

PETROLEUM AND NATURAL GAS REGULATORY BOARD

New Delhi, the 2nd September, 2020

1. Short title and commencement:

- (1) These guidelines may be called the Petroleum and Natural Gas Regulatory Board (Gas Supplies to Industrial, Commercial Customers) Guidelines, 2020.
- (2) These shall be effective from the date they are issued by the Petroleum and Natural Gas Regulatory Board.

2. Definitions:

- (1) In these guidelines, unless the context otherwise requires, -
 - i. “Engineer In-charge or responsible engineer” means the qualified engineer appointed by CGD entity who will be responsible for the application of all or part of these guidelines;
 - ii. “MRS” means Metering and regulating station or “IPRS” means Individual Pressure Regulating Station used for pressure controlling and metering of natural gas at customer’s premises with or without pressure regulation;
 - iii. “Internal Piping (IP)” means the section of pipeline installed fabricated from the outlet flange of MRS, up to appliances point;
 - iv. “Commissioning” means safe introduction of natural gas into the internal pipeline; and
 - v. “Authorized Personnel “means a competent person of the agency authorized by CGD or PNGRB who is deployed or assigned to carry out a specific job for conducting inspection and testing of the installation in line with these guidelines.
- (2) Words and expressions used and not defined in these guidelines, but defined in the Petroleum and Natural Gas Regulatory Board Act, 2006 or in the rules or regulations made thereunder, shall have the meanings respectively assigned to them in the Act or in the rules or regulations, as the case may be.

3. Applicability:

- (1) These guidelines shall apply to the industrial and commercial customers connected by CGD entity with their city or local natural gas distribution networks as well as customers consuming natural gas other than for domestic use and categorized under non-domestic segment except in transport for automotive use where natural ventilation is not available.
- (2) These guidelines cover the general recommendation for material selection, safe installation, inspection or testing which is to be carried out prior to commissioning of the facilities at the downstream of MRS up to appliance point for new as well as for the cases where alterations are required;
- (3) The customer shall ensure compliance to these guidelines for the health, safety, and integrity of the IP downstream of meter or MRS as well as appliances or equipment throughout the operating period.

- (4) A certificate from PNGRB's approved Third Party Agency, certifying that material selection, planning and designing, installation, inspection, testing and commissioning as well as health assessment of the facilities downstream of Meter or MRS shall be obtained by customer and retained. List of Approved PNGRB Third Party Agencies ("TPA") shall be available in website of PNGRB (www.pngrb.gov.in).
- (5) The customer shall ensure that any alteration in IP line or any addition or reduction of equipment post gas-in shall be done after approval from CGD entity or PNGRB empaneled third party inspection agencies with intimation to CGD entity.
- (6) Wherever underground PE pipeline is laid, PNGRB T4S for CGD network standard shall be complied with.

4. Intent:

These guidelines is intended for ensuring the health, safety and integrity of internal installation within the customer premises including and not limited to its material selection, planning and designing, installation, inspection, testing and commissioning as well as operation and maintenance of the facilities downstream of Meter or MRS conforming to specifications laid down in the PNGRB Technical Standards for CGD Networks (T4S).

The guidelines may be read in conjunction with the following standards (latest editions):

- i. **IGEM/UP/2:** Installation pipework on industrial and commercial premises (for MOP not exceeding 0.5 bar);
- ii. **BS EN 15001-1:** Gas infrastructure. Gas installation pipework with an operating pressure greater than 0.5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations. Detailed functional requirements for design, materials, construction, inspection, and testing; and
- iii. **BS EN 15001-2:** Gas infrastructure. Gas installation pipework with an operating pressure greater than 0.5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations. Detailed functional requirements for commissioning, operation, and maintenance.

Unless otherwise specified, the latest editions of the standards mentioned herein including all addenda and revisions, shall apply. All pressure values mentioned in this specification are in gauge.

Installations shall be in accordance with applicable approvals issued by local authorities.

Installing pipework in commercial and industrial premises is a potential hazardous operation and shall be undertaken safely.

