

Design and Construction Standards

# Natural Gas Mains, Service Lines and Metering

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## INTRODUCTION

DU standards of construction shall be utilized for all facilities to be owned, operated and maintained by the utility, to include hookups from the utility facility to the demarcation point.

Generally, natural gas mains, service lines and meters will be constructed by DU or by DU's contractor at DU expense. Thus, these standards will be followed by DU contractors. In rare circumstances, (with prior written approval of the utility), main/distribution facilities may be constructed by the Army's Facility Contractor for the utility, at DU expense. Thus, these standards will be followed by the facility contractor.

In all cases natural gas meters and automated meter reading equipment will be installed, owned and maintained by DU.

DU will be responsible for planning, designing and constructing utility water, wastewater, natural gas and heat mains and electrical distribution system improvements for new government facilities. This will require close cooperation and utility involvement in the government facility planning process. Without this coordination, facilities constructed will have no utility service.

All connections or disconnections to the natural gas main, whether the natural gas main is pre-existing or new, will be performed by DU. Under no circumstances shall any person other than a DU employee or authorized representative connect or disconnect any service line to a natural gas main on Fort Richardson.

The government, Army, or Corps of Engineer will not be responsible for design, construction, or oversight of any natural gas facilities owned by DU, whether natural gas mains, service lines, pressure regulation equipment or meters.

The government facilities construction contractor will be responsible for connecting the building's internal fuel line piping to the shutoff valve on the customer side of the gas meter. DU will provide and install the meter and downstream shut off valve. Coordination will be necessary so that the appropriate meters are on hand for the facilities to be constructed.

## 1.1 SCOPE

This Standard covers the acceptable design and construction features for the installation of natural gas mains, service lines, and metering equipment, and will serve as the official inspection guideline. Deviation from this Standard is permitted only by written consent of DU.

## 1.2 DEFINITIONS

In general, the following definitions apply to this Standard:

AKDOL.....Alaska Department of Labor

AMR ..... Automatic Meter Reader

ANSI ..... American National Standards Institute

ASME ..... American Society of Mechanical Engineers

ASTM ..... American Society for Testing and Materials

Army ..... United States Army

BLDG..... Building

BTU ..... British Thermal Unit

CFR.....Code of Federal Regulations

CTS.....Copper tubing size

Designer..... Any person who engineers or designs equipment or system(s) governed by this Standard.

DPW ..... Directorate of Public Works

DU ..... Doyon Utilities LLC (the Utility)

°F..... Degrees Fahrenheit

FRA ..... Fort Richardson

Ft..... Foot

HDPE ..... High Density Polyethylene

Hr.....	Hour
IBC .....	International Building Code
IFC.....	International Fire Code
IPS.....	Iron Pipe Size
IMC.....	International Mechanical Code
Installer.....	Any person or entity performing installation, excavation, insulation, or any other work related to complete or partial accomplishment of the repair or new installation of DU district heat distribution mains.
LBS.....	Pounds
MAOP.....	Maximum Allowable Operating Pressure
NDE.....	Non-Destructive Examination
PHMSA.....	Pipeline and Hazardous Materials Safety Administration
PSIG.....	Pounds per Square Inch Gauge
PSI.....	Pounds per square inch (pressure)
SDR.....	Standard Dimension Ratio (wall thickness/outside diameter)
UPC.....	Uniform Plumbing Code
Utility.....	Doyon Utilities LLC (DU),
Wt.....	Wall thickness, inches
US DOT.....	United States Department of Transportation

### 1.3 AUTHORITY

DU recognizes the most recent version of the US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Natural Gas parts 191-192 as a basis of establishing minimum standards of design and installation for natural gas mains, service lines and meters.

#### 1.4 LIABILITY

DU assumes no responsibility or liability that is not required by law concerning the suitability or applicability of this Standard to the requirements of the Army.

#### 1.5 INTENT

It is not the intent of this Standard to supersede codes or regulations.

This Standard is intended to:

- 1 provide Designers and Installers a basic guide for the design and installation of natural gas mains, service lines and meters to ensure compatibility with DU's system; and
- 2 protect the interests of DU, their Customers, and the Army by imposing uniform requirements for the installation of all natural gas mains, service lines and meters.

