



National Association of Regulatory Utility Commissioners

Gas Distribution Network Codes ,Standards : Guidelines

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National Association of Regulatory Utility Commissioners







- Final activity and operation of gas value chain
- Some large industrial, commercial, and power generation end users receive natural gas directly from high pressure gas transmission system.
- Other users receive natural gas from a local distribution company (LDC).
- LDCs are regulated utilities within a specific geographic area





- Commences from the downstream flange of Custody Transfer Metering Station of Gas Transmission system at CGS/ TBS/ DRS or Bulk CMS .
- DS network design, implementation and operation are very important as it directly deals with marketing and utilization of Gas.





- Two types
- Owned by Private investors, and
- Public gas systems owned by local governments.
- Local Distribution Companies (LDC) links transmission system with to households and businesses through small-diameter distribution pipe lines





- Involves moving smaller volumes of gas at much lower pressures over shorter distances to a great number of individual users.
- Smaller-diameter pipe also is used to transport natural gas from the city gate to individual consumers.
- The pressure required to move natural gas through the distribution network is much lower than that found in the transmission pipelines.





Distribution System

- # MAOP Transmission pipelines may be as high as 1,500 psi,
- # Distribution network usually operate at 4 psi and at times as low as 1/4 psi at the customer's meter.
- # Pressure regulation is done at the city gate, as well as scrubbed and filtered to ensure low moisture and particulate content.
- # Odorant is injected to gas stream in distribution networks





- The delivery point the 'city gate', is an important market center for the pricing of natural gas in large urban areas.
- Utilities take ownership of the natural gas at the city gate, and deliver it to each individual customer's meter.





Natural Gas Distribution System.







Guide Lines For Distribution System Design

- The custody transfer point of gas to distribution network is the City Gate Station (CGS)
- CGS : Regulating and Metering Station regulates pressure of gas from High Pressure of transmission system to intermediate and lower distribution pressure
- The Design of Pressure Regulation and Metering station usually follow IGE/TD or equivalent codes and standards





Guide Lines For Distribution System Design

- CGS components Inlet Separator (Vane Mist Extractor), Filter Separator, In direct Fired Heaters, Regulating and Metering Skids and Downstream Separator
- Sometimes Odorants are injected to gas stream at recommended doses as natural gas is odorless
- Odorant (usually THT) helps in detecting leakage in the system as natural gas mixed in a given proportion with air makes explosive mixture.





Guide Lines For Distribution System Design

- Town Border Stations (TBS), District Regulating Stations (DRS) and Customer Metering Stations (CMS) are medium and low pressure forms of CGS. These are Regulating and Metering Stations.
- Gas load survey in gas distribution network command area is conducted taking into account anchor load (s), present demand and future demand growth
- Design software using these inputs design a comprehensive balanced gas distribution networks for phased construction







Distribution Summary

Domestic & Commercial Consumers

Field & District

City Gates

Compressor Stations

Processing Plant

Basin





Pressure Regulation Stations

City Gates:

Transmission ☐ High Pressure 6,500kPa ☐ 450kPa





Field Regulation:

High Pressure □ Medium Pressure 450kPa □ 140kPa





District Regulation:

High pressure □ Low Pressure 450kPa □ <70kPa









Purpose: High Pressure reduced to Medium Pressure









Small Pressure Regulating & Metering Station.





AXIAL FLOW REGULATORS



CRITICAL STATION ALARMS:

1. Pressure **TOO HIGH** at outlet





2. Pressure **TOO LOW** at outlet







Case 1: HIGH outlet pressure



Example: Pressure Regulation Station Case 2: LOW outlet pressure







Examples : Bangladesh

- Chittagong is the major industrial and the largest port city of Bangladesh which has very well designed Gas Distribution Network or City Gas System
- Custody of Gas from Gas Transmission System or Natural Gas Grid is transferred at City Gate Station of Gas Transporter at an intermediate pressure of 350 PSIG
- The LDC receives gas through a City Gas Ring Main circling the city along the periphery .





Examples : Bangladesh

- The ring main has five IP DRS which feeds secondary distribution networks at 150 PSIG
- Ring main also has 8 high Pressure CMS which feeds two large Urea Fertilizer Plants, three large power plants, One Crude Oil Refinery, One Major Export Processing Zone of Industries, One Paper and Rayon Mill
- On the secondary distribution system there exists 17 IPDRS regulating pressure to 60 Psig at which the distribution system for thousands of industrial, commercial and domestic consumers draw upon





Codes and Standards of Gas Distribution Networks

- Gas Standards (Gas Supply and System Safety) Regulations 2000
- The Gas Standards (Gas Supply and System Safety) Regulations 2000 In Australia and New Zealand came into effect on 2 August 2000. The regulations mandate the following standards:
- AS/NZS 1596 "The storage and handling of LP Gas"
- AS 1697 "Installation and maintenance of steel pipe systems for gas"





Codes and Standards

- AS 3723 "Installation and maintenance of plastic pipe systems for gas"
- AS/NZS 4645 "Coal distribution networks"
- AS 4565 "Specification for general purpose natural gas"
- AS 4670 "Commercial propane and commercial butane for heating purposes"





Safety and HSE

- Natural Gas is tasteless, odorless and colorless
- A given proportion 1:8 NG with Air makes explosive mixture and can trigger disaster if it gets a spark
- The distribution network requires
- Designing following standard codes and practices
- Only prescribed materials of required specifications must be used in construction
- Steel Pipeline Networks must have corrosion protection system in place and monitored





Safety and HSE

- Specially when working in confined spaces additional care must be taken to evacuate the place of accumulated gas from the area due to possible leakage
- City gas network must be regularly odorized at prescribed doses
- Regular leakage surveys must be done and remedial actions taken
- CGS/DRS/TBS /CMS must have standby streams for redundancy .