

Gas Supplies to High Rise Multi Occupancy Buildings – Draft Guidelines

Contents

- 1) Scope**
- 2) Regulations and Standards**
- 3) General**
- 4) Meter Positions**
- 5) Meter Control Valve**
- 6) Planning and Design of the Risers**
- 7) General guidelines of Stress Analysis**
- 8) Laterals**
- 9) Ventilation**
- 10) Risk Assessment**
- 11) Pipes passing through walls**
- 12) Pressure Testing**
- 13) Pipe Coatings**
- 14) Records**
- 15) Review**

1. Scope.

This document suggests guidelines which may be referred for installation of the pipe-work between the Service Regulator (SR) up to and including the steel reinforced rubber hose installed inside the kitchen of the domestic customer, and includes the risers and laterals systems supplying gas to high rise multi occupancy buildings (domestic premises), to facilitate supply of gas to the domestic customers.

Any deviations from this document will be subject to the Management of Change (MOC) Procedure.

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.

2. Regulations and Standards.

- a. This document follows the general principles detailed in the Institution of Gas Engineers and Managers, UK publication No. IGEM/G/5 – Gas in Multi-Occupancy Buildings, with amendments for the conditions that exist in the areas of Greater Mumbai and adjoining areas, and with reference to the Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks) Regulations 2008.
- b. Installations shall be in conformance with relevant standards / codes & prevalent best practices. The builder / society shall be responsible for meeting any additional requirements such as those of the Fire Departments / civic bodies, etc. of their areas.
- c. Installing risers and pipe work on high rise buildings is a potential hazardous operation and must be undertaken safely.

3. General.

- a. All the construction of risers and laterals related activities are to be undertaken with the materials either procured from vendors approved by local CGD entity, and as per the prevalent procedures approved by local CGD entity.
- b. The pipe-work in the riser shall be of welded steel construction, and the materials shall be ERW GI pipe (heavy class) as per IS 1239 Part 1 standard and wrought steel fittings as per IS 1239 Part 2 standard.
- c. For high rise buildings, the jointing method will be welding using wrought steel fittings. The buildings will normally have a built with utility shafts / ducts for accommodating risers and will be the preferred route for constructing / locating the riser.

- d. The operating pressure of the riser to multi occupancy buildings will normally be 100 mbar (g).
- e. The PE portion of a service terminates at the crimp fitting approximately 0.5 metres above ground and thereafter changes to galvanized steel pipe. The RIV is located at height of 1.5 metres from ground level. The PE portion of 0.5 metres above ground is protected with anti-rodent HDPE sleeve and RCC crimp guard.
- f. Immediately above the RIV, an equal tee will be fitted to facilitate the pressure testing of the riser.
- g. In areas susceptible to rats' bites, the PE pipe shall be protected with anti-rodent sleeve / tape protection.
- h. Where the pipe must be laid over the building Podium / roof slab, to gain access to the riser, this may be done either:
 - i. By laying exposed steel pipe clipped to the roof in the car parking area.
 - ii. By laying (in the podium) buried PE pipe at depth of at least 375 mm. Refer PNGRB T4S regulations for more details.

4. Meter Positions.

- a. Meters will normally be located inside the property on an outside wall with a minimum length of uncontrolled inlet pipe-work inside the property. The Kitchen is the preferred room to locate the meter, thereby minimizing the length of the outlet pipe-work.
- b. The meter shall be installed in an area with adequate ventilation. As a guide, a minimum ventilation area of 2% of the internal floor area of the room must be provided in the room where the meter is located.
- c. However, in exceptional cases wherein adequate ventilation is not possible / achievable, then it will require carrying out a detailed risk assessment for the individual installation. Risk Assessment will be carried out by as per UK publication No. IGEM/G/5 – Gas in Multi-Occupancy Buildings, and the onus of which shall be with the builder / society / customer for the entire life of the building.
- d. Meters must not be installed along a route that it is used by more than one property as a means of a fire escape – i.e., a communal fire escape route.
- e. The meter shall be installed at a proper location to facilitate safe and convenient meter reading and maintenance activities in future.

