

# LUSAIL DEVELOPMENT

## Gas Distribution System Design Guidelines for Pressure Reducing Station (Primary Customer Meter)

Document No.: LUS-CPALL-MAQ-SPE-UT-0006

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1	IFA	09-01-2012	WOQOD's comments incorporated	A	James Kenyon	Abdullah Abushaikha	D. Reed Phillips
2	IFI	12-04-2012	PRS detail for villas included	A	Muhamad Kamal	Abdullah Abushaikha	D. Reed Phillips
3	IFI	10-05-2012	Lusail comments incorporated	A	Muhamad Kamal	Abdullah Abushaikha	D. Reed Phillips
4	IFI	12-11-2014	Additional requirement on gas meter	A	Muhamad Kamal	Abdullah Abushaikha	D. Reed Phillips

### REASON FOR ISSUE:

<b>IFR</b>	Issued for Review/Comment(s)
<b>IFI</b>	Issued for Information
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### STATUS

<b>PFC</b>	Preliminary for Comment	<b>A</b>	Approved
<b>SS</b>	Superseded		

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## 1 INTRODUCTION

The purpose of this document is to describe the works related to the supply and installation of the gas service riser and pressure reducing station and metering (customer primary meter) for Villas and Multi Storey Buildings in gas distribution network at Lusail City project development.

## 2 SCOPE

The design guidelines are the basis of Marafeq's synthetic natural gas distribution and associated utilization systems within its gas supply areas. The scope of these guidelines is covering the work from gas service riser to the primary meter set for Villas and Multi Storey Buildings.

### Gas utilization systems:

- Gas service riser.
- Pressure Reducing Station (Customer Primary Meter) installations for Villas and Multi Storey Buildings.

## 3 OBJECTIVE

The design guidelines form a part of technical documents and provide a platform for:

- Engineering instructions
- Management procedures
- Work procedures
- Method statements
- Minimum functional specifications
- Material specifications

The objective of the design guidelines is to define the basis for the design of synthetic natural gas distribution and utilization systems.

## 4 GENERAL

Gas supplied to domestic or commercial customers shall be metered to enable the Gas Utility Company to charge for energy consumed.

The Pressure Reducing Station (Customer Primary Meter) installation is to be provided by the gas plot developer and is used for billing purposes. All gas meter installed shall be calibrated to International Organization of Legal Metrology (OIML) standard.

A Pressure Reducing Station (Customer Primary Meter) installation typically comprises of inlet isolation valve which may be the ECV, a pressure regulator to control the delivery pressure and a meter fitted with an outlet valve.

Customers requiring the measurement of gas usage for each of their consumers may install Consumer (Secondary) Meter Installations at their discretion.

All installed gas meter shall be calibrated by approved third party.

## 5 DESIGN STANDARDS

Pressure Reducing Station (Customer Primary Meter) shall be designed and installed with minimum requirement complying to the below listed reference standards and codes of practice.

- IGE/GM/6 – Diaphragm and RD Meter Installations, > 6m<sup>3</sup>/hr, MOP ≤ 75 mbar
- IGE/GM/8, Part 1 – Meter Installations I & C – Design, MOP ≤ 38 bar
- IGE/GM/8, Part 2 – Meter Installations I & C – Location & Housing, MOP ≤ 38 bar
- IGE/GM/5 – Electronic Gas Meter Volume Conversion Systems
- IGE/SR/25 – Hazardous Area Classification of Natural Gas Installations
- IGE/TD/13:2001 - Pressure regulating installations for transmission and distribution systems
- BS EN 1359:1999 - Gas meters. Diaphragm gas meters
- BS EN 12480:2002 - Gas meters. Rotary Positive Displacement (RPD) gas meters
- BS EN 12261:2002 - Gas meters. Turbine gas meters
- BS EN 12405-1:2005 - Gas meters. Conversion devices. Volume conversion.
- BS 6400 – Specification for the Installation of domestic-sized gas meters maximum rated capacity not exceeding 6 m<sup>3</sup>/h (2nd and 3rd family gases)

Part 1 Natural Gas (low pressure)

Part 2 Natural Gas (medium pressure)

- IGE/UP/15- Gas In Flats: Gas Installations In Multi-Occupancy Buildings
- IGE/UP/2 - Gas installation pipe work, boosters and compressors on industrial and commercial premises
- IGE/G/5 - Gas in flats and other multi-dwelling buildings
- IGE/TD/4 - Gas Services
- IGE/TD/3 Edition 4; 2005 Steel and PE pipelines for gas distribution
- BS 6891 - Specification for installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises (2<sup>nd</sup> family gas)
- NFPA 54 – National Fuel Gas Code Handbook
- NFPA 58 – Liquefied Petroleum Gas Code

#### Local Authority Regulations:

- Qatar Civil Defense
- Qatar Construction Specification
- WOQOD Gas Department Regulations.

## 6 DESIGN PRINCIPLES

Below is the design principles adopted by Marafeq to ensure safe delivery of gas to the end users.

- All customers shall be provided with a Pressure Reducing Station (Customer Primary Meter) Installation.
- Installations shall be designed to ensure gas consumption is measured accurately and that metering and delivery pressure is constant.
- Where a primary meter is upstream of the regulator (high pressure line) a volume converter shall be installed.
- For installations providing non-standard customer delivery pressures (e.g. large commercial) a volume converter shall be installed.
- Filtration should also be installed where required.

- Installations shall incorporate a regulator with a relief piped to the outside as well as overpressure shut-off capabilities (OPSO) and under pressure shut off (UPSO) capabilities. The regulator shall have an integral filter.
- Primary meters shall incorporate provisions for remote meter reading capabilities.
- Large non-standard (e.g. large commercial) installations should be designed considering the pressure reduction system design basis and minimum functional specification.

All Pressure Reducing Station (Customer Primary Meter) installation shall be installed in locations that are;

- Easily accessible for inspection and meter reading;
- Preferably on the outside wall at ground level;
- Protected against physical damage, vandalism and the effects of severe weather
- Well ventilated such that any gas venting or leakage does not result in gas entering the building
- Positioned to minimize risk from possible interference or 3rd party damage.

Where Consumer Secondary Meter Installations are desired by customers in Multi Storey Buildings they should preferably be installed in common meter areas with secure access.

## 7 DESIGN CRITERIA

Pressure Reducing Station (Customer Primary Meter) installations shall be designed for:

- Maximum Inlet Pressure – Upstream network MOP plus 10%
- Minimum design inlet pressure is 1.2 bar for mains networks with MOP 4 bar.

Standard customer delivery pressures provided at the Pressure Reducing Station (Customer Primary Meter) installation outlet is:

- Inside Villas – max 21 mbar (75 mbar before enter the villa)

- Inside Multi Storey Buildings – max 75 mbar.
- Other standard pressures that may be used for external pipework not containing branches for Multi Storey Buildings i.e. Risers is 350mbar.