5. Route Selection:

- (1) In case gas burners are connected directly to the regulator supplied by the authorized entity, the line size shall be designed in such a way that adequate pressure is available at burners inlet when all burners (existing as well as proposed) are running on full load capacity.

- (2) The meter and regulator or MRS shall be installed at the entry of the premises.
- (3) In case a separate regulator is to be installed before burners then pressure at the farthest point (before the regulator) should not be less than minimum inlet pressure required at the regulator inlet.
- (4) The route shall be selected so that it shall not create unsafe condition for new installation as well as alteration cases.
- (5) The route shall be chosen in such a way that oil stains, hot applications, electrical appliances, electrical cables, AC Outdoor units etc. shall be at safe distance from gas line path.
- (6) The route shall be approved by CGD entity.
- (7) Customer shall ensure that IP shall not be used for any purposes which can compromise the safety and integrity of installation.
- (8) Due care should be taken during planning stage to accommodate additional equipment or burners adjoining to existing facility without compromising safety and integrity of installations.
- (9) The IP line should be installed aboveground due to reasons attributed to the safety, integrity, ease in inspection, O&M and to avoid corrosion. In case PE pipeline is laid in IP, then, the same shall comply with the requirements of PNGRB T4S regulations.
- (10) Safe route should be selected from where firm structure is available. The structural stability to be ensured by customer prior to installation and ensure fit for intended use.
- (11) Safe distance (as per applicable guidelines) should be maintained from utilities like steam line, oil line and electric HT line, hot zones, etc.
- (12) Passing of IP line should be avoided through less or non-ventilated areas, temporary structure, and drain ducts.
- (13) Installation of pipeline should be avoided at heights where the construction and subsequent inspection of PNG piping becomes unsafe.
- (14) Wherever, adequate natural ventilation is not available at critical public places, customer should carry out risk assessment and implement mitigation measures (one or more of the followings) reduce the risk to ALARP (As Low As Reasonably Practical), namely:
 - i. Ventilation
 - ii. Increase inspection frequency
 - iii. PNG Gas detection system
 - iv. Solenoid and shut off valve
 - v. Any other means to reduce the risk
- (15) The onus and efficacy of installation, operation and maintenance of the systems provided by the customer like gas leak detectors, flame proof forced draft fan, solenoid valves (to shut off supply), audio alarms, etc. and its linkages (if any) to Centralized Management Systems, shall be checked

by the customer annually, and the functioning (during the entire life cycle of the system) of the same shall solely be the responsibility of the customer. No by-pass of the gas solenoid valve shall be provided and such systems shall be monitored or controlled round the clock (24 x 7) by customer.

- (16) The gas detectors shall comply with BS EN 60079-29-1 standard or equivalent and these shall be installed in accordance with BS EN 60079-29-2 standard or equivalent.
- (17) The gas detectors (Ex-D, IIA and IIB, IP 65 protection, approved by ATEX or PESO or CMRI) shall be highly sensitive (duly calibrated by the customer initially as well as periodically) and shall be installed at appropriate locations along the pipeline system in the premises of the customer, and shall be supplemented with hooters which shall be installed at strategic locations to warn all the concerned about the gas leakage. Emergency Shut Down (ESD) devices shall be provided by the customer at strategic locations to facilitate shut down of the supply of gas in the event of any exigencies. Customer shall also ensure that these ESDs are operable (24 x 7) even in the event of power failure, that is to say by providing back-up power supply to such critical devices.

6. Materials Selection:

All materials and equipment forming a permanent part of the IP system shall be constructed according to these guidelines and should be qualified for the conditions in which it is to be used. The materials should be conforming, but not limited to, the standards and specification mentioned in Annexure 1.

