.

Whenever an imperfection is repaired by chipping or grinding and subsequent repair by welding is not required, the excavated area shall be blended into the surrounding surface so as to avoid sharp notches, crevices or corners.

When welding is required after repair of an imperfection the area shall be cleaned & welding performed in accordance with a qualified Welding Procedure. All other Non-destructive tests, which were originally conducted for the affected area, shall also be repeated.

9.15 Post Cleaning

Post Examination cleaning shall be carried out as soon as practical after completion of the examination using a process that does not adversely affect the part.
Post cleaning is carried out using cleaner in order to remove residual penetrant and developer that will interfere with subsequent processing.

10.0 Records

Liquid Penetrant Test Report shall be made in the format attached.

10.1 Recording of Indications

10.1.1 Non -rejectable Indications – Non-rejectable Indications shall be recorded as specified by the referencing Code section.
Rejectable Indications - Rejectable Indications shall be recorded.

As a minimum, the type of indications (Linear or Rounded), location and extent (length or diameter or aligned) shall be recorded.

11.0 Report

11.1 PT report: ITER-INDIA/NDE/PT/F01 Rev: 0 Format attached

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	9 of 11

12.0 Procedure History

Rev. No.	Date	Revision Changes
0	25/07/2016	Initial Issue

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	10 of 11

Annexure – 1

TABLE - 1
Requirements of a Liquid Penetrant Examination Procedure

Sr. No.	Requirements	Essential Variable	Non-Essential Variable	Ref. Procedure
	Identification of and any change in type or family group of penetrant material including developer, emulsifiers etc.	X		9.3
	Surface preparation (finishing and cleaning, including type of cleaning solvent)	X		9.2 9.4
	Method of applying Penetrant	X		9.5
	Method of removing excess surface Penetrant	X		9.7
	Hydrophilic emulsifier concentration and dwell time in dip tanks and agitation time for hydrophilic emulsifiers	X		NA
	Hydrophilic emulsifier concentration in spray applications	X		NA
	Method of applying developer	X		9.9
	Minimum & maximum time periods between steps & drying aids	X		9.8
	Decrease in penetrant dwell time	X		9.6
	Increase in developer dwell time (interpretation time)	X		9.11
	Minimum light intensity	X		9.11
	Surface temperature outside (5^0C to 52^0C)	X		9.5
	Performance demonstration, when required	X		5.0
	Personnel qualification requirements		X	4.0
	Materials, shapes or sizes to be examined and the examined extent of examination		X	1.0, 4.0
	Post examination cleaning technique		X	9.15

PROCEDURE FOR LIQUID PENETRANT EXAMINATION	Procedure No	ITER - INDIA - NDE-DPT - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	11 of 11

Annexure 2

Minimum and maximum time for steps in penetrant Examination procedures

Sr.No.	Procedure Step	Minimum	Maximum	Reference
1	Drying after preparation	1mins	20 mins	9.4.2
2	Penetrant Dwell	10 mins	2 Hr	9.6
3	Penetrant removal solvent removable [T 673.1]	…	…	9.7
4	Drying after penetrant Removal [T-674]			
4a	Solvent removal penetrants	5 mins	20 mins	9.8
5	Developer Application	…	20 mins	9.8
6	Developing and interpretation time[T 675.3 and T-676]	10 mins	30 mins	9.11

PROCEDURE FOR HYDROSTATIC TEST	Procedure No	ITER - INDIA - NDE-HYDRO - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	1 of 6

Table of Content

Activity	Name	Signature	Date
Prepared by-	VIKRANT GUPTA		30.07.2016
Reviewed and Approved by-NDE Level III	P D Tamhankar		30-07-2016

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PROCEDURE FOR HYDROSTATIC TEST	Procedure No	ITER - INDIA - NDE-HYDRO - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	2 of 6

1. SCOPE

This procedure outlines the method and technique of Hydrostatic Pressure Test in accordance with clause number 345 of ASME B 31.3 2014 for piping and parts.

2. RESPONSIBILITY

2.1 This procedure shall be prepared by QAC Engineer and approved by QAC Head.

2.2 The QAC Engineer shall issue, update and maintain this procedure.

3. REFERENCE DOCUMENTS

3.1 ASME B 31.3 Edition 2014

3.2 Approved Drawings

4. GENERAL REQUIREMENTS

4.1 Preparation for Testing

4.1.1 The QAC Engineer shall ensure completion of all the fabrication, examination and inspection activities and verify all inspection and test records, including PWHT (if applicable) prior to test.

4.1.2 Vents shall be provided at all high points in the test boundary to purge air pockets while filling the piping.

4.1.3 Before testing, the component internals shall be thoroughly cleaned of slag, debris and other foreign materials. The piping shall also be examined to ensure that it is tightly connected.

4.1.4 The Customer / Inspector shall be notified to witness the test as required by their inspection check point on Quality Assurance Plan.

4.1.5 All pressure retaining welds shall not be painted or coated either internally or externally before pressure test.

4.1.6 The piping or part shall be adequately supported and all loadings that may exist during test shall be given consideration.

