



**TECHNICAL SCOPE OF WORK
HOT TAP ON STEEL PIPELINE**

DOCUMENT NO: GGL/TS/STEEL/SERVICE/HOT TAP/SOW

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1. INTRODUCTION

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) developed City Gas Distribution Networks for Distributing Natural Gas to Industrial/Commercial, Domestic Customers and CNG Stations in various cities across Gujarat, DNH, Rajasthan, Maharashtra and Punjab.

This document summarizes the scope of work, technical requirements and specifications of safety, procedure and equipment for hot tapping work to be carried out on carbon steel pipelines containing flammable hydrocarbons.

EDUCATION AND TRAINING

Working on commissioned network is critical and hence it is responsibility of **CONTRACTOR** to deploy competent work force at site. Activity wise all involved work force shall be provided with ongoing education and training as well as help to develop those skills that are required to perform, supervise and manage assigned tasks without mishap at **CONTRACTORS** own expenses. The training will be exhaustive including various job skills and HSE management, especially, on the job and off the job safety, emergency handling, PPEs, etc. Training to be imparted by **CONTRACTOR** at his own cost. In case **GGL** is providing training for some of the activities, the same will be imparted at **CONTRACTORS** own cost.

ACCOUNTABILITY

CONTRACTOR and all their work force shall be held accountable for personal and functional performance. An important factor in a **CONTRACTOR'S** overall job performance evaluation will be, how well the **CONTRACTOR** meets their skill and safety responsibilities.

This document shall be read in conjunction with the conditions of all specifications and documents included in the **CONTRACT** between **GGL** and **CONTRACTOR**.

This document is not intended to be all inclusive, and the use of guidelines set forth herein does not relieve the **CONTRACTOR** of his responsibility of performing the **WORK** safely and completing the **WORK** capable of performing the intended service.

2. DEFINITIONS

In the **CONTRACT** (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires.

The "**GGL**" or "**COMPANY**" or "**OWNER**" shall mean GUJARAT GAS LIMITED (**GGL**), having its registered office at Registered Office at Gujarat Gas CNG Station, Section 5/C, Gandhinagar – 382 006, Gujarat, India, Gujarat, hereinafter mentioned as "**OWNER**" which expression shall, unless repugnant to the context or meaning or meaning thereof, include all its successors, administrators, executors and assigns.

"**SELLER/ BIDDER/ CONTRACTOR**" shall mean the person or firm with whom **PURCHASE ORDER/ CONTRACT** is placed/ entered into by **OWNER** for supply of equipment, materials and services. The term **CONTRACTOR** includes its successors and assigns.

“CONTRACT” shall mean Purchase Order (PO)/ CONTRACT and all attached exhibits and documents referred to therein and all terms and conditions thereof together with any subsequent modifications thereto.

“CONTRACT PRICE” shall mean the price payable to the **CONTRACTOR** under the PO/ CONTRACT for the full and proper performance of his contractual obligations.

"SUPERVISOR" shall mean the person deployed by the **CONTRACTOR** for control & supervision of the work of his work force, as per the Scope of work mentioned and to receive instructions from Engineer-In-Charge or his representative.

"VENDORS" shall mean the agreement between the **GGL** and the Manufacturer for supplying the Material at **GGL** Designated store or Site through the transporter with required documents.

"OWNER'S REPRESENTATIVE" or "GGL'S REPRESENTATIVE" or “ENGINEER IN CHARGE” shall mean the person designated as such by **GGL** and shall include his authorized nominee, provided however that the **GGL's** Representative to be so designated by **GGL** may be one person for certain aspects of this agreement and another person for other aspects of work covered by this Bid / Contract.

"STORES" shall mean the Company's Stores located at various locations within the area of the operation of **GGL**.

"SITE" shall mean the land, buildings and water and other places on, under, in or through which the Permanent Works are to be carried out for the purpose of CONTRACT together with any other places designated in the CONTRACT as forming a part of the site.

"PERMANENT WORKS" or **"WORKS"** shall mean and include all works to be executed in accordance with the CONTRACT or part thereof as the case may be and shall include all extras, additional, altered or substituted works as required for the purpose of CONTRACT.

"TEMPORARY WORKS" shall mean all temporary works of every kind required in or about the execution, completion or maintenance of the works, which are not permanent.

“SERVICE” shall mean erection, installation and testing, commissioning, provision of technical assistance, training and other such obligations of the **CONTRACTOR** covered under the CONTRACT.

"SPECIFICATIONS" shall mean all directions, the various technical specifications, provisions attached and referred to in the Bid documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the contract or works as may be amplified or modified by the COMPANY during the performance of Contract in order to provide the unforeseen conditions or in the best interests of the work or works. It shall also include the latest edition of relevant standard specifications including all addenda / corrigenda published before entering into the contract.

“TESTS” shall mean such process or processes to be carried out by the **CONTRACTOR** as are prescribed in the CONTRACT or considered necessary by Owner or his representative in order to ascertain quality, workmanship, performance and efficiency of equipment or part thereof. TESTS ON COMPLETION shall mean such

tests as prescribed in the CONTRACT to be performed by the **CONTRACTOR** before the Works are taken over by the Owner.

"APPROVED" shall mean approved in writing including subsequent written confirmation of previous verbal approval and 'Approval' means approved in writing including as aforesaid.

"DRAWINGS" shall include maps, plans, tracings, prints & sketches thereof with any modifications approved in writing by the Engineer In-charge and such other drawing as may from time to time, be furnished or approved in writing by the Engineer In-charge.

"EMERGENCY" means any incident / fire / explosion / gas leakage on **GGL** pipelines including installations.

"THIRD PARTY INSPECTION AGENCY (TPIA)" shall mean any person or outside inspection Agency nominated by OWNER to inspect equipment, stage wise as well as final, before dispatch, at **CONTRACTOR's** works and on receipt at SITE as per terms of the PO/ CONTRACT.

"CONSTRUCTION EQUIPMENT" means all appliances / equipment and things of whatsoever nature for the use in or for the execution, operation, or maintenance of the work or temporary works but does not include materials or other things intended to form or to be incorporated into the WORK, or camping facilities.

"MOBILIZATION" shall mean establishment of sufficiently adequate infrastructure by the BIDDER at site comprising of construction equipment, aids, tools tackles including setting of Site Offices / Site Camp with facilities such as power, water, communication, legal & statutory compliances per Government laws, etc., establishing manpower organization comprising of resident engineer, supervising personnel and an adequate strength of skilled, semi-skilled and unskilled workers, who with the so established infrastructure shall be in a position to commence execution of work at site (s). MOBILIZATION shall be considered to have been achieved, if the BIDDER is able to establish infrastructure as indicated above to commence work at all site (s)/ locations as per time schedule, where so warranted in accordance with agreed schedule of work implementation to the satisfaction of COMPANY / engineer — in-charge.

"WORKING DAY" means any day, which is not declared to be holiday or rest day by COMPANY.

"COMMISSIONING" shall means pressing into service of the system including the plant(s), equipment(s), vessel(s), pipeline, machinery (ies), or any other section or sub-section of installation(s) pertaining to the work of the BIDDER after successful testing and trial runs of the same.