5. Meter Control Valve (MCV).

The meter MCV shall be installed in the premise of each domestic customer.

6. Planning and Design of the Riser.

- a. Risers and laterals must be designed to run by the safest and most economical route, taking into consideration potential meter positions, design regulations and access for future maintenance.
- b. The riser and associated laterals must be constructed in the most economical manner using the least number of fittings, minimum pipe and considering future maintenance requirements.
- c. Risers and laterals must be laid a minimum of 300 mm from any electrical equipment or installations. On occasions where the pipe must cross over a cable this has to be done at right angles and a 25 mm gap between the pipe and the cable must be maintained. Consideration may be given to wrapping the pipe with electrical insulation tape for protection against electrical short circuiting.
- d. Risers will be welded pipe-work, laid in a purpose designed and built in ventilated utilities shaft that has access at each floor level. The access entry MUST allow for a person to enter and exit the shaft unrestricted, and will normally be the size of a standard door opening. The access opening into the shaft should normally be outside the flat / property.
- e. Risers and laterals shall not be laid directly inside individual premises unless in a purpose built and designed ventilated shaft.
- f. The shaft shall not be capable of being converted into an inhabitable room by the flat owner.
- g. Any shaft etc., containing a riser or lateral shall be ventilated directly to outside air.
- h. Safe Access to the riser MUST be available for future maintenance and repair. In the case of a continuous shaft, a concrete slab or similar flooring must be provided for access for maintenance at each floor.
- i. The riser & lateral system is to be designed and evaluated to ensure that the stresses along the entire lengths of the riser and lateral system (including the stresses at supports, clamps, etc.) are within the acceptable limits, and no undue stresses are developed in the riser & lateral system due to the expansion / contraction / swaying / settlement of the building and the piping system attached thereof. The effects of environmental (thermal, wind, etc. at higher elevations of the building) and other associated factors like change in temperature over the entire year, solar gain in the riser, etc. should also be taken into consideration in the detailed designing of the PNG Riser & lateral system.

7. General guidelines of Stress Analysis.

The following loads must be covered in stress analysis of piping systems for piped gas distribution in buildings.

- a. Pressure, Self-Weight, Building Settlement and seismic effect (as per building design data, the onus of which shall be with the builder for the entire life of the building).

- b. Difference in installation temperature may be taken as 20 °C and the design temperature must be taken as 65 °C for calculating the stresses due to thermal expansion and contraction. Considering a design life of 40 years and one thermal cycle per day, number of thermal stress cycles for which the design should be safe is 40x375=15000. Stress range reduction factor will correspond to this and expansion stress range will be correspondingly reduced by a factor of approximately 0.8.
- c. Pipe displacement due to building sway in +X, -X, +Z and -Z directions (as per data from civil engineering design of the building). Sway table providing displacement of pipe at various floor levels must be provided for review and cross-check of input files of stress analysis.
- d. Pipe vibration due to building vibration caused by seismicity (as per seismic-class and spectrum data used in civil engineering design of the building).

LOAD CASES

The pipeline must be safe under the following load cases.

- a. Combined Loads Pressure, Self-weight, Building Settlement, Thermal expansion and Pipe displacement with direction +X.
- b. Combined Loads Pressure, Self-weight, Building Settlement, Thermal expansion and Pipe displacement with direction -X
- c. Combined Loads Pressure, Self-weight, Building Settlement, Thermal expansion and Pipe displacement with direction +Y
- d. Combined Loads Pressure, Self-weight, Building Settlement, Thermal expansion and Pipe displacement with direction -Y
- e. Combined Loads Pressure, Self-weight, Building Settlement, Thermal expansion and Seismic effect.