7. Installations:

- (1) The installation of IP line shall be ensured as per PNGRB T4S regulations for CGD networks.
- i. All welding should be carried out by qualified welder as per API 1104.
 - ii. Teflon tape should be used for threaded joints. Any sealant agents or chemicals like M-seal, fevikwik, etc. shall not be used.
 - iii. Wherever gas pipeline crosses over other pipes and electric cables or electric points necessary measures to be taken to safeguard the gas line. For pipes passing through walls, sealing should be sleeved and filled with cement or sealant.
 - iv. Flanged joints should not be provided within 300 mm distance of electrical points or junction points, but the service line installed in confined spaces like basement, etc. shall be of welded type only.
 - v. All pipe work should be horizontally and vertically aligned.
 - vi. Pipe should be firmly tightened on support with U bolts or clamps, having adequate strength to hold the piping system.
 - vii. Adequate clamps or pipe supports on the piping system shall be provided such that the safety and integrity of PNG installation is maintained.
 - viii. Pipe support or clamps should be firmly fixed on wall or structure. A safe gap of 1" should be maintained between pipe and wall.
 - ix. Rubber sheet shall be provided between pipe and support so to protect pipe from corrosion. PVC coated "U" clamp shall be provided to support the pipe of size 2" and higher.
 - x. Pipe support should not be mounted on temporary wall or temporary shed or trees or glass or wooden facades, etc.
 - xi. In case provision is made by customer to have alternate fuel source during natural gas supply

disruption, then, the customer should ensure that both the fuels shall not be used at a time using same IP line (i.e. both the fuel should not be mixed). The customer should get the “Changeover operation methodology” and customized site-specific P&ID approved by CGD entity or PNGRB empaneled TPA.

- xii. In case of IP modification or alteration after gas commissioning, the entire pipeline shall be isolated, purged using nitrogen prior to carry out any welding operation.
- xiii. Flanges joint should have nuts or stud bolts. The extra length stud bolts shall be used such that at least 3 pitches are visible on both sides after placement of washers. All stud bolts and nuts should be galvanized as per ASTM A153.

8. Corrosion Protection and Markings:

- (1) Pipes or fittings or valves or supports & other equipment shall be painted.
- (2) Special care should be taken to ensure uniform painting thickness throughout entire pipework.
- (3) Direction of gas flow and PNG should be marked along the natural gas pipeline.
- (4) Self-adhesive anti-corrosion tapes or PE or PVC sleeve shall be used while crossing of walls or slabs or corrosion prone area to protect the pipe from corrosion.

9. Inspection and Testing:

- (1) Entire pipe work should be flushed with nitrogen / air to remove spoils, dust, dirt, welding spatter etc. Meter and regulator should be removed before flushing to avoid any potential damage. Flushing should be done from each end point.
- (2) After flushing, the entire pipework should be pneumatically tested, after removing meter and regulators, as per T4S for CGD networks.
- (3) Testing should be done with all appliances valves open and plugged. Each joint, specifically threaded joint should be checked with leak detection method. All necessary precautionary measures should be taken during testing.
- (4) For IP operating at MOP up to 4 bar, the testing shall be done with 1.5 times design pressure and pressure holding period shall be minimum 60 min.
- (5) After successfully completion of testing, the pressure should be vented out safely, meter and regulators may be kept in place. The testing certificate should be produced and signed by Contractor and Authorized personnel of approved Third Party inspection agency as per the proforma. (Annexure-2 to be filled by TPIA).
- (6) If pressure in Meter or MRS downstream pipeline is operating at the pressure 4 bar (g) or above, Non-destructive Examination (NDE) and soundness testing should be carried out as per T4S for CGD network regulation. All defects identified during NDE shall be repaired.
- (7) For IP operating at MOP up to 4 bar, all welded or threaded joints are inspected, and defects shall be repaired prior to commissioning.
- (8) The leak survey should be carried out annually to ensure safe control of operation by customer.
- (9) All the pressure tests conducted shall be witnessed by authorized personnel of approved TPA issuing a certificate for being fit for use (as per **Annexure 2**). The fit for use certificate shall be submitted to Engineer In-charge of CGD entity for records and prior to commissioning. The customer shall ensure that MRS or IPRS installation has been independently approved by certified TPA before the entity supplies the gas, and the customer shall ensure recertification once in 3 years, as per the requirements of PNGRB T4S regulations.