"GUARANTEE" means the period and other conditions governing the warranty / guarantee in respect of the work as detailed in section hereunder.

"HSE" means Health, Safety & Environment.

3. REFERENCE CODES & STANDARDS

Following standards and codes of latest edition have been used in this specification.

Governing Standards

ASME B 31.8	Gas Transmissions and Distribution Piping Systems
PNGRB Guideline	Technical standard specification including safety standards (T4S) for Natural Gas Pipeline & CGD
PNGRB Guideline	Technical Standards and Specifications including Safety Standards for Natural Gas Pipelines Regulations, 2009.

Reference Standards

API RP2201	Procedure for welding or Hot tapping on Equipment in Service
API 1104	Standard for Welding Pipelines and Related Facilities
ASME SEC.IX	Boiler and Pressure Vessel code Welding & Brazing Qualification
SSPC – SP1	Steel structure painting council.
ISO – 14001: 2004	Environmental Management System
ISO – 18001: 2007	Occupational Health & Safety Management System
HSE EXHIBIT	CONTRACTOR Own Health, Safety, Security and Environment (HSE)

Management System, its HSE policy and its HSE Plan are compatible with **GGL** HSE policy, objectives and HSE Management System.

In case of conflict between the requirement of this specification and that of above referred codes, standards and specifications, the requirements of this specification shall govern.

In case of contradiction, the most stringent of the above shall be applied.

4. GENERAL TERMS & CONDITIONS

CONTRACTOR shall, with due care and diligence, execute the work in compliance with all laws, by-laws, ordinances, regulations, etc. and provide all services and labor inclusive of supervision thereof. All materials, equipments, appliances, or other things (other than issued by **GGL**) of whatsoever nature required in or about the execution of the work, whether of a temporary or permanent nature shall be provided by the **CONTRACTOR**.

CONTRACTOR shall take full responsibility for the stability and HSE of all operations and methods involved in the work.

CONTRACTOR shall be deemed to have inspected and examined the work area and its surroundings and to have satisfied himself so far as practicable as to the form and nature thereof, including subsurface conditions, the extent and nature of work and materials necessary for the completion of the work and the means of access to the work area.

During the execution of work, **CONTRACTOR** should ensure that it should not obstruct any or all other activities performed by other agencies.

CONTRACTOR shall be deemed to have obtained all necessary information on subject as above mentioned as to risks, contingencies and all other circumstances, which may influence the work.

CONTRACTOR shall, in connection with the work, provide and maintain at his own cost, all lights, guards, fencing, watch & ward etc. when and where necessary or required by COMPANY or by any duly Constituted Authority for the protection of the work and properties for the safety and convenience of the public and / or others.

Unless otherwise specified, all sections of this specification shall apply to all the specification referred in this **CONTRACT**.

CONTRACTOR shall procure and supply all the materials other than **GGL** supplied materials, required for permanent installation of main pipeline and terminals in sequence and at appropriate time. All equipment, materials, components etc. shall be suitable for the intended service. **CONTRACTOR** has to take prior approval from **GGL** in the form WO / LOI / PO for providing any Materials / Services not covered under the SOR attached herewith in this document.

CONTRACTOR shall supply equipment, appliances or other tools & Tackles along with consumables of whatsoever nature required in or about the execution of the work, whether of temporary or permanent nature

5. CONTRACTOR'S SCOPE OF WORK

Scope of work indicated below shall be read in conjunction with the specifications and other documents forming a part of the **CONTRACT** document. The **CONTRACTOR**'s scope of work shall be, but not limited to, the following.

- 5.1. Collect pipeline operational data from **GGL** and simulate line data for velocity and predicted cooling rate
- 5.2. Prior to starting of work, the **CONTRACTOR** shall submit a detailed procedure for company's approval proposed to be adopted for hot tapping. Such procedure shall contain, but not limited to, the following details:
 - Preparation for hot works, viz., selection & finalisation of location on pipe for hot tap, ultrasonic testing and out of roundness checks to ensure that pipe at the hot tap location is suitable for welding, pre-heating (if required) and cutting operations, etc.
 - Method of ensuring and monitoring recommended minimum and maximum velocity of fluid in the pipeline.
 - Connection details.
 - Detailed welding procedure.
 - Procedure for non-destructive testing of weld and hydrostatic test of assembly including test pressures, duration, etc.
 - Details of all materials and equipment.
 - Hot tapping procedure and check-list.
- 5.3. Safety instructions, and safety measures viz., gas detection tests, tests for presence of toxic environment, etc. and safety measures for installations, equipment, personnel, etc.

Additional requirements as deemed necessary by company or by authorities having jurisdiction for execution of any or all phases of the work shall be binding on the **CONTRACTOR**.

- 5.4. Provide In-service welding procedure (WPS & PQR) as per API 1104.

- 5.5. Methods for welding procedure qualification and qualification of welders shall be prepared and submitted by the **CONTRACTOR** for **GGL**'s review and approval in accordance with section IX of ASME Boiler and pressure vessels code. Upon receipt of approval, **CONTRACTOR** shall prepare for the tests and conduct them in the presence of **GGL** representative. Separate qualification tests shall be carried out for each grade of steel and each size of weld. All welding shall be carried out by qualified welders and qualified welding procedures.
- 5.6. The manual arc process of welding using shallow penetration low hydrogen electrodes shall be used.
- 5.7. Test certificates for each batch of electrodes and other welding materials obtained from the **CONTRACTOR**(s) shall be submitted for the approval of **GGL**. **GGL** reserves the right to reject such material at any time, if these materials do not meet the requirements of this specification.
- 5.8. The **CONTRACTOR** shall proceed with construction only after obtaining approval of the procedure from **GGL** in writing.
- 5.9. Design and detail engineering for hot tap fittings and hot tapping work.
- 5.10. Hot tap shall be made using a full-encirclement fitting having a design suitable for **CONTRACTOR**'s proposed procedure.
- 5.11. Perform NDT inspection and test by qualified ASNT Level II NDE personnel as minimum.
- 5.12. Provide administrative support including communication and transportation facilities to staff for efficient functioning and reporting
- 5.13. Collect free issue materials from **GGL**'s storage point including loading / unloading and transportation of the materials from **GGL**'s store to the site and checking the material for its correctness prior to start of works.
- 5.14. Transportation of all required material and equipment's at site for execution of hot-tapping work
- 5.15. Mobilization of Hot taps machine/s with accessories (adaptor, Diesel Power units etc.) to job location after Inspection and maintenance at Contract workshop
- 5.16. Carry out excavation, shoring, barricading with sufficient workspace for personnel and means of entry and exit
- 5.17. Carry out the work area completely dewatered and dry for carrying out Hot Tapping.
- 5.18. Provide suitable material handling equipment for erection / fit-up of Hot Tap Tee and Hot Tap Machine.
- 5.19. Providing services of Hot tap specialist to carry out Hot tapping including mobilization to work front.
- 5.20. Supervision of hot tap operation by Hot tap specialist who is trained and periodically assessed for competence
- 5.21. Adequate safety arrangements shall be made for the protection of adjacent installations, exposed personnel and equipment.
- 5.22. No hot-tapping work shall be performed in adverse conditions of weather, such as rain, fog, high dusty winds, etc., which may be detrimental to the quality and workmanship of the performed job.