External pipe work inside mechanical shaft or outside the building wall containing branch connections to domestic consumers shall operate at a maximum pressure of 75 mbar.

External pipe work not containing branch connections shall operate at standardized pressures of 75 mbar or 350mbar.

Delivery pressures above 75 mbar at the Pressure Reducing Station (Customer Primary Meter) outlet require special design consideration and shall be considered on an individual basis, building designers should consult with the Marafiq prior to designing any customer installation pipework that operates at pressures in excess of 75 mbar.

## 8 DESIGN PARAMETER

Refer to Marafiq's Design Guidelines for Mega Development and Sub Development design parameter Section 6 on document no: LUS-CPALL-MAQ-SPE-UT-0005

## 9 LOCATION OF PRESSURE REDUCING STATION (CUSTOMER PRIMARY METER) SET

Gas service riser shall be piped to the preferred location A, B or C as mentioned in the figure 1.

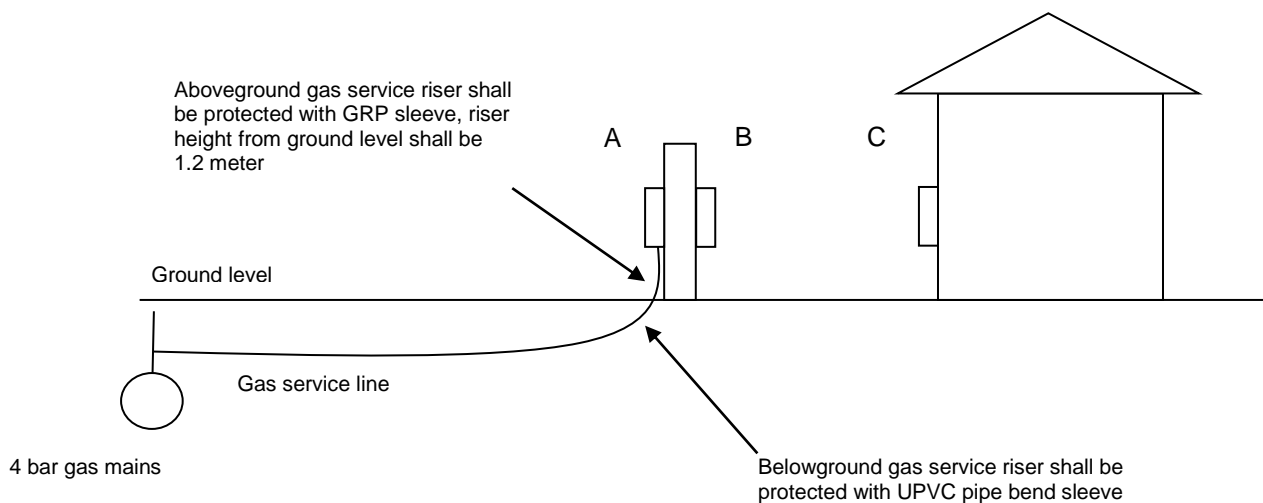


Figure 1 Villa pressure reducing station location



Where is possible for ease of access the Pressure Reducing Station (Primary Customer Meter) box shall be installed in recess and lockable.

All Pressure Reducing Station (Primary Customer Meter) located at point A, B or C shall be easily access.

Pressure shall be keep at 21 mbar or 75mbar depending on the length of pipe.

If 75 mbar pressures is use, secondary pressure regulator with over pressure and under pressure shut-off valve (OPSO & UPSO) shall be installed prior to entering the Villas or Multi Storey Buildings.

Only 1 mbar pressure drop is allowed on pipeline between the gas meter (21mbar) and the apparatus.

Pipes installed crossing the wall shall be in sleeve and grouted with fire resistance sealant.

All service riser shall protected with GRP pipes and UPVC

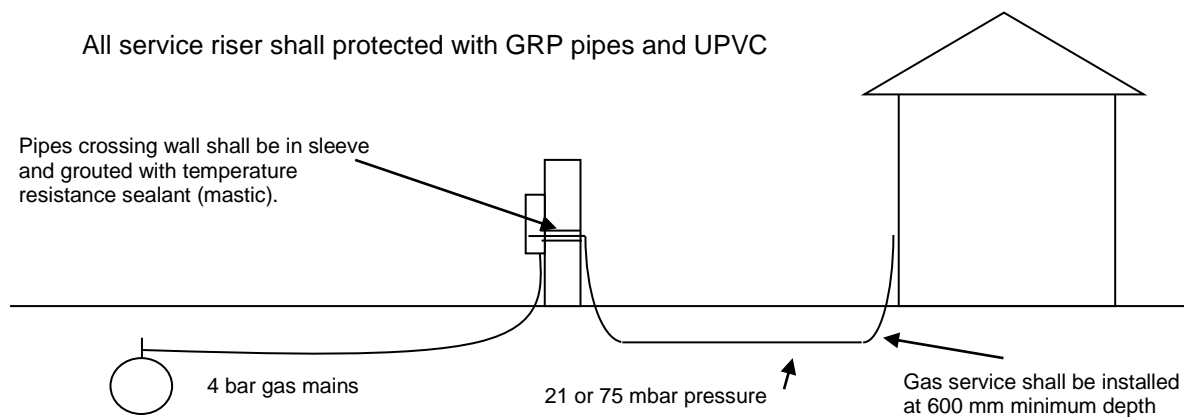


Figure 2

All belowground service risers shall be protected with UPVC sleeve bend and aboveground with GRP pipes sleeve.

All belowground pipes shall be rise aboveground before entering the building.

All PRS pipe material shall be carbon steel or equivalent.

Pipe diameter 50 mm and above shall be installed with welded and flanges connection.

All steel pipes installed below ground shall be protected from corrosion with suitable method of coating or wrapping.

Gas leak detector shall be installed in the Pressure Reducing Station and at the basement level of the building.

Gas leak detector shall be install at minimum 300mm from the floor and shall have provision to be installed at high level for future Natural Gas.

Pressure Reducing Station location shall be approved by MARAFEQ.

Refer to drawing number LUS-CPALL-MAQ-DWG-UT-30300 for details of gas service riser and pressure reducing station (Customer Primary Meter) for Multi Storey Buildings.

Refer to drawing number LUS-CPALL-MAQ-DWG-UT-30301 for details of gas service riser and pressure reducing station (Customer Primary Meter) for Villas.

## 9.1 Gas Meter Room

The building owner is responsible for the maintenance and installation of the metering room and non-meter related equipment (for example the meter room lighting, mechanical ventilation, alarms, locks, core holes, and cleanliness).