8. Laterals

- a. For welded risers, the joints on laterals can be of threaded type. The ERW GI pipe used for lateral shall be of heavy class as per IS 1239 Part 1 standard and the fittings in the laterals shall be forged / malleable cast iron fittings (as per IS 1879 standard).
- b. For high rise building, stress analysis should be carried out and suitable mechanisms should be incorporated in the design of the riser and lateral system to allow for thermal expansion / contraction of risers, and shall ensure that the stresses in the piping system are within the acceptable limits.

9. Ventilation

- a. Adequate ventilation shall be provided to the PNG system in the premises of the building / customer to prevent any potential gas leaks from accumulating in the atmosphere to unsafe levels.
- b. Riser ducts / shafts shall be well ventilated. Where the duct has a single ventilator that is part of the architectural design of the building, the free area of the ventilator to outside area shall be a minimum of 0.04 m² or 4% of the Cross Sectional Area (CSA) of the duct, whichever is greatest.
- c. However, in exceptional cases, wherein adequate ventilation is not possible / achievable, then it will require carrying out a detailed risk assessment for the installation, the onus of which shall be with the builder / society / customer for the entire life of the building. Risk Assessment will be carried out by as per UK publication No. IGEM/G/5 – Gas in Multi-Occupancy Buildings. The onus and efficacy of functioning of any auxiliary systems provided by the builder / society / 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 Building Management Systems (BMS), etc. shall be demonstrated by the builder / society and addressed appropriately in the risk assessment; and the functioning (during the entire life cycle of the system) of the same shall solely be the responsibility of the builder / society / individual customer – as the case may be, and in no case shall be the liability of CGD entity. No by-pass of the gas solenoid valve shall be provided.
- d. The gas detectors shall comply with BS EN 61779 and these shall be installed in accordance with BS EN 50073.
- e. The gas detectors (Ex-D, IIA and IIB, IP 65 protection, approved by ATEX / PESO / 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 these shall be interlocked with the shut off valve located at the inlet of the piping system in the premises of the customer. In any case, a minimum of 2 Nos. of gas detectors shall be installed by the customer. The gas detectors 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, i.e., by providing back-up power supply to such critical devices.
- f. These above-mentioned auxiliary systems shall be monitored / controlled round the clock (24 x 7) by a centralized building management system, which will be operated and maintained by competent agencies who will be managed by the builder / society for the entire life of the premises. The responsibility of the operation, maintenance and functioning of the equipments shall always be with the builder / society, and the CGD entity shall be indemnified for any untoward consequences resulting out of the malfunctioning of any of such systems / equipments. Commissioning shall be undertaken only when Indemnity bond is submitted by Authorized Signatory of the Customer in the format attached herewith at Annexure 1. Indemnity bond is to be

notarized on Rs. 200 non-judicial stamp paper in original. First & last page should be notarized & stamp of Notary shall be available for each page.

- g. The fitting of air conditioning units does not present any additional hazard to the installation of a gas meter or pipe work in the same room or building.
- h. A fire rated door will be provided at each level for accessibility in case of any emergency.
- i. The onus of safety, integrity and the efficiency of the operability the BMS in its entirety, and each of its components thereof shall be with the builder / society / customer for the entire life of the building, and the same shall initially be demonstrated to the CGD entity at a frequency of not more than 6 months.

10. Risk Assessment.

A risk assessment shall be undertaken, and the results recorded. A systematic approach is required to minimize the risk. The risk assessment shall include the following elements.

- Hazard Identification
- Hazard reduction, including the application of inherent safety principles
- Evaluation of failure modes
- Evaluation of release frequency
- Evaluation of release consequences
- Risk mitigation, consideration of risk reduction options.
- An assessment of the significance of the risk

11. Pipes passing through walls.

Pipe passing through walls should be in accordance with PNGRB T4S regulations.

12. Pressure Testing.

Pressure testing should be in accordance with PNGRB T4S regulations.