- 5.23. Collect safety permit and hot-work permit from **GGL** and obtain valid hot work permit before initiating any work whatsoever.
- 5.24. The Exact location of the hot tap on the pipe shall be carefully identified and marked in the field and **GGL** approval shall be obtained.
- 5.25. Ultrasonically examine this area to determine the actual thickness and soundness of pipe, where the Hot Tapping is to be carried out; the UT surface to be checked should be 6" more than the length of the fitting on either side.
- 5.26. Provide temporary / permanent support for the Hot Tap fitting if required
- 5.27. Hot tap fittings located at safe distance from longitudinal and circumferential weld seams, and from any existing weld on carrier pipe
- 5.28. Prior to commencement of final welding, **CONTRACTOR** shall obtain approval from **GGL** for proper joint fit-up and alignment.
- 5.29. All necessary gas detection tests shall be conducted by the **CONTRACTOR** to ensure safe environment prior to commencement of job.
- 5.30. The weld attaching the fitting to the pipe shall be circumferential to the pipe.
- 5.31. Welds shall be made in the following sequence — longitudinal welds first then one end circumferential weld, then the other.
- 5.32. Buttering to be done on pipe for increasing thickness of parent pipe before starting circumferential joint.
- 5.33. Confirm the in-process operating flow parameter which is meeting the requirement or not during welding
- 5.34. Monitor all data/parameter which are mentioned in welding procedure/PRCI during welding of hot tap fittings. Any changes in data shall be communicated to **GGL**
- 5.35. The heat shall be controlled during welding operation to prevent undue overheating of pressurized pipe.
- 5.36. The surface to be welded shall be smooth, uniform, and free of fins laminations, tears, scales, slag, grease, paint and other deleterious materials, which might adversely affect the welding and its quality.
- 5.37. All weld joints shall be cleaned of slag and other irregularities before the deposition of the next pass. Defective welds shall be completely removed or repaired in accordance with the qualified welding procedure before further welding and when instructed by **GGL**.
- 5.38. Tack welds, if allowed, shall be executed as per qualified welding procedure. Defective tack welds shall be completely removed prior to final welding.
- 5.39. Dye penetration test shall be performed for the first pass (root pass) and after completion of all welds. In addition, radiographic and/or ultrasonic tests of the welds shall be carried out.
- 5.40. Before cutting operation, the assembly shall be pneumatically pressure tested to a pressure 1.1 times of the internal operating pressure in the run pipe. The test pressure shall be maintained for a minimum period of one hour. **GGL** representative/third party inspector shall witness and grant approval on satisfactory completion of the test. All welds found defective by pneumatic testing or by NDT shall be repaired or cut and re-welded as directed by company, and re-tested. Repair of a repaired weld is not permitted.

- 5.41. The **CONTRACTOR** shall carry out all checks and inspection as recommended by hot tapping equipment manufacturer, before hot-tapping is attempted.
- 5.42. Erect scaffolding, working platform as may be required. Scaffolding where intended by Company shall be inspected by TPIA.
- 5.43. Instructions given by the Manufacturer of the hot-tapping machine shall be strictly followed while installing the machine and during the cutting operation.
- 5.44. Cutting operation shall begin only after all welds have been tested and approved by Company.
- 5.45. **CONTRACTOR** shall ensure that the full-bore ball valve or the sandwich valve is precisely centered on the tee-connection and is cleaned of all dirt, etc.
- 5.46. Boring bar of the hot tap equipment shall be run several times through the valve to ensure that the cutter does not jam or drag.
- 5.47. Complete Pressure testing of installed Hot Tap M/C assembly on line prior to Hot Tapping
- 5.48. Leakage test shall be carried out at all bolted joints. Packing of hot-tapping machine, bleed valve, bolts of cutter, pilot bit and blank catcher shall be checked before starting the cutting operation.
- 5.49. The branch connection shall be purged with an inert gas prior to commencing drilling operations.
- 5.50. When drilling operations commence, it proceeds without interruption until the hot tap operation gets completed, the valve closed and the hot tap machine removed from the carrier pipe. (Reframed: Drilling operation shall be proceeded without interruption till the hot tap operation gets completed. After the completion of the operation, valve shall be closed and the hot tap machine shall be removed)
- 5.51. Continuous gas detection and where considered necessary immediate shutdown of the welding equipment in case of gas detection. (Reframed: Continuous gas detection shall be carried out and ensure the immediate shutdown of the welding equipment in case of gas detection)
- 5.52. After the cutting operation is complete, the boring bar shall be extracted, the valve closed and the machine shall be depressurized through manifold block by opening the bleed valve. Machine shall be dismantled after these operations get completed and when authorized by company.
- 5.53. A blind flange shall be provided on the valve after removal of hot tap equipment. In the event sandwich valve is utilized, the end shall be made with a Lock-O-Ring flange.
- 5.54. The hot-tap work shall be considered complete when it is certified in writing by company/companies TPIA. The **CONTRACTOR** shall clear-off the area by removing all equipment and left-over material, etc. from the job site after completion of the work.

6. CONTRACTOR SCOPE OF SUPPLY

- 6.1. All required consumables/ tool tackles/equipment/manpower/supervision/fuels etc. for Hot Tapping and associated activities.
- 6.2. Arrangement of all testing tools/materials/consumables for the hot-tap activities.
- 6.3. Supply of hot-tap fittings as per **GGL** specification with all associated flanges, fittings, bolting, sealing material, gas bags, consumables necessary to complete the entire hot-tapping work.

- 6.4. Cold cutting machine for cutting of isolated pipeline section.
- 6.5. Transportation of all required material and equipment's at site for execution of hot-tapping work
- 6.6. All material other than free issued by **GGL**
- 6.7. All materials, equipment, trailers for transportation, loading, unloading, stringing etc. for **GGL's** supplied material.
- 6.8. All welding machines, lifting equipment, instruments, transporting vehicles and consumables for welding such as oxygen, acetylene, inert gases and all types of electrodes, filler wire, solder wire, brazing rods, flux etc. for welding/cutting and soldering purpose.
- 6.9. All materials, equipment and instruments required for all types of tests such as radiography, Ultrasonic testing, magnetic particle and dye penetrate examination and any other tests as per requirement of **GGL/GGL's** Representative.
- 6.10. Material required for Temporary supporting of carrier pipe and anchors to support the additional weight of the drilling machine, fittings and forces exerted during the drilling operation
- 6.11. All measuring instruments with valid calibration test certificates issued by external/internal agencies as appropriate and as approved by TPIA at site which shall have traceability to national / international standards.
- 6.12. **CONTRACTOR** shall arrange for adequate firefighting equipments/facility along with required supervision at site during entire hot tapping operation.
- 6.13. **CONTRACTOR** to supply of pipe upto 12 meters of length for temporary bypass arrangement in stopple job operation including loading, transportation, unloading, installation, fabrication, testing, decommission, removal etc. **GGL** will provide the pipe for temporary bypass arrangement in case of the length is more than 12 meters. Connectivity and removal of the bypass line with Hot Tap fitting/stopple fitting shall be done by **CONTRACTOR**.
- 6.14. All other materials not specifically listed herein, but required for the execution of the WORK in all respects