Gas meter room shall no closer than 3m vertically and horizontally from source of ignition or electrical substation

Building owner/manager is required to provide certificates regarding:

- Fire classification of material used to build metering room
- All internal electrical installations should be Flame-proof enclosure – Ex'd' or Explosion proof enclosure - Ex'e'

Installation of double doors is preferred to provide adequate access for crew and equipment.

## 10 COMPONENT OF PRESSURE REDUCING STATION (CUSTOMER PRIMARY METER) SET

Below is the list of component shall be available in the pressure reducing station.

- Gas meter (diaphragm, rotary or turbine type , unit reading shall be in cubic meter)
- Pressure regulator with OPSO & UPSO and relief valve
- Gas solenoid valve

- Pressure gauge with valve
- Filtration unit where applicable
- Inlet ball valve (Emergency Control Valve)
- Outlet ball valve
- Cabinet (Steel or GRP) with lock
- Gas leak detector

Additional items for Multi Storey Buildings Pressure Reducing Station (Customer Primary Meter):-

- Inlet and outlet bypass valve for single stream unit
- Creep pressure relief valve
- Electronic volume corrector where applicable

## 11 ELECTRICAL APPARATUS

### 11.1 Electrical apparatus near to a gas meter

A gas meter and its associated fittings shall be fitted more than 1000 mm from an electricity meter/electrical apparatus or more than 500 mm away from the electricity supply and distribution cables, if this distance cannot be achieved a non-combustible partition made of an electrically insulating material shall be placed between them.

### 11.2 Electrical Bonding

Where electrical cross bonding is applied to the gas installation pipes, a clamp shall be used to make connection to the outlet side of the meter not further than 600 mm of the pipe run from the meter.

### 11.3 Smart Meter Reading

All plot Pressure Reducing & Metering Station (PRMS) shall be provided with smart meter reading and control capability with minimum requirement to read gas volume, corrected volume, pressure, temperature, monitoring and controlling of solenoid valve and gas leak detection system.

All Pressure Reducing & Metering Station (PRMS) shall be equipped with the automatic control and monitoring PLC-HMI with ESD system, the automatic system shall be equipped with the feature that capable to communicate and transfer the data on fiber optic communication on

TCP/IP protocol to Lusail SCADA system which shall be located in Gas farm control room | The PRMS system shall be able to control and monitor minimum gas volume, corrected volume, pressure, temperature, solenoid valve and gas leak detection system

## 12 PAINTING AND COLOR CODES

### 12.1 General

The Pressure Reducing Station equipment and pipes spool shall be protected from corrosion and to be provided with piping color to easy identification of the pipelines and their content. Pipeline colour coding shall follow to international acceptable standard.

### 12.2 Technical Details

The material surface to be painted shall be cleaned from any welding slag, dust, grease or debris.

Various methods of surface preparation can be adopted e.g. degreasing, high pressure fresh water hosing, hand tool cleaning, power tool cleaning, blast cleaning etc.

Paint shall be in 3 layer coating system as given below:-

- Primer coating shall be 85% metallic zinc by weight, grey colour, matte finish
- Intermediate coating shall be Polyamide Epoxy, matte finish
- Finish coating shall be polyurethane, golden yellow, high gloss finish.

Procedure for painting shall be submitted to Marafeq for approval.

Color coding for SNG, LPG and NG steel piping:-

- Final coat for gas piping shall be Golden Yellow colour RAL 1007

Material surface to be painted shall be dry

Paint shall be fully cured before another layer to be applied.

Paint application shall follow manufacturer specification or procedure

## 12.3 Painting Standard and Codes of Practices

ASTM 8117	Salt Spray (Fog) Testing
ASTM D4060	Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4541	Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D5162	Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
RAL840 HR	Standard Colors
ISO 2409	Paints and Varnishes - Cross-cut test for adhesion
ISO 2808	Paints and Varnishes - Determination of film thickness
ISO4624	Paints and Varnishes - Pull-off test for adhesion
ISO 4628	Paints and Varnishes - Evaluation of degradation of paint coatings
ISO 8501	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness.
ISO 8502	Preparation of steel substrates before application of paints and related products-Tests for the assessment of surface cleanliness-
ISO 8503	Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast cleaned steel blast-cleaned steel.
SSPC-SP1	Solvent Cleaning
SSPC-SP10/NACE2	Near-White Blast Cleaning
SSPC-PA1	Shop, Field & Maintenance Painting
SSPC-PA2	Measurement of Dry Coating Thickness with Magnetic Gauges

## 13 FABRICATION/INSTALLATION

Contractor shall be responsible for all fabrication and installation work for gas facilities located

downstream of service line except for gas meter and its accessories.

The necessary approvals and permissions from the relevant authorities having jurisdiction shall be obtained by the contractor prior to fabrication and installation work.

Material and design drawings submittal shall be prepared by customer or contractor for submission to Marafeq for No Objection to Installs.

During the fabrication and installation of Pressure Reducing Station, Contractor is requested to follow the contents of design documents/drawings reviewed by Marafeq.

Furthermore Marafeq will perform necessary inspection and witness in order to make sure that the quality of Pressure Reducing Station is satisfactory in accordance with Marafeq's minimum requirements stated in the technical guidelines.

## 14 TESTING AND COMMISSIONING OF PRESSURE REDUCING STATION

### 14.1 General

All Pressure Reducing Station pipe work shall be tested according to Marafeq's Design Guidelines for Mega Development and Sub Development Section 19 Testing and Commissioning of Piping on document no: LUS-CPALL-MAQ-SPE-UT-0005 Rev01.

As an additional requirement for steel pipe, testing may be one or all of the below given method.

1. Pneumatic or hydrostatic Test
2. Nondestructive test
  - X ray
  - Magnetic Particles Test
  - Dye Penetrant Test
  - Ultra sound test

Any installation shall be subject to strength test and tightness tests. Testing shall be carried out prior to application of paint or other protective coatings and before the installation is put into service.

Meters, regulators and associate equipment shall not be subjected to on site pneumatic or hydrostatic test. It shall be tested by manufacturer in factory.

## 14.2 Acceptance Test

Acceptance Testing for Pressure Reducing Station is an additional requirement prior to put the system in service.

Acceptance Test is a test conducted on each Pressure Reducing Station to determine if the requirements of a design specification are met for operational. It involves specification checks, physical tests and performance tests.

Testing generally involves running a suite of tests on the completed system. Each individual test, known as a case and steps, exercises a particular operating condition of the installation environment or feature of the system, and will result in a pass or fail outcome.

There will be two type of acceptance test.

1. Factory Acceptance Test (FAT)
2. Site Acceptance Test (SAT)

There is generally no degree of success or failure. The test environment shall be designed to be identical, or as close as possible, to the anticipated installation environment, including extremes of such.

