SECTION 4
GAS CONSTRUCTION SPECIFICATIONS CONTENTS

1. GAS CONSTRUCTION SPECIFICATIONS

1.1. PURPOSE

The purpose of this standard is to provide general specifications for the construction of gas facilities.

1.2. GENERAL STATEMENT

Gas distribution facilities shall be designed to supply natural gas to all intended places with sufficient operating pressure. Layout of facilities shall be such that no consumer is without supply during repair of any section of the system under most operating conditions. Flow calculations for gas facilities are based upon industry standard methods, with resulting pipe sizes dependent upon specific physical location within the overall delivery system. Pipe sizes and the location of underground control valves shall be determined by NV Energy Gas Engineering prior to construction, drawing preparation, and subsequent installation of facilities. The minimum size gas main for installation is 2" in diameter, consisting of high-density polyethylene material unless otherwise specified.

1.3. CONTRACTOR QUALIFICATION

As of April 1st, 2020, Contracted employees who perform covered tasks listed in Appendix 2 Part A of the Operator Qualification Plan, must be operator qualified. Contractors must join ITS (Industrial Training Services) and go through the Operator Qualification process set in place by NV Energy's plan Administrator; this includes all approved gas install and backfill contractors.

1.4. LOCATION OF GAS FACILITIES

1.4.1. Gas Mains: Gas mains shall be located in public streets or dedicated easements, shall be designed to occupy only one travel lane, and will be installed to meet or exceed the depths specified in Section 3 Part 5 of this standard. Gas mains may be stubbed into future planned and paved roadways such that they are protected and made locatable. Parallel gas mains are prohibited unless approved by Gas Engineering.

1.5. LIVE GAS FACILITIES

All work on live, energized gas facilities shall only be performed by NV Energy personnel. If prior approval has been given, non-NV Energy personnel may only work on live, energized facilities under direct observation of qualified NV Energy personnel.

NV Energy live gas facilities may only be worked on by NV Energy employees or NV Energy supplemental labor (as defined in Section 11 of the NV Energy OQ plan). Under no other circumstances may contractors weld on NV Energy live gas facilities.

1.6. PIPELINE CONDITIONING

All new steel installation designs shall be reviewed by Gas Engineering throughout the design and approval process. Special considerations shall be made for pipeline conditioning, also known as pickling, to prevent odor fade on newly installed steel gas pipelines. If pipeline conditioning is required for the project, additional materials, labor, and time must be accounted for. Pipeline conditioning may also be required on excessive lengths of PE main, especially 4" and 6". Consult Gas Engineering for pipeline conditioning details.

Pipeline Diameter	Length at which Pickling is Typically Needed
2"	>5,500 ft
4"	>2,800 ft
8"	>1,400 ft
12"	>900 ft
16"	>700 ft
18"	>650 ft

Deviations from these recommended lengths may be made at the discretion of the NV Energy gas Engineering Department.

1.7. MATERIALS TO BE FURNISHED

All materials shall meet NV Energy's specifications and shall be purchased from approved manufacturers. The following materials shall be furnished as part of the proposed improvement as specified in the drawings or specifications:

Polyethylene Pipe (PE)
Coated Steel Pipe (NV Energy Approved Coating)
Valves
Valve Boxes and Conductor Pipe
Fittings (Elbows, Tees, Reducers, etc.)
Tracer Wire
Yellow Nonmetallic Warning Tape
Pressure Test Supplies (Soap Solution, Gauges, etc.)
Bare Steel Casings with Spacers, End Seals and Vents
Cathodic Protection and Insulating Materials (Anodes, Monolithic Fittings, etc.)
Miscellaneous Items (Nuts, Bolts, Gaskets, etc.)

1.8. DESCRIPTION OF PIPE

1.8.1. Coated Steel Pipe: All coated steel gas pipe shall be API 5L PSL2 Specification, plain end pipe, beveled for welding, bare inside, approved fusion bonded epoxy (FBE) coated, and shall be purchased from approved manufacturers. Contact the UDA or Gas Engineering for the current list of approved manufacturers and detailed specifications. Additional coatings may be required for bores, drills, or other special circumstances.
The contractor shall provide NV Energy with the material/mill tests reports (MTRs) and coating reports for all steel pipe. The pipe must be manufactured within 18 months and coated within 12 months of installation. Any pipe not meeting this timeline requires engineering consultation.