7. **COMPLETION DOCUMENTS**

As a part of completion documents shall submit during and immediately after the construction in original, with 1 copy in hard binder and 1 CD contains scan copy as a minimum but not limited to the following;

- Material approval record for the material supplied by the **CONTRACTOR**
- Manpower competency / qualification records
- Hot tap equipment Inspection report
- Calibration / test certificates of measuring instruments
- Test certificates of lifting devices to be used
- Hot Tap activity Procedure including job safety analysis
- PRCI (Prediction of cooling rate) Analysis / validations
- Welding procedure specification
- Welding procedure qualification report
- Electrode Qualification Test Report
- Welder qualification report
- NDT Procedure and report

- Welding / Thickness survey report
- Check Sheets for the various work carried out by the **CONTRACTOR**

8. GGL SCOPE OF SUPPLY AND WORK

- 8.1. Ball Valves for the Hot-tap shall be issued by **GGL**. Permanent gaskets and studs & bolts (if any required) shall also be in **GGL** scope.
- 8.2. Construction of valve chamber and its cover shall be done by **GGL**. However, all work required for excavation at spot to the desired depth and area appropriately to the Hot-tap work shall be in **CONTRACTOR**'s scope.
- 8.3. **GGL** will deploy a third-party agency for the inspection of the hot-tap activity. The QAP shall be prepared by **CONTRACTOR** in consultation with **GGL** and shall be reviewed and approved by **GGL** and TPIA.
- 8.4. **GGL** / TPIA shall inspect and certify items "fit for use" supplied by the **CONTRACTOR**.
- 8.5. **GGL** shall provide pipeline base data, operational parameters required for Hot Tap operation for Preparing Procedure related to welding and tapping operation
- 8.6. **GGL** shall provide work schedule for carrying out the job.
- 8.7. **GGL** shall provide necessary site clearance / approval for carrying out the job.
- 8.8. **GGL** shall provide assistance for locating **GGL** existing pipeline.
- 8.9. **GGL** shall obtain necessary principal permission and will hand over to **CONTRACTOR**.
- 8.10. **GGL** shall provide Work Permit to carry out the job
- 8.11. **GGL** shall inform **CONTRACTOR** about Risk Associated with the job & it's Control Measure.
- 8.12. **GGL** shall provide measuring instruments like Cable locator, Leak surveyor etc.
- 8.13. **GGL** shall provide pipe for bypass arrangement for double stopple operation where length of bypass is more than 12 meters.
- 8.14. **GGL** shall arrange fire tender for the hot tapping operation.
- 8.15. **GGL** shall ensure coordination with other (pipeline laying-pipeline O&M) contractor.

9. WORK MANAGEMENT

Location of Site

The location of work site shall be provided in work order/call out order issued from time to time across **GGL** operation areas.

9.1. Scope of Work

The **CONTRACTOR** shall provide all necessary materials, equipment, tools & tackles, labor etc. and get it approved (Fit for Purpose) through **GGL**/ TPIA for execution and modification of the work till completion.

CONTRACTOR shall, with due care and diligence, execute the work in compliance with all laws, by-laws, ordinances, regulations, **GGL** Business Principal etc. and provide all services and labor inclusive of supervision thereof. All materials, equipment, appliances, or other things of whatsoever nature required in or about the execution of the work, whether of a temporary or permanent nature shall be provided by the **CONTRACTOR**.

CONTRACTOR shall, in connection with the work, provide and maintain at his own cost, all lights, guards, fencing, watch, etc. when and where necessary or required by **GGL/ TPIA** or by any duly Constituted Authority for the protection of the work and properties for the safety and convenience of the public and/ or others.

9.2. Construction Equipment

The **CONTRACTOR** shall without prejudice to his overall responsibility to execute and complete the work as per specifications, time agreed in order, progressively deploy at site adequate equipment, tools and tackles and augment the same as decided by **GGL/ TPIA** depending on the exigencies of work so as to suit the construction schedule. All equipment shall be "FIT FOR USE". Audit/ Inspection of all equipment shall be carried out by **GGL** at **CONTRACTOR** place/ site prior to mobilize equipment.

9.3. Site Organization

Subject to the provisions in the Bid Document and without prejudice to **CONTRACTOR's** liabilities and responsibilities to provide adequate qualified and skilled personnel on the work, **CONTRACTOR** shall deploy site organization and augment the same as decided by the Engineer-in-charge depending on the exigencies of work.

CONTRACTOR shall deploy necessary and competent man power required as per site activities including as minimum but not limited to following

- The Project Manager/ Coordinator authorized by **CONTRACTOR** must have qualification of B.E. (Mech.)/ Diploma in Mech. Engineer with min. one/ three years of relative work experience. He shall be single point contact for all the works and must represent company in the Review meetings.
- Project Supervisor who will be responsible for planning, execution, supervision of the project site activities and man power while maintaining a safe working environment ensuring compliance to applicable procedures and policies. The designated person must have diploma in mechanical engineering with min. 1 year of experience in relevant area.
- The **CONTRACTOR** will deploy his own supervisors as directed by site engineers/ EIC. These personnel will be reporting to the EIC for monitoring construction standards and for ensuring that all technical requirements are met for the job being carried out. The **CONTRACTOR'S** supervisor(s) shall have day-to-day liaison with the EIC, and will provide the EIC with technical reports and audits, and other management information as is required on work progress and construction quality standards.
- Material Quality Assurance who will be responsible and will look after quality and compliance of all material and consumables supplied by **CONTRACTOR** as per relevant standards and specifications. The designated person must have diploma in engineering with min. 1 year of experience in relevant area.
- Quality inspector (Non-destructive testing) who will be looking after quality aspect of various non-destructive testing required during project. The designated person must be certified for American Society for Non-Destructive Testing Level-II.
- Safety officer – Degree/ diploma in engineering with min. 1 year of experience in relevant area or diploma in fire and safety/ industrial safety (Fresher or experienced).
- Welder - certification in line with API 1104 and/ or Boiler and Pressure Vessel Sec IX.
- Fitter - ITI qualification and/ or 3 years relevant experience.
- Rigger - At least 1-year relevant experience and capable to read Hindi/ regional language of the area where deployed

- All construction work will be carried out as per direction of EIC, and EIC will be the primary point of contact between the **CONTRACTOR** and **GGL** on site. All work will be issued and sanctioned through the EIC. **CONTRACTOR** shall ensure that technical quality standards are adhered to during work execution is carried out cost effectively and a good customer and public image is maintained for **GGL**.
- **CONTRACTOR** manager & supervisor shall have mobile phones to ensure that they can be contacted at all times. The **CONTRACTOR** will also nominate one person who can be contacted if necessary in odd hours, for the duration of the works. The **CONTRACTOR** supervisor will have access to transport at all times to allow them to visit sites and attend meetings with **GGL**. The normal day-to-day issue of work instructions, communication will be between EIC and **CONTRACTOR'S** supervisor and the Site Engineer.