These test procedure must each be accompanied by test a formal description of the operational activities to be performed — intended to thoroughly exercise the specific procedure and a formal description of the expected results.

Factory Acceptance Test is purposely to identify any equipment operational and condition prior to send to site

Site Acceptance Test prior to making any gas commissioning, the primary meter installation shall be tested for tightness/leak test and purged in accordance to the acceptable standard.

All medium of test shall be inert gas or air

## 14.3 Non-Destructive Test (NDT)

All Pressure Reducing Station pipe work and steel piping shall be tested according to Marafeq's

Design Guidelines for Mega Development and Sub Development Section 22 on document no: LUS-CPALL-MAQ-SPE-UT-0005 Rev01.

The evaluation report made by NDT Company (approved by Marafiq or Authority) shall be submitted to Marafiq for review.

Pressure test shall not be performed until NDT Company and Marafiq or Third Party Inspection Company confirms that all films and testing results are satisfactory.

Marafiq will reserve the right to not to connect Pressure Reducing Station service to service line if the result is not satisfactory. Upstream high inlet pressure portion of Pressure Reducing Station welded joint shall be tested using nondestructive and pneumatic method.

#### **14.4 Pressure and Leak Test**

Pressure and leak test shall be according to Marafiq's Design Guidelines for Mega Development and Sub Development Section 19 Testing and Commissioning of Piping on document no: LUS-CPALL-MAQ-SPE-UT-0005 Rev01.

Marafiq will reserve the right not to connect Pressure Reducing Station to service if the testing result is not satisfactory.

#### **14.5 Pressure and Leak Test**

After the completion of Pressure Reducing Station pipe spools fabrication and station assembly, they shall be subjected to pressure test (hydrostatic or pneumatic).

The Pressure Test will be witnessed by representative from Marafiq together with customer or Marafiq representative. The Contractor is required to liaise with Authority on the arrangement and should advise the parties involve accordingly.

In accordance with the requirement of IGE or BS standard requirement, customer/contractor is requested to conduct pressure test not less than 1.5 times maximum operating pressure for not less than two hours.

Marafiq will reserve the right not to connect Pressure Reducing Station to service if the testing result is not satisfactory.

#### **14.6 Pressure Reducing Station Foundation and box/cabinet Preparation**

Customer/contractor is requested to prepare and install station foundation and box cabinet



complies according to the standard listed in this document. The cabinet must have suitable earthing connection.

- Size- The cabinet must be sized for all required equipment to be easily accessible
- Ventilation-It must have at least 10% ventilation
- Material- As per WOQOD requirements
- Door-PRS Cabinet of width 60 cm or less shall be provided with single hinged door fitted with locking system whereas if the cabinet is wider than 60 cm shall be provided with double egress door and appropriate gas safety sign must be imprinted.
- Cabinet Base- The base must be concrete and be a minimum of 100mm larger on each dimension than the cabinet base and be at least 150 mm thick.
- MARAFEQ will visit the station site to check and make sure of the foundation/meter box or cabinet conditions, after they have been completed

## 14.7 Commissioning and Start-up

Prior to commissioning of the Pressure Reducing Station, Contractor is required to perform Site Acceptance Test (SAT) with the presence of Marafeq personnel. SAT is performed to confirm that the Pressure Reducing Station meets Marafeq specifications and fully satisfied for operation.

Marafeq personnel shall attend the SAT to check on the following items:

- Leakage from Piping
- Setting Pressure of Regulator, Slam Shut Valve and Relief Valve
- Regulators and Relief Valve Internal Leak Test
- Performance of Pressure Reducing Station
- Condition of Pressure Reducing Station Foundation/Box or Cabinet and Surroundings
- Other necessary items

Contractor shall inform MARAFEQ schedule of the SAT at least one week in advance and

'Commissioning Meeting' shall be held before performing SAT to discuss the detail procedure to commission the Pressure Reducing station and Regulator setting procedure.

When the SAT is successful and the result are satisfactory and all necessary approvals\* from the relevant authorities having jurisdiction are obtained, MARAFEQ will give the permission for Gas-In to Customer.