PROCEDURE FOR HYDROSTATIC TEST	Procedure No	ITER - INDIA - NDE-HYDRO - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	3 of 6

4.1.7 Before pressurizing the piping, all low pressure filling lines and other appurtenances that should not be subjected to the test pressure shall be disconnected or isolated

4.2 Test Gauges

4.2.1 One of the pressure gauges shall be connected at topmost point of the piping. Pressure gauges shall be directly connected to the piping, or with a pressure line that does not include intermediate valves. At least one of the pressure gauges shall be visible to the operator throughout the duration of the test.

4.2.2 Dial type indicating gauges used in testing shall be graduated over a range of about double the intended maximum test pressure, but in no case shall the range be less than 1.5 or more than 4 times the intended maximum test pressure.

4.2.3 All test gauges shall have valid calibration. Gauges shall be verified for accuracy immediately after pressure tests and so recorded.

4.2.4 Gauges shall be re-calibrated at any time that there is reason to believe that they are in error.

4.3 Test Temperature

It is recommended that the metal temperature during hydrostatic test be maintained at least 30°F (17°C) above the minimum design metal temperature, but need not exceed 120°F (48°C), to minimize the risk of brittle fracture. The test pressure shall not be applied until the vessel and its contents are at about the same temperature. If the test temperature exceeds 120°F (48°C), it is recommended that inspection of the vessel required by (g) above be delayed until the temperature is reduced to 120°F (48°C) or less.

4.4 Test Position

4.4.1 The test position shall be as mentioned in the approved drawings.

4.5 Hydrostatic Test of a Piping with Vessels as a system

(a) Where the test pressure of piping attached to a vessel is the same as or less than the test pressure for the vessel, the piping may be tested with the vessel at the piping test pressure.

PROCEDURE FOR HYDROSTATIC TEST	Procedure No	ITER - INDIA - NDE-HYDRO - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	4 of 6

(b) Where the test pressure of the piping exceeds the vessel test pressure, and it is not considered practicable to isolate the piping from the vessel, the piping and the vessel may be tested together at the vessel test pressure, provided the owner approves and the vessel test pressure is not less than 77% of the piping test pressure calculated as shown below

When the design temperature is greater than the test temperature, the minimum test pressure, at the point under consideration, shall be calculated using eq.

$$P_T = 1.5\ PS_T/S$$

Where,
P = Internal design gage pressure
P_T = minimum test gage pressure
S = allowable stress at component design temperature for the prevalent pipe material
S_T = allowable stress at test temperature for the prevalent pipe material

4.6 Safety

4.6.1 Concerned personnel working in the vicinity of the test shall be informed of the test by providing adequate warning signs.

4.6.2 Necessary personal protective equipment shall be provided and used by all personnel engaged in the test.

5. PRESSURE TEST

5.1 Hydrostatic Test

5.1.1 Test Pressure :

The hydrostatic test pressure shall be as specified on the approved drawings.

5.1.2 Test Medium

The fluid shall be water unless there is the possibility of damage due to freezing or to adverse effects of water on the piping or the process. In that case another suitable nontoxic liquid may be used. If the liquid is flammable, its flash point shall be at least 49°C (120°F), and consideration shall be given to the test environment.

PROCEDURE FOR HYDROSTATIC TEST	Procedure No	ITER - INDIA - NDE-HYDRO - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	5 of 6

5.1.3 Test Method

5.1.3.1 The item which is required to be subjected to hydrostatic test shall be filled with water up to the highest point. The water shall be pumped and pressure increased in stages.

5.1.3.2 The leak test pressure shall be maintained for at least 10 min and then all joints and connections shall be examined for leaks. The test pressure may be reduced to not less than the design pressure while performing this examination.

5.1.3.3 Piping components and subassemblies may be tested either separately or as assembled piping.

5.1.3.4 Piping subject to external pressure shall be tested at an internal gage pressure 1.5 times the external differential pressure, but not less than 105 kPa (15 psi).

5.1.3.5 Where leaks are noticed, it shall be recorded. After draining the water completely, the repair shall be done after raising NCR as per QC Manual requirements.

5.1.3.6 No repair or welding is permissible while the equipment is under pressure or having water inside. Post weld heat treatment, if required for repair, shall be done before re-test.

5.1.3.7 When repairs are made, the complete item shall be once again subjected to the hydrostatic test as per this procedure.

5.1.3.8 Engineer QC shall offer the hydrostatic test to the AI for his witness. The AI shall have the right to reject the piping if there are any visible signs of permanent distortion.

5.2 After acceptance by Inspector, inspection agency or customer, open out the vent valve and depressurize the equipment in the reverse sequence used for pressurizing.

6. RECORDS

Records shall be made of each piping system during the testing, including

(a) Date of test
(b) Identification of piping system tested

PROCEDURE FOR HYDROSTATIC TEST	Procedure No	ITER - INDIA - NDE-HYDRO - 01 - PS
	Revision	0
	Date	25.07.2016
	Page	6 of 6

(c) Test fluid
(d) Test pressure
(e) Certification of results by examiner

These records need not be retained after completion of the test if a certification by the Inspector that the piping has satisfactorily passed pressure testing as required by this Code is retained.

7. RETENTION OF RECORDS

Unless otherwise specified by the engineering design, the following records shall be retained for at least 5 years after the record is generated for the project:
(a) Examination procedures
(b) Examination personnel qualifications

8. PROCEDURE HISTORY

Rev. No.	Date	Revision Changes
0	25.07.2016	Initial Issue