9.4. Recruitment of Personnel by **CONTRACTOR**

CONTRACTOR shall not recruit personnel of any category from among those who are already employed by other agencies working at the various sites of **GGL**. However, **CONTRACTOR** shall give priority and make maximum use of local workers available. If in any case, **CONTRACTOR** wants to recruit personnel of any category from among those who are already employed by other agencies working at the various sites of **GGL** than **CONTRACTOR** have to get No Objection Certificate from other agencies. **CONTRACTOR** man power mentioned above shall undergo all relevant safety and technical competency training as per the "Training Applicability Matrix" prior to deployment at site.

9.5. Water Supply

CONTRACTOR will have to make his own arrangements for supply of drinking water to his labor camps and for works.

9.6. Power Supply

It shall be the responsibility of the **CONTRACTOR** to provide electrical power supply to its equipment's at site. All the cabling, equipment, installations etc. shall comply in all respects with the latest statutory requirements and safety rules etc.

9.7. Work in Monsoon and De-Watering

The execution of the WORK may entail working in the monsoon and areas requiring extensive dewatering with ensuring all the required safety measures are taken to maintain site in workable condition. The **CONTRACTOR** must maintain a minimum labor force and necessary dewatering pump as may be required to Make the site safe for the job and plan and execute the construction and erection according to the prescribed schedule. No extra rate will be considered for such Work during Monsoon period is subject to prior approval from **GGL** and availability of permission from the authority

Risk profile for work during monsoon shall be prepared, and get it approved from **GGL** prior to start of the work during monsoon. All the mitigation actions suggested in Risk profile shall be ensured by **CONTRACTOR**. No extra cost will be paid for such risk mitigation

9.8. Mechanization of Construction Activities

The **CONTRACTOR** shall without prejudice to his responsibility to execute and complete the work strictly as per the specifications, HSE Compliances and within the stipulated TIME PERIOD, mechanize the construction activities to the maximum

extent by deploying all necessary construction equipment/ machinery in adequate numbers and capacities and commensurate with the extent of enhanced mechanization required to suit the construction schedule/ progress reviewed from time to time as per recommendation of **GGL/ TPIA**.

9.9. Work Responsibility

From the commencement to completion of the WORK, the **CONTRACTOR** shall take full responsibility for the all works including all temporary works and in case any damages, loss or injury to employees/ TPI shall happen to the WORK or to any part thereof or to any temporary works from any cause whatsoever, **CONTRACTOR** shall at his own cost repair and make in good order and in conformity in every respect with the requirement of the CONTRACT and **GGL/ TPIA's** instruction. **CONTRACTOR** shall have public liability and property damage insurance.

9.10. PROTECTION OF WORKING SITE

CONTRACTOR shall protect the site by hard barricading at city area/ public places or soft barricading like as Bamboo barricading/ cone/ caution tape at out skirts. The method of protection of work site shall be selected based on careful risk assessment and type of barricading shall be allowed considering the risk profile submitted by **CONTRACTOR**. Final decision of the type of barricading shall be decided by **GGL** engineer in charge and **CONTRACTOR** shall arrange the same as per the drawings enclosed with the Tender and to the entire satisfaction of Engineer in Charge/PMC.

CONTRACTOR shall not perform any activities without specified barricading as per the standard drawings and other safety measures. **CONTRACTOR** shall provide barricading for protection of site until the completion of the work. The same can be removed post consultation from **GGL** Engineer in Charge. All above activity shall be in scope of **CONTRACTOR** at no additional cost to **GGL**.

After completion of day time construction activities, an arrangement shall be done for flickering lights/ warning lights of suitable size at suitable locations right from the first day of execution along the site in case of working at or near traffic movement so as to prevent any accident. The cost of the same shall be borne by the **CONTRACTOR**. Also, the same arrangement shall be continued in case of low light OR working during night time.

9.11. WASTE MANAGEMENT

CONTRACTOR shall coordinate and carry out the disposal of any waste (Hazardous or otherwise) produced or occurring as a consequence of its operations pursuant to **CONTRACT**. All such disposals shall be in accordance with all legislations, **GGL's** norms and best practices, whether that shall be for Hazardous waste or non-hazardous waste. **CONTRACTOR** shall ensure that all necessary approvals or licenses are obtained. **CONTRACTOR** shall record & provide **GGL** with a copy of each waste transfer/ disposal. The same shall be done as per approved procedure and guidelines up to the satisfaction of **GGL/ TPIA**.

10. HSE REQUIREMENT

- **CONTRACTOR** shall apply and obtain work permit from **GGL** for the work to be performed. After completion of work a joint inspection shall be done at work place.
- **CONTRACTOR** shall submit documents required for the establishing competences a person deputed to execute job including medical fitness if job requirement.
- **CONTRACTOR's** Representative should not be without Identity Card at **GGL** sites / office as well as sites. The I Card shall be provided by **CONTRACTOR**.
- **CONTRACTOR** shall carry out the work within the duty hours agreed with **GGL**. No Work shall be carried out without permission of Company representative beyond the official duty hours.
- **CONTRACTOR** shall ensure that all tools, appliances, machines, vehicles, or other equipment, are in safe working condition at all times and comply with current regulations and, where appropriate, are used only by authorized and competent persons. This provision includes all emergency response life-saving equipment.
- Any breach of the HSE requirement shall be deemed by the company to-be a material breach of the terms of the contract between the parties and the company shall be entitled to take appropriate action including instructing the **CONTRACTOR** to (a) Remedy the breach; (b) Suspend the work or (c) Terminate the contract.
- All activities shall be carried out as per **GGL** documented procedure and HSE requirement and deviation from it shall be dealt with very strictly.
- **CONTRACTOR** shall observe all prevailing HSE norms & labor laws applicable to them during the period of contract.
- **CONTRACTOR** shall adhere to safe construction practice and guard against hazards and unsafe working conditions and shall comply with safety standards.
- **CONTRACTOR** shall ensure that all accident, incident, injuries shall be reported promptly to **GGL**.
- All personal shall be trained and educated having competent for the work he /she undertake. He /she shall be well aware of risk and mitigation action/s for the activities undertaken.
- **CONTRACTOR** shall strictly adhere to the environment norms and as per the existing local rules and **GGL's** environment management system.
- During manually handling of material, care should be taken that a material does not fall on leg / hand. Clear understanding required amongst the persons while handling material.
- **CONTRACTOR** shall make necessary arrangements for safe custody of material in his warehouse.
- **CONTRACTOR** shall ensure that the safe transportation of material from warehouse to the concerned site.
- In case of any hazard like fire, leakage etc. due to gross negligence of the **CONTRACTOR**, **GGL** reserves the right to impose penalty up to actual damage cost and or termination of work order depending upon the gravity of the situation.
- In case of any injury or an accident at the site, the **CONTRACTOR** shall immediately inform the **GGL** Engineer in Charge of the incident and further take immediate steps to take the injured person(s) to any of the **GGL** nominated hospitals. The payments for such hospitalization and treatment shall be borne by **CONTRACTOR**