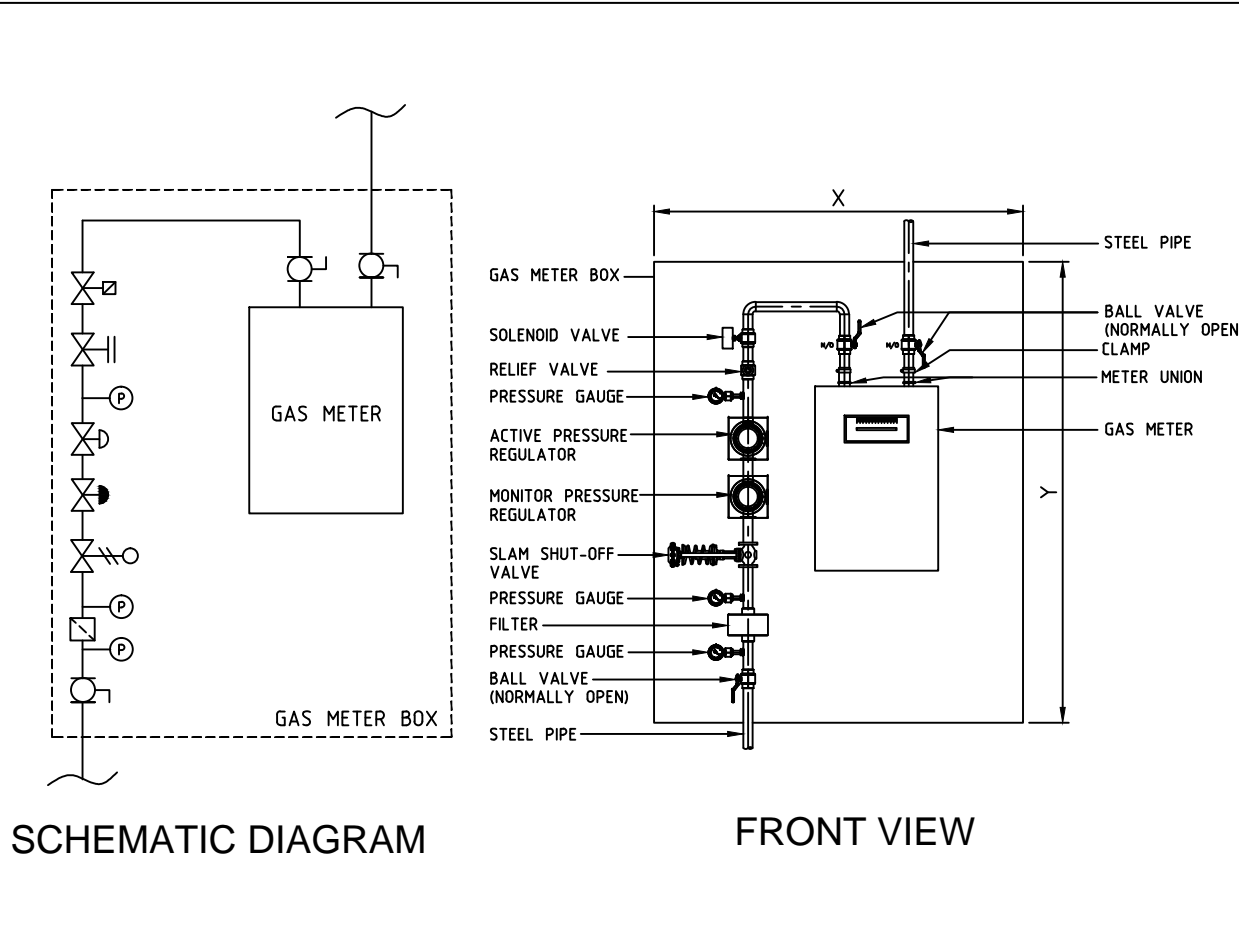
Notes\*

MARAFEQ will commission the gas facilities with Synthetic Natural Gas only after customer/contractor obtaining No Objection Certificate (NOC) from Authority on internal piping installation.

## APPENDIX 1

### Drawing

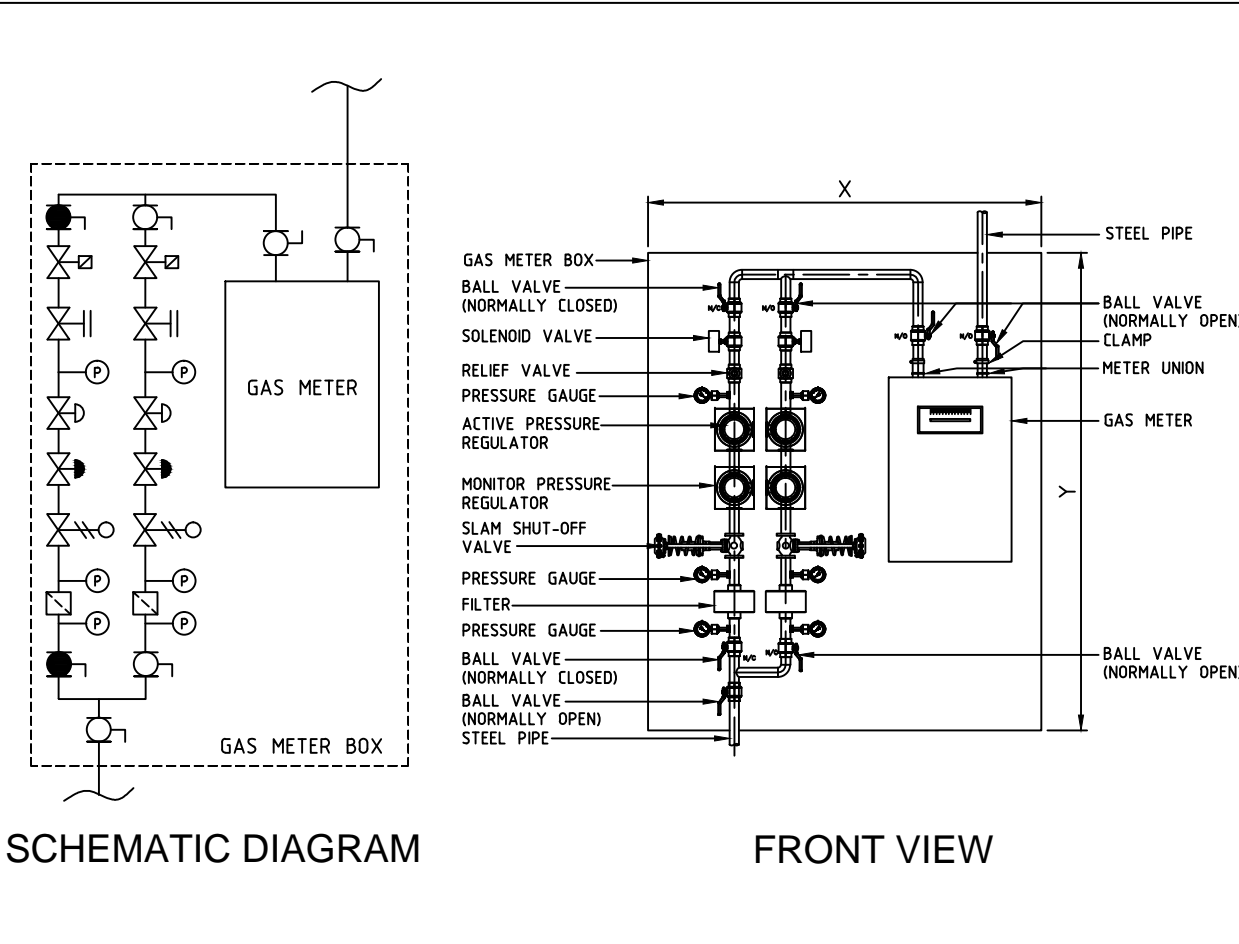
1. Pressure Reducing Station Installation Details for Multi Storey Buildings  
LUS-CPALL-MAQ-DWG-UT-30300
2. Pressure Reducing Station Installation Details for Villas  
LUS-CPALL-MAQ-DWG-UT-30301