10. Commissioning:

- (1) Before the start of commissioning works, all the relevant details of pre commissioning checks, safety audits including inspection and testing shall be recorded by TPA in checklist attached in **Annexure 3** (to be submitted by TPA on its letterhead and signed by the customer), so as to ensure that operations are carried out in a safe manner.
- (2) After completion of the pre-commissioning checks, the pipeline networks shall be considered to be ready for the commissioning.
- (3) The relevant records and documents should be made available prior to commissioning, i.e., material test reports, testing reports, equipment test and calibration reports, drawings, etc.
- (4) **Internal pipeline checks**
 - i. Remove blind spade from downstream of isolation valve.
 - ii. Keep the vent valve in the farthest end in open condition.
 - iii. Ensure no open flame and other flammable material is available near the venting area.
 - iv. Commission IP line by gradually opening of isolation valve and ensure more than 90% CH₄ by safe venting of natural gas at farthest vent point. Further for ensuring safety, flame arrestor arrangement to be fitted in Vent pipe.

11. Safety Measures:

- (1) Adequate No. of safety gadgets, personal protective equipment, emergency handling facilities, sign boards, Do's and Don'ts, etc. as required during the installation, testing and commissioning should be in place and available at designated place. The following should be ensured at sites.
 - i. The work area has been cordoned off and required displays are provided;
 - ii. A minimum of one (1) dry powder type extinguishers (9 kg) should be available at the time of purging or venting or commissioning activities;
 - iii. Smoking, naked light or other sources of ignition should be prohibited. Warning signage or pictograms like "NO SMOKING" and "NO NAKED LIGHTS" should be prominently displayed around the work site, including vent points during purging and commissioning;
 - iv. Signage covering Emergency contact number of entity to be affixed on Meter or MRS.
 - v. Electrical continuity bonds (copper jumpers) are fitted across separated metallic pipes prior to purging operation;
 - vi. It should be emphasized that purged gas other than air is potentially dangerous for asphyxiation and information to prevent asphyxiation should be provided in procedure;
 - vii. Proper housekeeping shall be maintained by customer around MRS or metering areas;
 - viii. In any case, no hazardous or inflammable materials shall be placed in vicinity of PNG installation; and
 - ix. All installations must have displayed the Do's and DON'Ts based on those provided by CGD entity.
- (2) In case of any incident, the CGD entity will carry out an investigation of the incident to identify the shortcomings or lapses, root cause of incident, suggestions or remedial measures to prevent recurrence and to fix responsibility

The entity shall discontinue gas supply to customer in the event of unsafe installation or unsafe practices observed by CGD entity at any point of time during and after commissioning.

12. Enclosure

- i. **Annexure 1:** Material Standards and specifications;
- ii. **Annexure 2:** Fit for use certificate; and
- iii. **Annexure 3:** Check list.

Annexure 1
[See Para 6]

Material Standards and Specifications

Sr. No.	Item	Material Type	Specification
1	Steel Pipe or Galvanized Pipe	Mild steel (M.S.) or Carbon Steel (C.S)	ERW GI pipes (Class C) as per IS 1239 Part 1 standard or API 5L Gr. B or ASTM A106 or ASTM A333
2	PE pipes and fittings and valves (underground)	Polyethylene	PE100 or PE80 grade, as per following standards: Pipes: IS 14885 or ISO 4437-2 or EN 1555-2 Fittings: ISO 4437-3 or EN 1555-3 Valves: ISO 4437-4 or EN 1555-4 or ASME B16.40
2	Isolation Valve	Brass/Carbon Steel (C.S)	Up to and including 2": EN 331 More than 2": API 6D
3	Galvanized Fittings	GI Fittings, Mild steel (M.S.) or Carbon Steel (C.S)	IS 1239 (Part-2); IS 1879, ASME B16.9, ASME B16.11, ASTM A234
4	Galvanized Flanges (forged)	Carbon Steel	SORF, 150#, ASME B 16.5, Material as per ASTM A 105 hot dip galvanized
5	Socket weld end fittings	CS Forged, Socket Welding fitting,	ASTM A 234 WPB, Dimensions as per ANSI B16.11, hot dip galvanized
6	PE fittings	Electrofusion Fitting	ISO 4437-3
7	Flexible Hose	Stainless Steel(S.S.) 316L	SS braided bellow pipe with polyolefin sleeve (heat shrunked)
8	Gasket	CNAF- Spiral wound or non-metallic flat	ASME B16.20 or ASME B16.21
9	Galvanized Fasteners	steel	ASTM A193 or A 194 Grade B7 or 2 H
10	Galvanizing	Hot dip Zinc coating	IS 4736
11	"U" clamp	GI Coated and PVC sleeve	1"to 4"
12	Welding Electrodes		AWS E 6010 & E6013
13	Stud bolt, Nut	Galvanized	Stud - ASTM A 193 GrB7M Nut – ASTM A 194
14	Filter	Stainless steel	50 micron mesh and forged body. Internal SS 316 and External ASTM A 106.