- **CONTRACTOR** shall ensure its personnel are:
 - Medically, physically and mentally fit to carry out the duties to which they are assigned in respect of the work.
 - Technically competent and experienced in the tasks assigned to them.
 - Ensure competency training and subsequent assessment by **GGL**.
- **CONTRACTOR** shall implement **GGL** HSE Policy, HSE Management System, Life Saver and guideline issued by **GGL** during the execution of Job.
- **CONTRACTOR**'s employees must use normally accepted and designated paths, walkways, or routes in going to, from, and within sites, buildings and other places of employment. "Short cuts" are prohibited.
- **CONTRACTOR** shall not carry out any work at any premises under construction. Permission & Instruction must be sought from **GGL**'s supervisor in case of exceptional circumstances.
- Emergency arrangement as agreed with **GGL** like Communication system, First aid box, etc. shall be ensured at site as directed by **GGL** appropriately.
- On completion of the contract, close out report shall be completed jointly with **GGL** contract holder covering evaluation of overall HSE performance & improvement area based on lesson learnt.
- **CONTRACTOR** should ensure an injury free incident free workplace and protect people from harm caused by work activities
- **CONTRACTOR** shall arrange work related Personal Protective Equipment (Hard Hat, Safety Shoes, Uniform, Hand Gloves etc.) to his staff and ensure to wear it during the execution of job.
- **GGL** reserves the rights to impose penalty if proper use of PPE not found on site.
- **GGL** reserves the rights to periodically inspect these PPE and to demand for availability of better quality of any PPE if that particular type of PPE is not meeting **GGL**'s requirements.
- **CONTRACTOR** shall erect & install warning sign boards at work place during the course of execution of job (I.e. "Work In progress" etc.).
- **CONTRACTOR** shall ensure that temporary scaffolding, cordons, sign boards etc. erected for purpose of the assigned job are fit for use and promptly removed following completion of the job
- **CONTRACTOR** shall ensure adequate transportation, storage and handling of material to prevent any damage which may impair safe performance of the equipment / material etc.
- **CONTRACTOR** shall use safety belts while driving four-wheeler during job execution.
- **CONTRACTOR** shall ensure safe manual handling (both individual handling & team handling) of materials / equipment to prevent any injury caused to self and third party.
- Wooden / insulated handles shall be used during the execution of job to avoid any electricity hazards related to potential live underground electric cables. Any cable/wire found during execution of job shall be considered as live and care shall be taken accordingly.
- During the execution of work **CONTRACTOR** should ensure that it should not obstruct any or all other routine activities performed by other agencies.
- **CONTRACTOR** must ensure that before using tools, appliances, machines or other equipment, the same are in safe working condition. Defective items must be repaired or removed from service promptly.
- All tools have to be insulated and rated for 1000 V AC & 1500 V DC

- All tools, measuring equipment's must be inspected and recorded and certified fit for use before putting into services
- **CONTRACTOR** shall take note that the use of open wires in sockets, use of wires with tape joints shall not be accepted at work place or site.
- **CONTRACTOR** shall take note that any electrical open wires, loose connections, hot running of equipment, open panels electrical boards, broken electrical switches etc. shall be promptly reported as hazards and until they get repaired a board of DANGER shall be displayed to caution the nearby persons.

11. SPECIAL TERMS & CONDITIONS

11.1. GENERAL

- a) Special Terms of Contract (STC) shall be read in conjunction with the Schedule of Rates, General Terms and Conditions of Contract, Material Specifications, Specifications of Work, Drawing and any other document forming part of this contract wherever the context so requires.
- b) The intending **CONTRACTOR** shall be deemed to have visited the site and familiarized themselves thoroughly with the site conditions before submitting their bid. Non-familiarity with the site conditions will not be considered a reason either for extra claims or for not carrying out work in strict conformity with **CONTRACT** terms & conditions, Scope of work & specifications and HSE requirements.
- c) In case of contradiction between referred Standard, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, Schedule of Rates, the following shall prevail in order of precedence.
 - Letter of Acceptance along with Statement of Agreed Variations
 - Schedule of Rates as enclosures to Letter of Acceptance
 - Fax of Intent/ Letter of Intent
 - Job/ Material Specifications with reference to SOR
 - AFC drawings
 - Technical Specifications
 - Special Terms of Contract
 - General Terms of Contract
 - Indian Standards
 - Other applicable Standards

11.2. MOBILIZATION

CONTRACTOR shall be required to mobilize the required resources within **15 days** post written intimation given by **GGL** for the commencement of work.

CONTRACTOR shall be ready at all times post award of **CONTRACT** with required resources and shall mobilize on allocation of job by **GGL** accordingly.

CONTRACTOR shall mobilize and deploy dedicated team for execution to ensure job completion within specified timeline.

11.3. EMERGENCY RESPONSE PLAN

In case of any injury or an accident at the site, the **CONTRACTOR** shall immediately inform the **GGL** Engineer of the incident and further take immediate steps to take the injured person(s) to any of the **GGL** nominated hospitals. The payment for such hospitalization/ medical treatment shall be borne by the **CONTRACTOR**.

11.4. WARRANTY/ DEFECT LAIBILITY PERIOD

Warranty period for all the services executed under the above scope of work and defect liability period for all the services provided by **CONTRACTOR** shall be 12 (Twelve) months from the date of completion of services as certified by **GGL/ GGL/ ENGINEER IN CHARGE**.

11.5. SUB-LETTING OF WORKS

CONTRACTOR shall not be sub-let/ sub-contracted entirely or in part by the **CONTRACT**. However, a specific specialist job can be subcontracted with prior written approval from **GGL**.

CONTRACTOR shall submit to **GGL**, the details of sub-**CONTRACTOR** including experience and skill of their manpower, along with the bid to declare their intent for execution of work. After evaluation of the SUB-**CONTRACTOR**, **GGL** may or may not give written consent to SUB-**CONTRACTOR** for the execution of any part of the work at site, being entered in to by **CONTRACTOR**.

CONTRACTOR shall be and shall remain solely responsible for the quality, proper and expeditious execution of the work and the performance of all the condition of the **CONTRACT** in all respect as if such subletting of sub-contracting had not taken place, and as if such work had been done directly by the **CONTRACTOR**.

If any SUB-**CONTRACTOR**'s work which in opinion of **GGL** is not in accordance with the **CONTRACT** documents, **GGL** may, by written notice to the **CONTRACTOR**, inform him to terminate such sub contract, and **CONTRACTOR** upon the receipt of such notice, shall terminate such subcontract.

11.6. PAYMENT CLAUSE

Terms of payment shall be as under:

FOR HOT TAPPING AND ASSOCIATED WORKS

- 10% on preparation of drawings and documents, submission to **GGL** and approval from **GGL**. Mobilisation of manpower, machinery, equipments and associated tools & tackles etc. to **GGL** designated site location. Equipment check and issuance of approval ("Fit for service") as per **GGL** approved guideline.
- 80% on completion of Hot tapping and associated works as per the scope of work, specifications and as per approved **GGL** guidelines-procedures, final acceptance by **GGL/GGL** Engineer In Charge.
- 10% on submission of As-laid drawings, documents and final acceptance by **GGL/GGL** Engineer In Charge.