SCHMATIC DIAGRAM

FRONT VIEW

SINGLE STREAM PRS INSTALLATION DETAIL



SCHMATIC DIAGRAM

FRONT VIEW

TWIN STREAM PRS INSTALLATION DETAIL

**KEYPLAN:**

**NOTES**

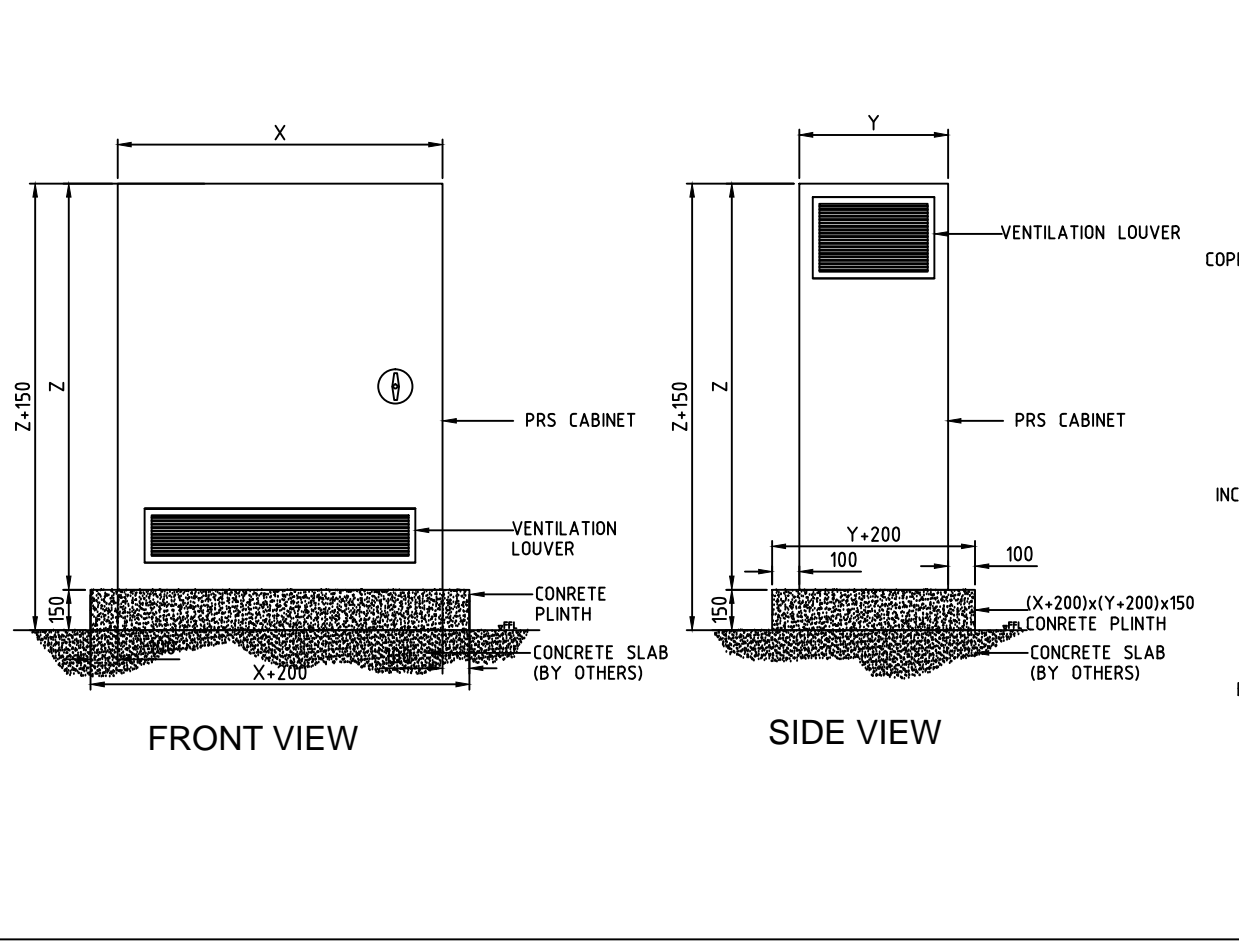
1. ALL UNITS ARE IN MILLIMETER UNLESS OTHER INDICATED.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH MARAFEQ GAS GUIDELINES.
3. THE PRS CABINET MUST BE PROVIDED WITH 10% VENTILATION OPENING.
4. TWIN STREAM PRS INSTALLATION SHALL BE USED FOR SPECIAL APPLICATION SUCH AS HOTELS, MALLS, AND HOSPITALS.

**LEGEND**

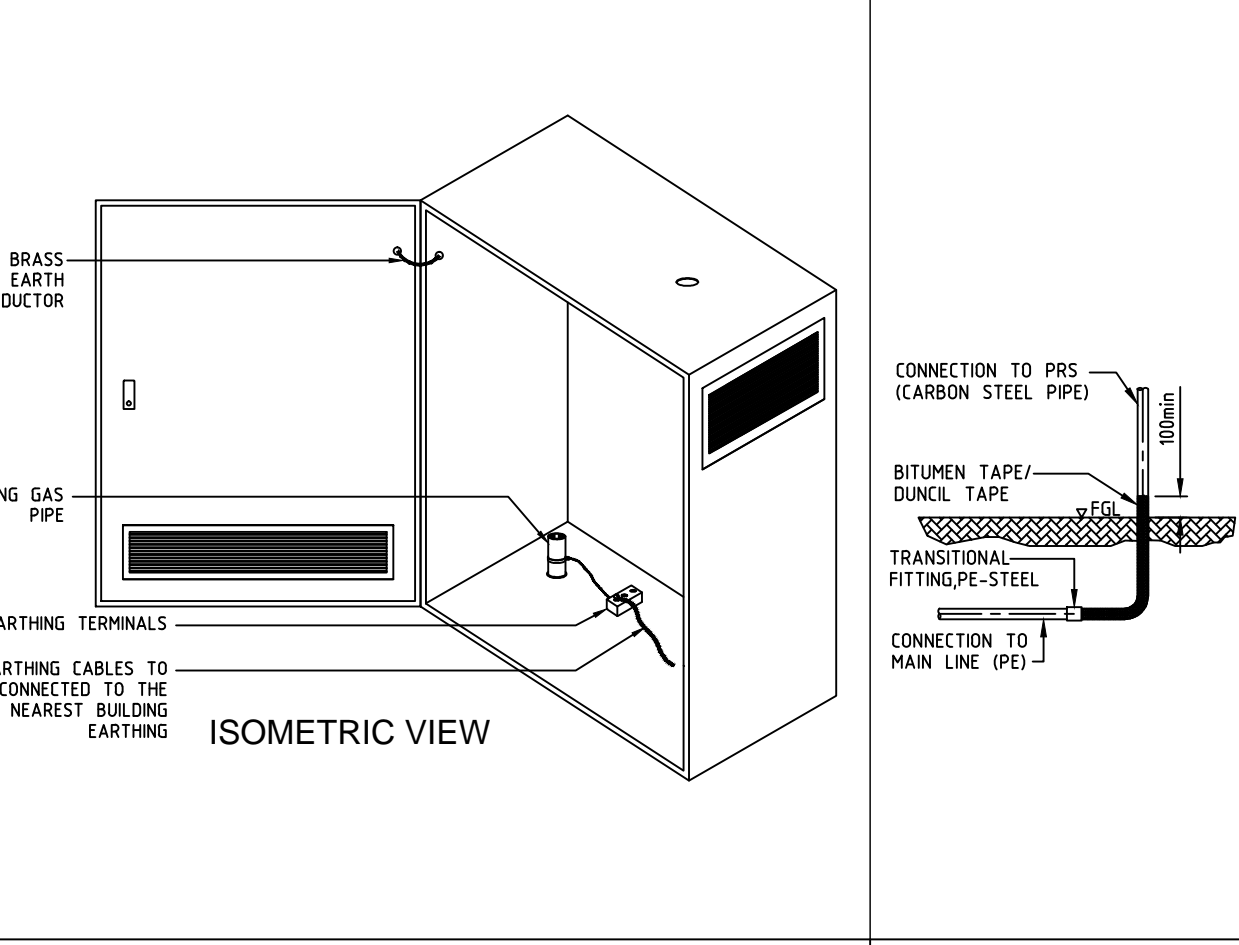
SYMBOL	DESCRIPTION
[Symbol]	BALL VALVE (NORMALLY OPEN)
[Symbol]	BALL VALVE (NORMALLY CLOSED)
[Symbol]	PRESSURE GAUGE
[Symbol]	MONITOR PRESSURE REGULATOR VALVE
[Symbol]	ACTIVE PRESSURE REGULATOR VALVE
[Symbol]	SOLENOID VALVE
[Symbol]	SLAM SHUT-OFF VALVE
[Symbol]	FILTER
[Symbol]	PRESSURE RELIEF VALVE
[Symbol]	PRESSURE REDUCTION STATION