15	Self-adhesive Anti corrosive Tape for wall crossing	300 micron, 2.5 cm or 5 cm (1" or 2")	As approved by CGD entity
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Annexure 3
[See Para 10]

Check list
(for issuance of Fit for Use Certificate)

(To be submitted by TPIA on letter head and signed by PNG customer)

Date:

Customer Number:

Customer Name:

Address:

Date of Inspection:

Name of CGD

Entity: Name of

Contractor: Name of

TPIA

Name of Authorized personal:

Sr. No.	Checklist Items	Yes	No	Remarks
A	Route Selection			
1	Pipe route, which is indicated by the authorized personnel, is followed	<input type="checkbox"/>	<input type="checkbox"/>	
2	Whether the pipeline route selected for IP is safe	<input type="checkbox"/>	<input type="checkbox"/>	
B	Materials			
1	All materials and equipment use in piping system are complied with PNGRB guidelines and relevant regulations	<input type="checkbox"/>	<input type="checkbox"/>	
C	Internal Piping			
1	All welding is carried out as per API 1104. NDE carried out and found satisfactory	<input type="checkbox"/>	<input type="checkbox"/>	
2	Teflon tape is used for threaded joints			
3	PVC sleeve is provided wherever distance between pipe and electric cables/electric points is less than 300 mm			
4	Flanged joints are not provided within 300 mm radial distance of electrical points or junction points			

6	Sufficient permanent support provided for Internal piping	<input type="checkbox"/>	<input type="checkbox"/>	
7	Pipe support or clamps should be firmly fixed on wall with U bolt or clamps	<input type="checkbox"/>	<input type="checkbox"/>	
9	The steel pipeline is not laid across or below the electrical lines	<input type="checkbox"/>	<input type="checkbox"/>	
D	Corrosion protection and Markings			
1	Pipes or fittings or valves or supports & other equipment are painted as per guideline	<input type="checkbox"/>	<input type="checkbox"/>	
2	Direction of gas flow and PNG are marked along the PNG pipeline	<input type="checkbox"/>	<input type="checkbox"/>	
3	Provide self-adhesive anti-corrosion tapes or PE sleeve while crossing of walls or slabs or other corrosion prone area to protect the pipe from corrosion	<input type="checkbox"/>	<input type="checkbox"/>	
E	Inspection and Testing			
1	Inspection and testing are carried out as per approved procedure	<input type="checkbox"/>	<input type="checkbox"/>	
2	The pneumatic test is carried out as per approved procedure	<input type="checkbox"/>	<input type="checkbox"/>	
3	The testing certificate is produced and signed by Contractor and Authorized personnel of approved TPA as per the proforma. (Annexure 2)	<input type="checkbox"/>	<input type="checkbox"/>	
4	For IP operating at the pressure 4 bar or above, 10 % nondestructive examination is carried out and defects are repaired	<input type="checkbox"/>	<input type="checkbox"/>	
F	Records			

Remarks:

1. _____
2. _____

Certificate

We hereby certify that the pipeline installation or laying work have been carried out in accordance with guidelines, specification, approved work procedures, including inspection and testing and the installation is found satisfactory and fit for use or ready for commissioning.

Issued by:

Third party Inspection agency Sign and Stamp:	
Date and Time:	

We hereby confirm that any responsibility beyond the delivery point lies with us in line with the Gas Sales Agreement.

Regards,

<Name and sign of the authorized person>

<Seal of the Company>