#### 1.6 OWNERSHIP

The extent of ownership of the natural gas system on Fort Richardson by DU is limited to the natural gas facilities transferred from DPW to DU on August 15, 2008 and all new natural gas facilities installed after that date. It does not include the natural gas facilities on FRA owned by Honeywell Inc or ENSTAR Natural Gas Company. Natural gas facilities include mains, and, where applicable, service tees, service isolation valves, service lines up to and including the pressure regulator, natural gas meter and Automatic Meter Reader (AMR) equipment.

#### 1.7 RESPONSIBILITY

The Designer and Installer are responsible for meeting the requirements of this Standard and all other applicable codes and regulations (see Article 1.3).

The Installer is responsible to obtain all necessary Dig permits prior to beginning any construction activity.

The Installer is responsible for meeting the requirements of Construction Code of the Occupational Safety and Health Standards and the National Fire Protection Association (NFPA) Code.

The Installer will be held responsible for damage to DU facilities resulting from failure to comply with the requirements of this Standard.

## SECTION 2 - GENERAL REQUIREMENTS

### 2.1 STANDARDS

Only work, materials, and tools meeting acceptable industry standards shall be permitted. All work shall conform to the standards set forth in the most recent edition of the US DOT PHMSA CFR Parts 191-192. All work and materials shall be free of defects and leaks. All materials used shall be new.

### 2.2 APPLICATION FOR SERVICE/PLAN SUBMITTAL

At the earliest stage possible, building project designers shall contact the DU office at 714 Fourth Avenue, Suite 201, Fairbanks, AK 99701 (907-455-5100) to obtain information on the availability of natural gas service on Fort Richardson and to establish the type of connection that will be required for the building being designed.

No later than at the 35% design stage of the project, the project designer shall contact DU to submit an official "Application for Service". With the application, the building designer shall submit three (3) sets of all paper plans or a single electronic copy of plans and specifications for the proposed project. The building designer shall include a list of all natural gas equipment, peak loads, and delivery pressure requirements.

### 2.3 DESIGN AND COST ESTIMATE

DU will review the "Application for Service" and prepare a preliminary engineering design and cost estimate within 30 days of receipt. No later than 30 days after application for service has been received, DU will contact the project designer and review DU's design and cost estimate.

Upon payment of any fees and final acceptance by the project designer, a construction work schedule will be developed for the installation of DU's natural gas main, service line and meter.

### 2.4 STORM WATER POLLUTION PREVENTION PLANS (SWPPP)

When DU's gas mains and service lines are contiguous to the building project, the project designer shall incorporate DU's work into the SWPPP for the project. The building contractor will be responsible for all aspects of the SWPPP.

When DU's gas mains and service lines are not contiguous to the building project, DU shall develop a SWPPP for its work and be responsible for its execution.

## 2.5 SYSTEM DESIGN AND OPERATING PARAMETERS

The FRA natural gas distribution system operates at a Maximum Allowable Operating Pressure (MAOP) of 60 PSIG. All components of the gas system shall be appropriately rated and tested to perform at a MAOP of 60 PSIG.

DU will size the natural gas regulator and meter based on the information provided from the project designer. The meter location shall be a mutually agreed upon location between the project designer and DU, subject to proximity restrictions to building openings and possible sources of ignition.

The natural gas service line shall be sized by DU to allow a maximum 4PSIG pressure drop across the length of the service line. A minimum ½" CTS service line size shall be used.

The natural gas main shall be sized to handle the building's load such that a minimum gas main pressure of 25 PSIG is maintained at peak flows. A 2" IPS minimum main size shall be maintained at all times.

Where large diameter feeder mains have been established, the larger diameter main size may be required to accommodate future growth on the DU gas system. Generally a 25 PSIG minimum pressure at peak day standard will be used in the design of all gas mains.

The demarcation point for DU ownership of gas facilities is the outlet tee or valve on the customer's side of the gas meter. The building contractor shall be responsible for tying in all of the building's internal piping to this location.

## 2.6 INSPECTIONS

DU reserves the right to inspect all new natural gas service line or mains installations. DU may assign full or part time inspectors to any natural gas installation project.

## 2.7 OPERATOR QUALIFICATION PROGRAM

All persons installing natural gas facilities on FRA shall be trained and qualified according to DU's Operator Qualification Program or under a program meeting Subpart N of CFR 192, Qualification of Pipeline Personnel that is acceptable to DU. The installer's qualification records shall be submitted to DU and approved before any work can begin.