**DRAWING REFERENCE:**

DRAWING NO.	DRAWING TITLE



PRESSURE REDUCING STATION INSTALLATION DETAIL (EXTERNAL VIEW)



GAS SERVICE RISER

**DRAWING REFERENCE:**

DRAWING NO.	DRAWING TITLE

**CLIENT:**

QATARI REAL ESTATE DEVELOPMENT COMPANY  
LUSAIL REAL STATE DEVELOPMENT COMPANY

**UTILITIES PROVIDER:**

Marafeq Qatar

**PROJECT:**

LUSAIL DEVELOPMENT

**DRAWING NAME:**

PRESSURE REDUCING STATION INSTALLATION DETAILS FOR MULTI-STOREY BUILDINGS

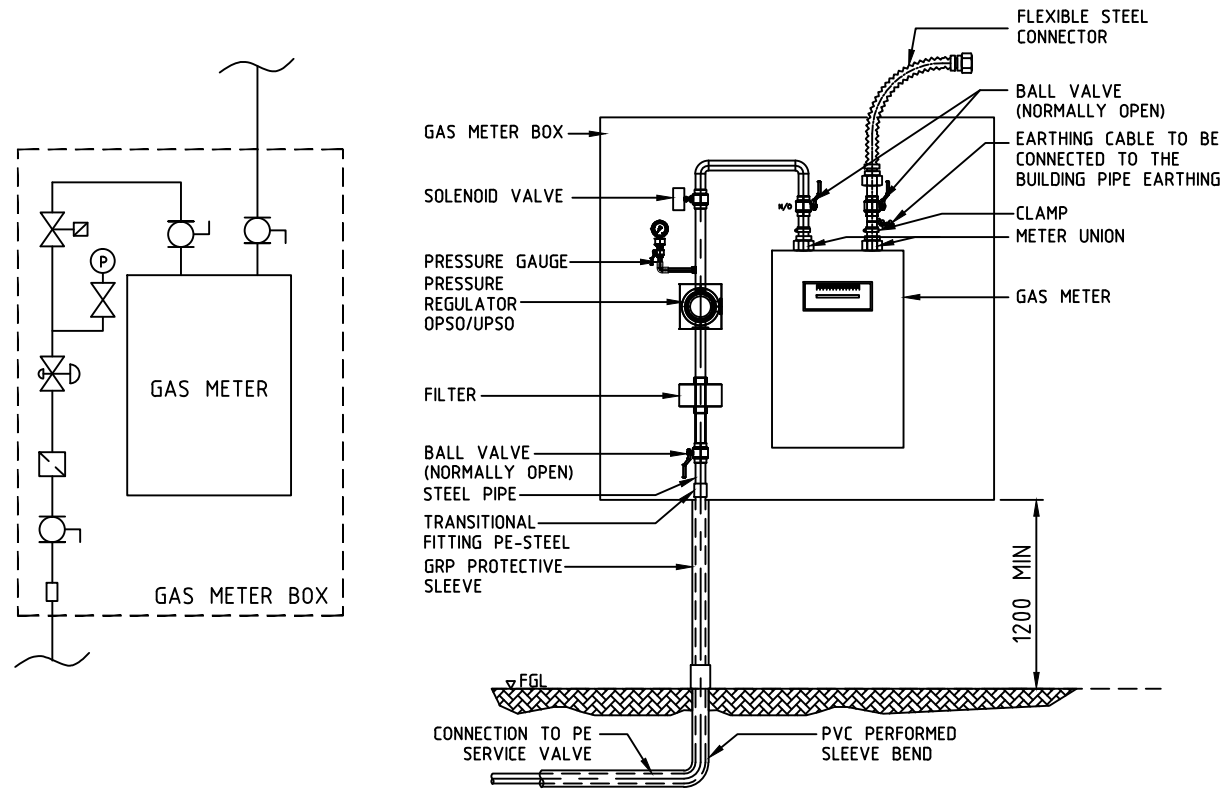
DRAWN BY:	CHECKED BY:	DATE:
N.BATARAO	J.KENYON	09.01.2012
	A.ABUSHAMSHA	09.01.2012
	D.R.PHILIPS	09.01.2012

**DRAWING NUMBER:**

LUS-CPALL-MAQ-DWG-UT-30300

**DRAWING SCALE:**

NTS



**SCHEMATIC DIAGRAM**

**FRONT VIEW**

KEYPLAN:

NOTES

1. ALL UNITS ARE IN MILLIMETER UNLESS OTHER INDICATED.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH MARAFEQ GAS GUIDELINES.
3. THE PRS CABINET MUST BE PROVIDED WITH 10% VENTILATION OPENING.

LEGEND

SYMBOL	DESCRIPTION
	BALL VALVE (NORMALLY OPEN)
	PRESSURE GAUGE
	PRESSURE REGULATOR VALVE
	SOLENOID VALVE
	FILTER
	PRESSURE REDUCING STATION
	TRANSITIONAL FITTING PE-STEEL

**PRS INSTALLATION DETAIL OPTION 1**

DRAWING REFERENCE:

DRAWING NO.	DRAWING TITLE

REV	DATE	DESCRIPTION
1	22.05.2012	ISSUED FOR INFORMATION (ADDITIONAL ON GAS FITTINGS)
2	12.06.2012	ISSUED FOR INFORMATION