FOR SUPPLY OF MATERIAL

- 100% on receipt and inspection of the material at site including submission of test certificates, drawings (wherever applicable), TPIA Inspection release note and Final acceptance by **GGL/GGL** Engineer-in-charge.

11.7. PARAMETERS, SERVICE LEVEL & PENALTY

Without prejudice to the **OWNER's** other rights available under the **CONTRACT** and/or Law, in case the **CONTRACTOR** fails to meet the performance parameter/SLA, for the reasons other than Force Majeure and/or reasons attributable to **OWNER** alone, the **OWNER** shall, recover, penalty for non-compliance/non-adherence/short fall as per the table below.

The following critical parameter describes the system performance and service level expectations and requirements during the Implementation phase of contract. The service level includes target performance measures, unacceptable measures and the related penalties for not meeting required service levels

Sr No	Parameter	Service Level Agreement	Penalty
1	Reportable Incident	Zero Incident	<ul style="list-style-type: none"> For each Fatal Incident - Rs. 1,00,000 or 10% of Total contract value, whichever is lower For each LTI(*) - Rs. 20,000 or 10% of Total contract value, whichever is lower For each MTC/RWDC Case(#) - Rs. 10,000 or 5% of Total contract value, whichever is lower <p><i>Note: Penalty shall be imposed over and above the payment & compensation that would be made by the service provider to the injured person or family of deceased vide the statutory provisions.</i></p>
2	Delay in initial Mobilisation of manpower, equipment, tools & tackles etc. required for Hot Tapping works	15 days from date of intimation from GGL	0.5% of the CONTRACT value per week (7 days) or prorate basis (in case of less than a week period, on per day basis) maximum upto 2% of the contract value (Till 4 weeks). In case CONTRACTOR fails to mobilize on the site within 4 weeks (30 days) then GGL reserves the right to offload/terminate the CONTRACT either in part (s) or complete as deemed fit.
3	Non-deployment /Short fall/Demobilization/Unauthorized Absence of resources	<p>Manpower requirement Skilled and un-skilled manpower at site throughout the project execution</p> <p>Equipment requirement Hot Tap Machines, Lifting, trenching, pipe welding equipment/ machineries, "Fit for Use" at site</p>	<ul style="list-style-type: none"> For Un-skilled manpower: Rs. 5,000 per month per manpower beyond absence of 7 days <p><u>AND</u></p> <p>For skilled Manpower (includes Project Manager, Site Supervisor, HSE person, QA/QC engineer, Qualified Welder): Rs. 5,000 per week (or part thereof) per manpower for the first week and then Rs. 1,500 per day per manpower beyond first week till the deployment of the manpower.</p> <ul style="list-style-type: none"> Rs. 1,000 per instance per Manpower/equipment for demobilization without prior intimation. <p><i>Note: Penalty shall be imposed with reference to manpower and equipment requirement during kick-off meeting / pre-</i></p>

Sr No	Parameter	Service Level Agreement	Penalty
			<i>mobilization / at different stages of project jointly agreed by GGL & CONTRACTOR</i>
4	QHSE Penalties	Un Authorized Work	Rs. 10,000/- per instance
		Working without PTW/ WA	Rs. 10,000/- per instance
		Non – compliance – Safety Training Card	Rs. 1,000/- per Employee
		Non – Compliance – Health Check up	Rs. 2,000/- per Employee
		Non – Compliance – PPEs	Rs. 500/- per employee per instance
		Use of non-standard electrical equipments	Rs. 1,000/- per instance
		Non-deployment of proper barricading as per scope of work	Rs. 2,000/- per instance
Either of the case as in Sr. No. 4, any subsequent instance shall attract penalty of Rs. 5,000/- per instance over and above specified against each Sr No with a written notice to CONTRACTOR . Multiple instances due to negligence from the CONTRACTOR and intentional non-compliance observed during CONTRACT period may, GGL may take suitable action i.e. CONTRACT Termination.			

- Cumulative value of penalty arising from Sr No 2 to Sr No 4 of the table of the above Clause shall be limited to the 5% of the total monthly invoice value or total value of the invoice for the applicable period.

*LTI - Loss time Injury

A disabling Occupational Injury which results from a work-related activity or from a single instantaneous exposure in the work environment and that results in a person being unfit for work beyond the day of the incident. Where the injured party returns to work on the following day but subsequently has to take time off as a result of the injury this shall count as a Lost Time Injury.

MTC - Medical Treatment Case

A work-related injury case is classified as Medical Treatment Case (MT) when the management and care of the injured person is above and beyond First Aid

RWDC - Restricted Work Day Case

Any work-related Injury Case (other than a fatality or lost workday case) which results in a person being unfit for full performance of their regular job on any day after the work-related injury

Note: For further details on glossary (terminology/definitions) and guidelines on same, refer **GGL** approved Guideline on Glossary related to **GGL** HSE incident Statistics.

12. IMPLEMENTATION OF DIGITAL INITIATIVES BY GGL

GGL has implemented and will implement various initiatives towards automation and digitization of the activities and processes with an aim of having high efficiency work, to reduce manual efforts, TO improve communication and collaboration. Accordingly, **CONTRACTOR** shall implement the same including but not limited to digital attendance reporting, online documentation and transaction monitoring, online document review and approval, online data uploading and updating, online material management etc. with no additional cost to **GGL**. Time to time, **CONTRACTOR** shall ensure the required resources like smart phones, computers, internet connectivity etc. to implement the app based/web-based process including training of the manpower for the same.

GGL has implemented GPS (Global Positioning System) based Vehicle Tracking Operations and Payment (V-TOP) system on IT platform provided by the **GGL**. The System will analyze GPS data of vehicles to ascertain various details of vehicle operations in terms of mileage, geo-locations, route deviations, operational hours, unscheduled stops, delays, breakdowns, fuel use, operational efficiency etc. V-TOP system will provide alerts and notifications in order to guide and to ensure the vehicle operations as per standard operating procedures. V-TOP system will be integrated with PALM system to capture attendance of drivers and manpower deployed with the vehicles. Further, V-TOP system will automatically process the GPS and attendance data for billing and payment of fuel use, manpower used and services of the vehicle provider without any manual intervention. **CONTRACTOR** shall be responsible to ensure compliance to any such vehicle tracking system, where applicable.

GGL has implemented Vendor Invoice Submission Application (VISA) for office automation, digitization and transparency in processing of vendor invoices. **CONTRACTOR** shall upload the invoices and other specified supporting documents on VISA before submitting physical set of Invoice & documents along with covering letter generated from application to respective **GGL** Offices. Additional reports/documents (not specified on VISA portal), may be directly submitted to concerned **GGL** / EIC as per requirements. The onus of selecting relevant name of **GGL** / EIC (where physical invoice is to be submitted by vendor) is on the **CONTRACTOR** for timely processing of invoices and for further certification / payment.