Steel pipe must be handled and stored to prevent damage to the pipe and coating. Pipe must be stored at an elevation to prevent mud or water from entering and accumulating in the pipe. Pipe shall be placed on wooden skids with full-encirclement separators no more than 18 ft apart on each stick. It is recommended to separate each layer of pipe with wooden skids when stacked. Refer to manufacturer's specifications for detailed requirements.

Minor damage to the coating may be repaired using epoxy sticks for holidays up to approximately 2 mm in diameter. Larger holidays must be repaired with a two-part epoxy coating or other acceptable system. Up to five holidays per stick of pipe is acceptable but all defects shall be repaired before installing the pipe. If a pipe has more than five holidays per stick or extensive coating damage, contact gas engineering. The table below shows standard NV Energy steel pipe specifications.

NOMINAL SIZE	O.D. (INCHES)	WALL THICKNESS (IN.)	LENGTH (FEET)	WEIGHT PER FOOT (LBS.)
3/4"	1.050	0.113	20	1.13
1"	1.315	0.133	20	1.68
1-1/4"	1.660	0.140	20	2.27
1-1/2"	1.900	0.145	20	2.72
2"	2.375	0.154	20	3.66
4"	4.500	0.237	40	10.80
8"	8.625	0.188	40	16.96
12"	12.750	0.219	40	29.34
18"	18.000	0.375	40	70.65

1.8.2. Polyethylene Pipe: All Polyethylene (PE) gas pipe shall be manufactured according to ASTM D-2513 and shall be iron pipe sized (with an exception for ½"), PE4710 (previously identified as PE3408) high density pipe per NV Energy's material specifications and shall

be purchased from approved manufacturers. Any variations in PE pipe must be approved by Gas Engineering.

PE pipe is available in straight lengths or coils for diameters up to 2". The use of straight or coiled pipe is at the discretion of the NV Energy gas inspector. It is recommended to use coiled pipe for long stretches of main to decrease the number of fittings and joints present in the pipeline. If a section of straight pipe is required for any fittings or connections, it is recommended to use at least 5' of straight pipe before switching back to coiled pipe. Additionally, straight pipe is preferred in colder temperatures.

4" or 6" coiled pipe may be allowed on a case-by-case basis as approved by NV Energy. If 4" or 6" diameter coiled pipe is to be installed, special considerations must be made to re-round the pipe in accordance with ASTM D-2513. The table below shows standard NV Energy PE pipe specifications.

NOMINAL SIZE	SDR	AVERAGE O.D.(IN.)	MINIMUM WALL THICKNESS (IN.)	LENGTH (FEET)	WEIGHT PER FOOT (LBS.)
1/2"	7	0.625	0.090	40/1000*	.07
3/4"	11	1.050	0.095	40/500*	0.12
1"	11	1.315	0.119	40/500*	0.19
1-1/4"	11	1.660	0.151	40/500*	0.31
2"	11	2.375	0.216	40/500*	0.64
4"	11	4.500	0.409	40	2.30
6"	11	6.625	0.602	40	4.97
8"	11	8.625	0.784	40	8.47

* These are coiled pipe lengths

1.9. PIPELINE CLEANING

All open ends of pipe lowered into a trench shall be properly closed with a cap or plug to prevent entry of any foreign matter. At the end of each working day, the open ends of the pipeline shall be properly closed to prevent foreign matter from entering the pipe. Should foreign matter enter the pipeline due to lack of proper care by the Contractor, the NV Energy gas inspector shall require the Contractor to clean the line by swabbing or pigging at the Contractor's expense to the satisfaction of the NV Energy gas inspector.

If required by the NV Energy gas inspector, the interior length of every pipe shall be swabbed before it is welded or fused to the adjoining length to ensure that it is free of dirt or obstructions of any kind.

1.10. COATED STEEL PIPE CONSTRUCTION

1.10.1. Pipeline Welding: Steel pipelines shall be welded together in accordance with Part C Section 8 of NV Energy's Operations and Maintenance Manual. The Installer shall also install all valves, fittings, and appurtenances by approved methods.

All welds shall meet every requirement set forth in Part C Section 8 of NV Energy's Operations and Maintenance Manual.

Only welders certified per NV Energy's welding procedures shall perform any welding on the pipeline. Copies of applicable welding procedures must always be maintained by welders on site. Only proper welding equipment in good working order shall be used.

All welders shall have successfully completed an initial qualification test according to each specific NV Energy welding procedure. Additionally, the welders shall have proof of qualifications and shall be required to present such proof when requested.