CLIENT:  
**LUSAIL REAL STATE DEVELOPMENT COMPANY**

UTILITIES PROVIDER:  
**Marafeq Qatar**

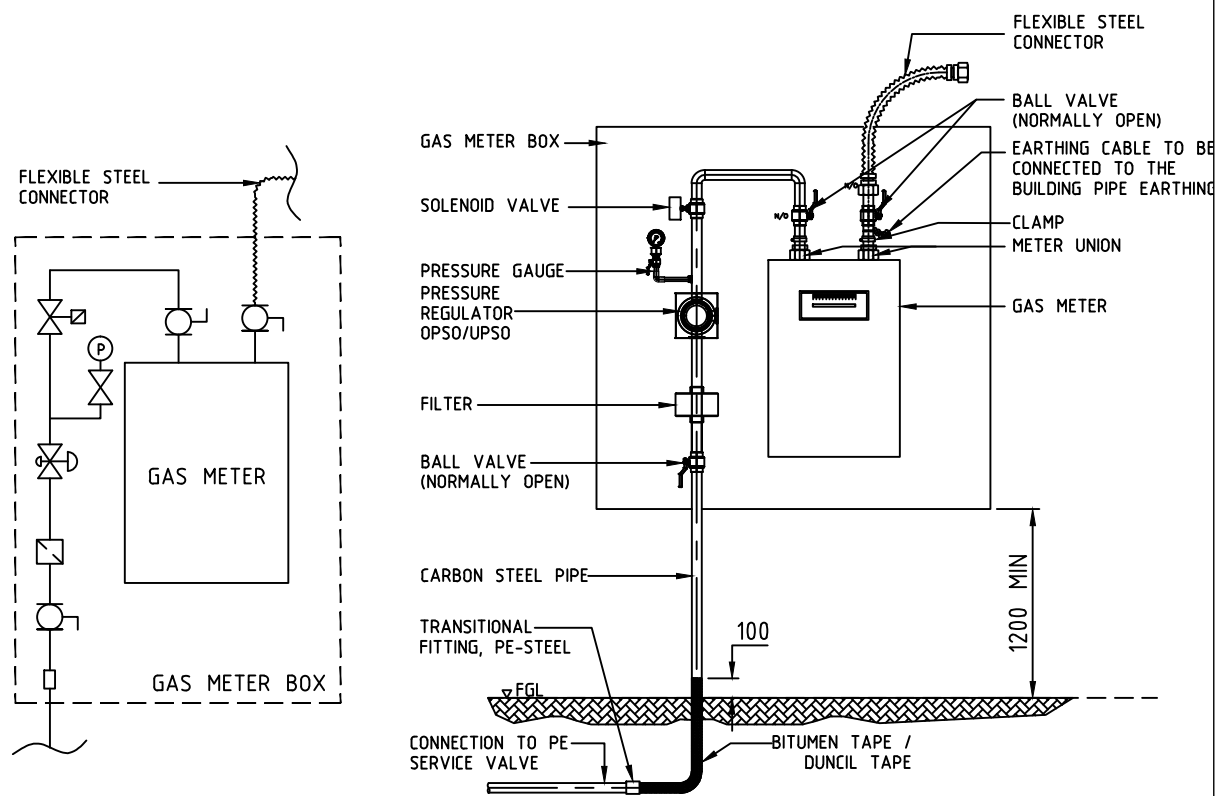
PROJECT:  
**LUSAIL DEVELOPMENT**

DRAWING NAME:  
**PRESSURE REDUCING STATION  
 INSTALLATION DETAILS  
 FOR VILLAS**

DRAWN BY:	P.K.S	DATE:	22.05.2012
DRAWN BY:	M.K.Y	DATE:	22.05.2012
REVIEWED BY:	A.ABUSHAIKHA	DATE:	22.05.2012
APPROVED BY:	D.R.PHILIPS	DATE:	22.05.2012

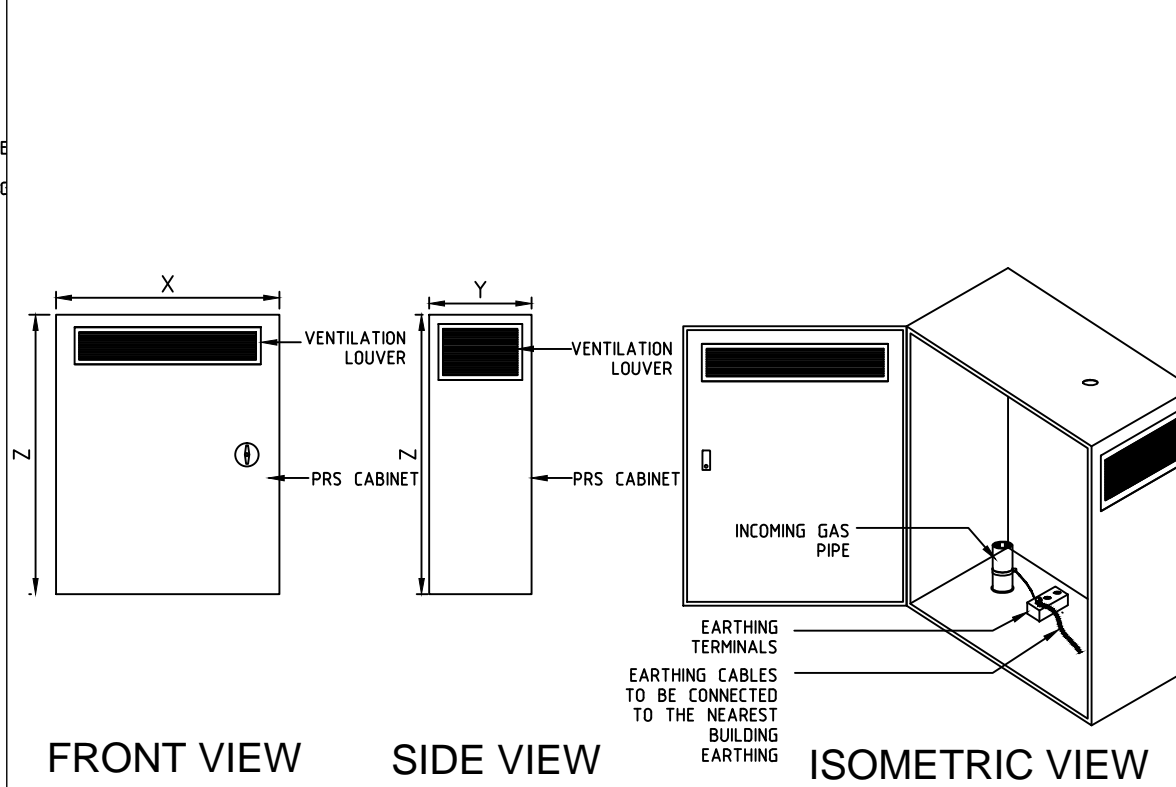
DRAWING NUMBER:  
**LUS-CPALL-MAQ-DWG-UT-30301**

DRAWING SCALE:  
**NTS**



**SCHEMATIC DIAGRAM**

**FRONT VIEW**



**FRONT VIEW**

**SIDE VIEW**

**ISOMETRIC VIEW**

**PRS INSTALLATION DETAIL OPTION 2**

**PRS INSTALLATION DETAIL (EXTERNAL VIEW)**