13. ANNEXURES

Annexure – 1: Requirements for welding of Hot Tap Fittings

Annexure – 2: Requirement for Hot Tap drilling operations

Annexure – 3: Requirements for strength and leak testing of hot tap fittings

Annexure – 4: Requirement for stopple/gas stop operation

ANNEXURE 1: REQUIREMENTS FOR WELDING OF HOT TAP FITTINGS

Welding activities shall follow qualified and approved welding procedures with no deviations, and shall be witnessed by **GGL** site-in-charge or approved TPI. In addition, welding shall be done considering the following as a minimum:

- Welding operations shall be completed by the prescribed welding procedures with respect to the approved welding sequence and orientation.
- All welding, NDT and related activities shall be carried out in accordance with the relevant design code and the appropriate requirements
- Only welding consumables capable of depositing low hydrogen deposits (8ml H₂/100g (H₈)) weld metal hydrogen levels, Electrode E7018) shall be used for welding of ferritic steels. Low hydrogen SMAW consumable shall be stored and handled in accordance with the requirements Hot tap welding procedures and welder performance approvals shall be fully established in accordance with API 1104, and specific welding procedure specification shall be prepared for each type of hot tap fitting longitudinal, circumferential and attachment welds, including the following as a minimum:
 - Weld groove detail including variable root gap, root depth and use of backing strips
 - Special welding technique for completing fitting circumferential attachment welds
 - Hot tap fitting type and range in pipe wall thicknesses including pipe chilling effects
 - Range in CE/Pcm values for both fitting and pipe materials
- Welding electrodes, heat input and preheat shall be selected to prevent burn through and hydrogen cracking.
- The carrier pipe shall be welded overlaid ('battered') with at least two layers of weld metal in the location adjacent to the hot tap fitting.
- The width of the weld overlay shall be sufficient to overlap the hot tap fitting attachment weld by at least 6mm on both inside and outside diameter. The weld overlay shall be subject to 100% visual examination and 100% MTP/PT
- When welding full encirclement split tees, the longitudinal welds shall be welded at the same time as each other using opposing welders. Thereafter, one end of the reinforcement shall be completed prior to starting the welding at the opposite end.
- The completed weld shall be subjected to 100% visual examination and 100% MTP / PT. DPT shall be carried out for each filler pass of longitudinal welds and fillet welds.

ANNEXURE 2: REQUIREMENTS FOR HOT TAP DRILLING OPERATION

- The hot tapping equipment shall be certified by the service provider / vendor as suitable for exposure to the carrier pipe operating conditions and process environment and reviewed by Assessing Authority (This shall include all components exposed to the carrier pipe contents including seals etc.)
- Consideration shall be given to the temporary supports for the hot tap machine and carrier pipe, that the travel of the cutter and pilot have been correctly calculated and the hot tap valve can be fully closed when the coupon is retracted.
- The branch connection shall be purged with an inert gas prior to commencing drilling operations.
- Hot tap valves shall be gate valve (Sandwich valve) with a block and bleed facility. The valve shall comply with the same minimum performance requirements/specification of any other valve operating in the carrier pipe system. (API 6FA & 607, confirming to API 6D & GGL specification for line valves).
- When drilling operations commence, it shall proceed without interruption until the hot tap operation has been completed, the valve closed and the hot tap machine removed from the carrier pipe.
- Hot tap coupon shall be recovered to confirm successful perforation of the hot tap operation. If the coupon cannot be retrieved, no attempt shall be made to retrieve it with the hot tap machine in position. (If the coupon has fallen into the carrier pipe and needs to be recovered. the carrier pipe shall be isolated, decommissioned and the coupon retrieved by cutting and opening the carrier pipe. The coupon may provide valuable metallurgical and corrosion information for the asset and shall be retained by GGL).
- Hot tapping/stopping work shall be done in 12 o'clock position (vertical). If the same is required in other position then review and approval from GGL shall be required after feasibility study for work execution.

ANNEXURE 3: REQUIREMENTS FOR STRENGTH AND LEAK TESTING OF HOT TAP FITTINGS

- All hot tap fittings shall be pressure (strength) and leak tested after welding and prior to commencing drilling operation.
- Tests shall be carried out after taking into account the carrier pipe internal pressure and the maximum allowable pressure differential with respect to buckling of the carrier pipe.
- If necessary, an (Finite element analysis) FEA assessment maybe undertaken to establish the limiting test pressure. Recognized stress and strain formulae or relevant ASME standards etc, may also be used.
- As a minimum the following pressure (strength) tests shall be performed on the installed hot tap fitting
- Pressure (strength) testing of the hot tap valve independently of the connected branch to the maximum flange rating of the valve or to the maximum operating pressure of the carrier pipe, whichever is lower
- Pressure (strength) testing of the branch connection including the hot tap valve in the open position, to the maximum carrier pipe pressure or the maximum allowable external pressure for the carrier pipe, whichever is lower. Design calculations shall be carried out to demonstrate the safe external pressure before testing including the weight of the hot tap machine where appropriate.
- The test medium shall be compatible with the carrier pipe material, process fluid and its operation (i.e. vent lines, where rapid cooling of the carrier pipe may, full encirclement split tees where the residue from hydrostatic testing will be present).
- Test medium may be water or an appropriate alternative. When pressure (strength) testing full encirclement split tees with water then consideration shall be given to the removal of the water from the annular space between the tee and the carrier pipe to avoid any future corrosion problems
- Pressure (strength) test of the hot tap machine to at least the maximum pressure of the carrier pipe or the flange rating of the machine, whichever is lower, shall be undertaken independently. The relevant pressure test certificate shall accompany the hot tap machine.
- Pneumatic leak test of the attached hot tapping machine and welded branch connection to a maximum pressure of 1.1 times of the operating pressure for a duration of at least 15 minutes, with an inert gas, shall be performed immediately prior to drilling operations commencing. (Air or other gases shall not be used due to the consequences of failure. Internal pressure of Carrier pipe and the maximum allowable pressure differential with respect to buckling of the carrier pipe also to be taken into consideration).

ANNEXURE 4: REQUIREMENTS FOR STOPPLE/GAS STOP OPERATION

Following requirements are defined for carrying out stopple/gas stop operation in addition to the requirement covered above.

- Welding of stopple fitting to live pipeline as per the locations finalized and testing of the joints. Pneumatic testing of the assembly as per the testing requirement defined for Hot Tapping.
- Supply, installation of temporary bypass pipeline. Hook up with temporary bypass pipeline or permanent bypass pipeline at both ends.
- Installation and testing of tapping machine in the upstream and downstream. Carry out further activities for hot tapping as per the scope for Hot Tapping.
- Insert plug and gas bags to ensure isolation of cold cutting section. There shall be no leakage of gas at cold cutting area.
- Installation of cold cutting machine near the line stop fitting and cold cutting of pipeline after ensuring zero gas percentage.
- Install new pipe / section and complete the fit up with the existing pipeline and carry out the welding of the tie-in joints. Supply of new pipe / section shall be in GGL scope.
- Complete the installation of plug and blind flanges, commission main line, decommission temporary bypass line and associated activities to complete the stopple/gas stop operation.
- All other requirements for carrying out tapping shall be as per the detailed scope of work defined in this document.