13. Pipe coatings.

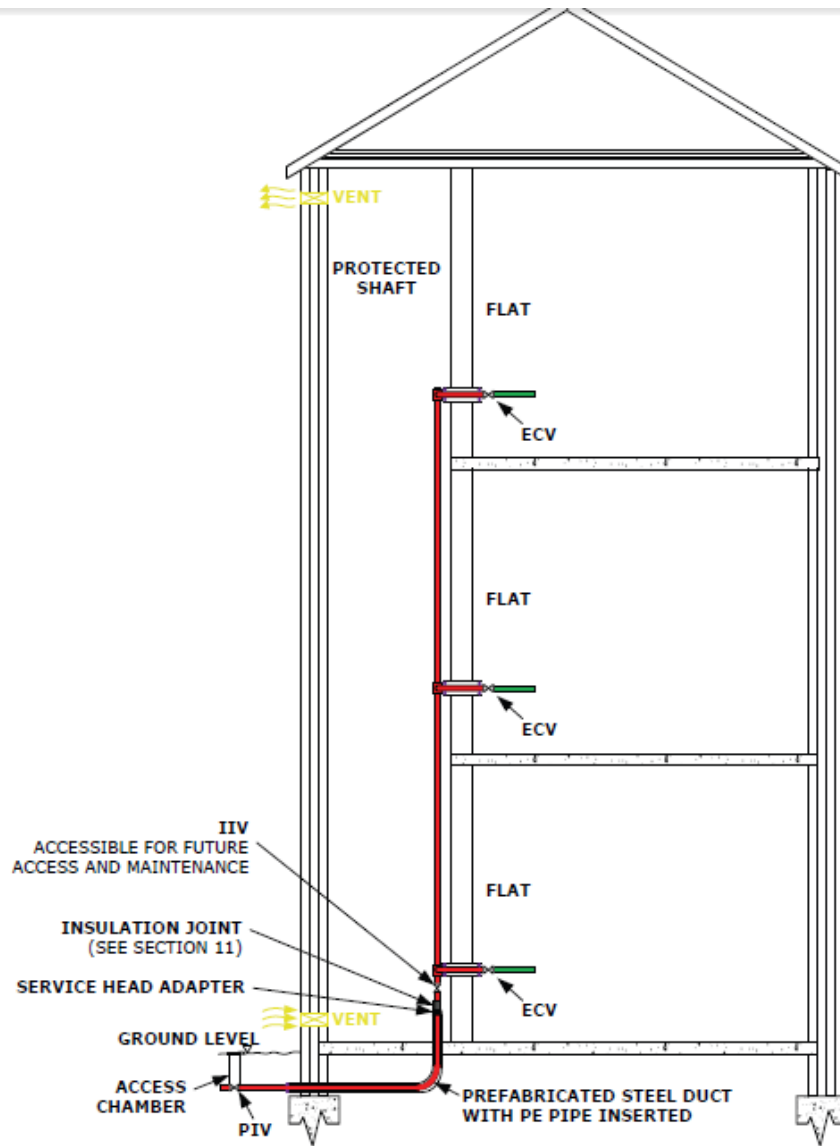
- a. All risers and laterals shall be painted yellow to signify that they are carrying gas, regardless of whether the pipe is enclosed or exposed.
- b. Pipe coatings should be in accordance with PNGRB T4S regulations.
- c. Usage of SS tubes and fittings in risers and laterals may be employed, subject to approval from PNGRB.

14. Records.

- a. A sketch and or written instruction of the design route and construction must be provided to the installer prior to installation.

- b. A sketch / drawing of the completed work must be supplied by the builder / contractor to CGD entity prior to commissioning. The drawing will be entered into the Document Management system of the CGD entity.

The drawings provided herein are to be referred in conjunction with PNGRB T4S regulations.



Internal riser passing through the shaft

Annexure I.