A welder may retain certification by having one or more welds tested and found acceptable at least twice each calendar year not to exceed 7 ½ months. If a welder's certification expires, they must successfully complete a qualification test before being allowed to weld.

1.10.2. Tapping and Line Stopping: Any welding required for hot tapping or line stopping of steel pipe shall be performed by NV Energy welders using NV Energy's approved welding procedures.

1.10.3. Testing of Welders: NV Energy reserves the right to test any welder the Contractor intends to use on a project before the welder is allowed to work on the project. If any weld fails to meet NV Energy specifications, NV Energy reserves the right to disqualify the welder from performing any welding on the project.

The Contractor shall be responsible for all expenses incurred in the testing of welders and any expenses resulting from the failure of any welder to qualify.

1.10.4. Welding Procedures: If the ends of the pipe are bent or damaged, the damaged or bent section shall be removed prior to welding so that proper alignment can be obtained. Prior to welding, seam pipe must be aligned so that the seams are not abutting and are staggered at least 3 inches apart. When practicable, longitudinal seams should be positioned on the top of the pipe (between the 10 o'clock and 2 o'clock positions).

The Contractor shall use line-up clamps on pipe diameters 3" and larger to ensure proper alignment of the lengths of pipe. Line-up clamps shall be left in place until the first pass or root bead is at least 50% completed in equally spaced segments.

Unless otherwise specified, change in pipe direction shall be made with an elbow. A miter shall only be used to deflect the pipe 11 degrees or less. Miter joints shall be made by cutting equal amounts from both pipe ends. The mitered pipe ends must butt together properly. No more than two miter joints are allowed for each deflection. The miter joints shall not be closer than one pipe diameter from each other as measured from the crotch of each joint.

Unless appropriate protection is provided, the Contractor shall not perform any weld when the quality of the weld could be impaired by the prevailing weather conditions.

1.10.5. Testing of Welds: All welds shall be inspected by visual, nondestructive, and/or destructive methods as determined by NV Energy.

1.10.5.1. All welds shall be visually inspected

1.10.5.2. Nondestructive Testing is required as follows:

- A minimum of 25% of all welds on steel mains shall be radiographically (x-ray) tested. Additional testing may be required at the discretion of the NV Energy gas inspector.
- When in UPRR or NDOT right of ways, 100% x-ray at the applicant's expense shall be required for all main tie-ins.
- X-ray requirements for offsetting under other utilities shall be at the discretion of the Inspector.
- 100% x-ray at the applicant's expense shall also be required for welds on encased pipe, welds on gas-carrying pipe installed via boring/drilling, or for additional extenuating circumstances.
- Additional x-ray testing may be requested by the NV Energy gas inspector at the applicant's expense.

1.10.5.3. Destructive Testing:
NV Energy reserves the right to order sections of the line, including a weld, to be cut out and tested at any time. The Contractor shall immediately remove the designated section and deliver it to the NV Energy gas inspector. If any test fails in the weld metal, the entire weld shall be considered as failing to meet the NV Energy specification. The Contractor shall prepare all welds for test at their own expense and to the satisfaction of the NV Energy gas inspector.

The Contractor shall, at their own expense, remove and/or replace any weld failing to meet the NV Energy specifications. For each weld tested that meets NV Energy's specifications, NV Energy shall pay the Contractor a predetermined amount. NV Energy shall determine the type and number of weld tests to be performed.

1.10.6. Pipeline Strains: Wherever the NV Energy gas inspector has reason to believe there is a strain on a section of pipeline that has been installed in the trench, the Contractor shall sever the pipe. If the two ends of the pipe pull apart, the Contractor shall, at their own expense, reconnect the two ends with no strain upon the pipeline and wrap the new field joint to the satisfaction of the NV Energy gas inspector. If the ends of the pipe do not pull apart, NV Energy shall assume the expense of severing the pipe, re-welding the pipe together, and wrapping the field joint.

1.10.7. Repair of Steel Pipe: All imperfections or damages, which may impair the serviceability of the pipe, shall be repaired by the Contractor at their own expense in accordance with the method prescribed by the NV Energy gas inspector.

1.10.8. Protective Coating: The shop-applied protective coating of every length of steel pipe shall be tested by the Contractor with a high potential Holiday Detector. The contractor shall provide the Holiday Detector with calibration records available.

Holiday detection should follow applicable manufacturer and NACE standards, NACE SP0490 for thin film FBE, NACE SP0188 for conductive substrates, and NACE RP0274 for non-thin film FBE coatings (coating with thickness greater than 30 mil).