## 2.8 LOCATION OF EXISTING UNDERGROUND UTILITIES

The Installer shall be responsible for determining the location of all underground utilities and shall be responsible for any damages to underground utilities caused by the work. Possible underground utilities to be located include, but may not be limited to: telephone lines, cable TV lines, electrical lines (including power for street lights), water and wastewater lines, district heat steam and condensate lines, natural gas lines, storm drains, etc.

Contact DU by calling 811 for a one (1) time final field locate and ground marking of all DU-owned underground utility features in the area of the excavation. Contact for this field locate must be accomplished at least 2 working days prior to the actual anticipated time of the beginning of excavation, and before 3 PM of the date of contact. DU requires that a disclaimer of liability be on file before any utility location work can be conducted. The first locate for DU-owned underground utility features is provided without charge. Once a field location has been provided, a fee may be charged if a subsequent locate is requested to reestablish a previously marked feature.

## 2.9 EXCAVATION DIG CLEARANCE PERMIT

The Installer must obtain a Dig Clearance permit from the FRA DPW Office prior to beginning any excavation work.

The Installer is responsible to control the excavation work and to take proper safeguards to protect private and public property as well as to provide a safe workplace. All excavations shall conform to State (AKDOL) and Federal (OSHA) requirements. The Installer shall furnish all necessary construction and safety equipment including, but not necessarily limited to, shoring, de-watering pumps, excavation equipment, ladders, barricades, temporary fencing and signage.

The Installer shall do all excavating, including hand excavation around the gas main as necessary to provide an excavation of sufficient extent to allow safe entry for the installation of all DU materials and equipment. In general, the entire surface of gas main at any tie-in point must be exposed for the entire circumference and for a length of not less than four feet (4'). The soil shall be removed to a minimum distance of twelve inches (12") around all surfaces of the main.

## 2.10 STREET EXCAVATION/ASPHALT REPAIRS

Any portion of a service line or gas main trench that crosses or enters a street, alley or other paved surface shall be backfilled and compacted in conformance with the appropriate DPW requirements. This work must be inspected by the appropriate DPW Office prior to replacement of pavement.

Where practical and cost effective, boring shall be utilized to minimize disruption to traffic and eliminate asphalt repairs.

## 2.11 DAMAGE TO EXISTING EQUIPMENT OR FACILITIES

Any damages to DU's other utility system shall be reported immediately to DU and DU shall make repairs. Similarly, any damage to FRA infrastructure shall be reported immediately to the appropriate person or department for repair. The Installer may be charged for the repairs. Failure to notify may expose the Installer or his agent(s) to increased liability and civil penalties.

Any damage to DU's natural gas facilities will be repaired by DU personnel and may be billed to the Installer.

## 2.12 BACKFILL

Backfill the natural gas mains by shading the pipe with rock free material a minimum of four (4") inches above the pipes and compact as necessary. Backfill the remainder of trench by mechanical means and compact as necessary.

## 2.13 COMPACTION REQUIREMENTS

Compaction in street right of ways must meet Army standards. Compaction beneath the DU main and to a point twelve (12") inches above the main shall be ninety five percent (95%) or greater.

## 2.14 PURGING SYSTEM CONTAMINATION

The DU natural gas system contains only natural gas. All air, nitrogen, dirt, contaminants or foreign materials must be removed or purged from the system before being placed in service.

DU reserves the right to seek compensation from Installers responsible for design or construction errors that cause system contamination.

## 2.15 PRESSURE TEST

A pressure test using air or nitrogen is required for new natural gas service lines and gas mains. Test pressure shall be one hundred (100) PSI for a length of time explained in Section 3.33. DU personnel must witness such tests. The pressure test must be documented on the Completion Report.

## 2.16 TIE-IN TO EXISTING NATURAL GAS MAINS

DU personnel or its representatives will conduct all tie-ins to existing natural gas mains. This, together with the inspection of all materials and work, will constitute the scope of DU personnel work unless specific arrangements have been made in writing for DU to perform other work

Tie-in connections to existing natural gas mains will be made during normal DU working hours. No person, other than DU personnel or its representatives, shall fuse, tap or connect service lines or mains to any existing or new natural gas main or attempt to install a tie-in connection. The Installer shall take whatever action that is necessary to control and remove all standing and inflowing water from the excavation and properly dispose of it. Gas main tie-ins will not be allowed in cases of improper excavation, excessive groundwater, or other unsafe conditions. In the event that a DU crew is dispatched to the jobsite and the requested work cannot be completed because of an improper excavation, excessive groundwater, or other unsafe conditions, the Installer may be charged for all DU expense.