PROFORMA INDEMNITY BOND

On Non-Judicial Stamp Paper of Rupees Two Hundred

DECLARATION CUM INDEMNIFICATION

This DECLARATION CUM INDEMNIFICATION (“**Agreement**”) is made on this day of at _____

BY

_____, a company incorporated and registered under the Companies Act, 1956 with its registered office at _____ (hereinafter called “**BUYER**” which expression shall unless the context admits otherwise mean and include its successors, or assigns) of the one part;

IN FAVOUR OF

_____ a company duly incorporated under the Companies Act, 1956 having its registered office at _____ hereinafter referred to as “**SELLER**” (which expression shall unless repugnant to the context or meaning thereof mean and include its successors and permitted assigns) of the other part;

WHEREAS

1. BUYER & SELLER had entered into an Agreement dated _____ (hereinafter referred to as the “**Contract**”) for supplying of Piped Natural Gas (“**PNG**”) for Industrial / commercial purposes at their production facility/ hotel / situated at _____ (hereinafter called “**Premises**”).
2. BUYER had applied with the _____ Fire Department to get the NOC and the Fire Department after going through their request has issued its NOC bearing No. _____ dated _____ for getting the PNG connection from the SELLER at their Premises subject to fulfillment of certain Fire Safety Measures / guidelines / recommendations (“**Compliances**”) as mentioned / stipulated in the said NOC.
3. The BUYER has now approached the SELLER representing that he has completed all the compliances as required and stipulated in the NOC and the SELLER can now

commission his PNG connection, based upon its representation's and assurances the SELLER has decided to commission the PNG connection at his Premises.

NOW THIS DECLARATION CUM INDEMNIFICATION WITNESSTH as follows:

1. The BUYER represents, declares and assures the SELLER that it has completed all the Compliances as mentioned and directed in the NOC issued by the Fire Department for getting the PNG connection from the SELLER at its Premises.
2. That in future if at any time it is found that there has been any non-compliance and/or violation of any of the Compliance's stipulated in the NOC or the SELLER on its own comes to know or is informed by the Fire Department that the BUYER has violated any of the terms and conditions of the NOC or the BUYER fails to get the NOC renewed on time due to which the NOC gets cancelled then the SELLER shall be in its right to terminate the Contract forthwith and stop supplying PNG to its Premises without any notice to the BUYER and the BUYER undertakes not to raise any disputes, objections or otherwise in this regard with SELLER.
3. BUYER shall be solely liable for any type of loss or injury which any person may sustain or for any action by any statutory authority by reasons of any non-compliance of the conditions and terms of the NOC.
4. The BUYER shall be solely responsible for the safety and security of the equipment's installed at its Premises and shall ensure that the safety procedures are always duly followed by the BUYER.
5. BUYER hereby agree to hold harmless and indemnify SELLER, its employees, agents, authorized representatives, directors and officers from and against all action, demands, proceedings, prosecutions, attachments, claims or causes of action whatsoever, including (but not limited to) attorneys' fees and other costs arising out of any action or inaction of the part of such indemnifying Party in relation to the NOC.
6. The BUYER shall be liable to pay to ____ on demand, and shall indemnify ___ against, all liabilities, damages, costs, claims, losses, expenses, demands and proceedings sustained or incurred by ____ (including any loss of reputation, loss or damage to ___ and / or its property and those arising from injury to or death of any person) ("Losses") arising directly or indirectly from (i) violation of any of the terms and conditions of the NOC by the BUYER or any of its employees or agents; (ii) any damage or injury to the person or property of any third party caused by any negligence or default of the BUYER or any of its employees or agents in following the compliance directives and/or conditions as mentioned in the NOC; (iii) breach of any of the terms and conditions of the NOC; (iv) any representation or statement the BUYER has made under this Agreement.

IN WITNESS WHEREOF the BUYER has signed these presents on the day month and year first above written.

[1] Signature: _____ [1] Signature: _____

Name: _____

Name: _____

Address: _____

Address: _____

Seal