All coatings, wrappings and patches applied by the Contractor shall also be subject to test with a high potential Holiday Detector as determined by the NV Energy gas inspector. Any defects shall be repaired by the Contractor at their own expense and to the satisfaction of the NV Energy gas inspector.

If the protective coating of any pipe is damaged, it shall be repaired by the Contractor at their own expense and to the satisfaction of the NV Energy gas inspector.

After the lengths of pipe have been welded together and the welds tested and accepted, the ends of the protective coating shall be trimmed and any damaged coating removed. The bare section of the pipe, including the weld, shall be cleaned of all rust, scale, dirt, or other foreign material. An approved coating shall be applied to the satisfaction of the NV Energy gas inspector.

NV Energy may require the use of thermofit shrinkable sleeves on field joints and coating repairs. The Contractor shall install the sleeve on the pipe prior to performing the joint weld. After proper completion of testing, the sleeve shall be installed per the manufacturer's requirements. The Contractor shall install all sleeves to the satisfaction of the NV Energy gas inspector and shall remove and replace all improperly installed sleeves at their own expense.

1.10.9. Cathodic Protection Installations: All necessary cathodic protection equipment including but not limited to magnesium, anodes, coupons, insulating fittings, buried reference electrodes, and test stations shall be installed by the Contractor in accordance with the cathodic protection installation details included as part of these specifications or as shown on the drawings and to the satisfaction of the NV Energy gas inspector.

Test stations shall be installed approximately every 1,500 ft on steel mains that do not have other locations that can be used for locating or testing of cathodic protection. When possible, test stations shall be installed in easy to access locations that minimize traffic disruptions for personnel safety during locating and maintenance.

Whenever steel pipe or appurtenances are involved in the installation, removal, or modification of the NV Energy gas distribution system, cathodic protection shall be included in the design. Special conditions, such as foreign pipeline interference and AC induction must be included in design considerations, and will incur additional time to complete field evaluation, field condition testing, and modeling. All cathodic protection designs must be pre-approved by a qualified cathodic protection engineer representing NV Energy.

1.10.10. Test Wires: All test wires shall be fully annealed, low carbon 1010 grade steel, solid copper-clad steel (CCS), 30 mil jacket HDPE (HMWPE) for direct burial rated at 30 volts. Test wire size shall be #14 AWG unless otherwise specified in cathodic protection design notes/package. #8 AWG wire is typically used for anode bed configurations. Any exceptions/deviations from these requirements shall be approved by the cathodic protection engineer representing NV Energy. See the table below for the color-coding of test wires.

Color of Wire	NV Energy Stock Number	Wire Purpose
Black	#8 AWG - 457300	Anode bed configurations
	#14 AWG - 457600	Steel Carrier Pipe – Test Leads and Drain Wire
Yellow	457500	PE Carrier Pipe - Tracer Wire*
White	#8 AWG - 457200	Cathodic Protection – Anode Conductor Wire
Green	457950	Coupon – Test and Drain Wire
Red	457700	Casing and Foreign Pipeline – Isolation Test Wire
Purple, Blue, Green, Orange	Orange – 457400 Purple - 457800 Blue - 457900	4-Wire Current Span Test Station

*Also included in PE pipe section

1.11. POLYETHYLENE (PE) PIPE CONSTRUCTION

1.11.1. Applications for PE Pipe:

1.11.1.1. Polyethylene (PE) gas pipe may be used in gas distribution systems in the following applications:

- Direct burial of mains and services.
- Main or service replacements by insert or direct burial methods.

1.11.1.2. Polyethylene (PE) gas pipe shall not be used in the following applications:

- Systems designed to operate in excess of 100 psig.
- In above ground or exposed locations such as boxes, pits, and vaults, unless it is for short term emergency situations.
- As above ground riser material to a meter set unless it is part of an approved manufactured riser.
- In locations where the PE pipe would be subjected to temperatures in excess of 73ºF.

1.11.2. PE Pipeline Fusion: The Contractor shall join polyethylene pipe and all valves, fittings, and other appurtenances by means of approved NV Energy heat fusion joining procedures. In order to produce an acceptable butt fusion, lateral movement of the pipe is required. If lateral movement cannot be achieved, an electrofusion coupling must be used. Only approved types of compression and mechanical fittings shall be installed. Threaded, mitered, or solvent-welded joints are not permitted.

All fusions shall meet every requirement set forth under these specifications and shall be to the satisfaction of the NV Energy gas inspector.