## 2.17 COMPLETION REPORT/RECORDS

DU personnel must inspect all underground pipe installations prior to backfill. Upon inspection, the pipe shall be properly backfilled and compacted. The Installer shall maintain daily crew reports, damage reports, dig permits, field drawings and photographs of key installations. Upon completion of any gas mains or service lines, the Installer shall submit copies of daily records and electronic and paper as-built documents indicating tie-in depth, installed depth, test pressure, materials used, and employees performing work to DU. These documents shall be submitted within 10 working days of completion of all work

## 2.18 GPS DOCUMENTATION

The installed location of all gas mains and service lines shall be surveyed using sub-centimeter GPS accuracy equipment. A GPS file in a format that can be directly imported and accessed by ESRI ArcGIS 9.2 shall be submitted by the Installer with completion report and daily records.

## 2.19 WARRANTY

The Installer shall warranty all work and materials against defects for one year from the date of installation.

## 2.20 COMMISSIONING REPORT

On all natural gas construction projects where the combined cost of all mains, service lines and meters is in excess of \$150,000, DU shall conduct a commissioning inspection and report. The commissioning Inspection and Report shall be conducted by an independent Engineer or other qualified individual that is not an employee of DU or the Installer.

The Inspection shall include a review of the following; system design, project costs, materials, qualification of personnel, excavation practices, timelines, damages to other utilities, construction methods, inspections, quality of service, project documentation, testing, purging, safety, and any other parameter deemed appropriate by the Commissioning inspector.

The Commissioning Inspector shall document his findings in a report and submit the report to DU and the Installer within 30 days of the final inspection. The Installer shall be allotted time to correct deficiencies found in the report. Upon correction of all deficiencies, the project shall be accepted and deemed commissioned.

## SECTION 3 - SPECIFIC REQUIREMENTS

### 3.1 PIPE MATERIAL

Pipe material shall be HDPE 3408/PE 100 manufactured by Poly Pipe or Performance Pipe. Service line sizes may be ½" - .090" wt. CTS, ¾" - .090" wt, CTS or 1" IPS, SDR 11. Gas mains shall be 2", 4" or 6" IPS. SDR 11. All mains and service lines shall be sized appropriately for load and distance. Doyon Utility may request that line sizes be increased for future needs.

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2250, Plastic Pipe and Fitting Inspection Procedure

### 3.2 PIPE INSTALLATION PRACTICES

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2120, Pipe Installation Practices

### 3.3 PLASTIC PIPE CONSTRUCTION STANDARDS

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2205, Plastic Pipe Construction Standards.

SOP 2150 Testing and Purging Distribution Facilities

SOP 2125 Casings, Spacers, Seals and Venting

### 3.4 PLASTIC PIPE SQUEEZE OFF PROCEDURES

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2210 Plastic Pipe Squeeze Off Procedure

### 3.5 PLASTIC PIPE FUSION EQUIPMENT

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2215 Plastic Pipe Fusion Equipment

### 3.6 PLASTIC PIPE FUSION PROCEDURES

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2220 Plastic Pipe Fusion Procedure

### 3.7 PLASTIC PIPE BRANCH SADDLE HOT TAP PROCEDURE

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2225 Plastic Pipe Branch Saddle Hot Tap Procedure

### 3.8 INNOGAZ ELECTRO-FUSION PROCEDURE

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2230 Innogaz Electro-Fusion Process

### 3.9 PLASTIC PIPE JOINING QUALIFICATION PROCEDURE

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2240 How to Qualify an Individual to Make Plastic Pipe Joints

### 3.10 LOCATE AND GROUNDING WIRE CONNECTOR INSTALLATION

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2245 Locate and Grounding Wire Connector Installation Procedure

### 3.11 PLASTIC PIPE MECHANICAL JOINT PROCEDURE

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2210 Plastic Pipe Mechanical Joint Procedure

### 3.12 EXCESS FLOW VALVE PROCEDURE

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2260 Excess Flow Valve Installation Procedure

### 3.13 DISCHARGE OF STATIC ELECTRICITY ON PLASTIC PIPE

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 2270 Discharge Static Electricity

### 3.14 METER LOCATION STANDARDS AND DRAWINGS

Refer to ENSTAR Natural Gas Company Standard Operating Procedure SOP 1715 Meter Location Standards and Drawings and SOP 2130 Threaded, Flanged, and Victaulic Connections.