Only personnel certified per NV Energy's heat fusion procedures shall perform any heat fusions on the pipeline. Only proper fusion equipment in good working order shall be used.

All heat fusion personnel shall have successfully completed a qualification test performed annually according to NV Energy's plastic heat fusion procedures for each specific fusion procedure. The heat fusion personnel shall have proof of qualifications and shall be required to present proof when requested.

The heat fusion personnel must have performed qualified fusions for NV Energy within the last year. If the heat fuser has not done so, they must recertify for each specific heat fusion procedure that has lapsed before being permitted to heat fuse.

1.11.3. Testing of Heat Fusion Personnel: NV Energy reserves the right to test any heat fusion personnel the Contractor intends to use on a project before the heat fuser is allowed to work on the project. If any fusion fails to meet NV Energy specifications, NV Energy reserves the right to disqualify the heat fuser from performing any fusions on the project.

1.11.4. Heat Fusion Procedures: The most common reason for fusion failure is impurities in the fusion area, i.e., oil from human hands, dirt, water, or PE material from the facing process. The Contractor shall ensure that the pipe and fittings are free from any impurities.
The Contractor shall also:

1.11.4.1. Properly align and/or face the pipe ends and fittings with the proper equipment before performing the heat fusion process
1.11.4.2. Establish the proper melt bead for the fusion application
1.11.4.3. Allow adequate cooling time after the fusion before handling the pipe

Failure to follow NV Energy's approved heat fusion procedures to the satisfaction of the NV Energy gas inspector will result in rejection of the fusion.

Unless appropriate protection is provided, the Contractor shall not perform any heat fusions when the quality of the fusions could be impaired by the prevailing weather conditions.

1.11.5. Testing of Heat Fusions: Heat fusion procedures and joints will be visually inspected as determined by NV Energy. The Contractor shall cut out any rejected fusions and perform the work again at their own expense and to the satisfaction of the NV Energy gas inspector.

1.11.6. PE Pipeline Strains: All heat fusion joints shall be installed in straight alignment and carefully backfilled to prevent differential settlement.

The pipe must be installed so it will be free of tensile loading. PE pipe will expand as the temperature increases. The Contractor shall take special precautions, especially on warm days, to eliminate tensile loading in the pipe after it cools. Pipe shall be cut long so that it will be under compression when the final tie-in is made and shall be cooled to ground temperature before making the final tie-in.

The pipe must be fully supported along its entire length. The Contractor shall backfill the trench after the pipe has cooled to ground temperature to minimize tensile stress due to thermal contraction.

The pipe shall be installed in the trench so that there are no bends with a radius of less than twenty five (25) times the pipe diameter except for 1/2” pipe, which can have a radius of twenty (20) times the pipe diameter. There shall be no fusion joints within 3 feet of any bend.

Nominal Pipe Size	1/2"	3/4"	1”	1-1/4”	2”	4”	6”
Minimum Bend Radius	10”	18.75”	25”	31.25”	50”	100”	150”

1.11.7. Repair of PE Pipe: All imperfections or damages which may impair the serviceability of the pipe shall be repaired by the Contractor at their own expense in accordance with the method prescribed by the NV Energy gas inspector.

Temporary repairs can be made using a full encirclement stainless steel clamp for puncture or longitudinal-type damage. Compression couplings with insert stiffeners can be used for temporary repairs to completely-severed pipe. Permanent repairs are the Contractor's responsibility and shall be made as soon as practical and to the satisfaction of NV Energy.

Pipe with punctures or gouges which are greater than 10% of the pipe wall thickness, or pipe with any other extensive damage shall be removed and replaced by the Contractor at their own expense.

If, in any situation, it appears that there was pulling or movement of the pipe or that damage could have occurred at any other locations along the pipe, the suspected area shall be bar hole leak tested with a Combustible Gas Indicator (CGI). The Contractor shall, at their own expense, expose the pipe at any suspected damage area.

1.11.8. Storage and Handling of PE Pipe: The pipe shall be stored to prevent the possibility of the material being damaged by crushing, gouging, piercing or other mechanical damage or being exposed to excessive heat, harmful chemicals, or fire. The pipe must be stacked per the manufacturer's guidelines. If the pipe is to be stored for any length of time, it should be placed under cover for protection from the sun. If Performance Pipe HDPE 8300 Yellow Stripe pipe is stored in a manner that exposes it to direct Ultraviolet light for a period of 10 or more years it will be rejected per manufacturer specifications.

The pipe shall be handled to eliminate the possibility of damage during loading and unloading operations. During transport, the pipe must be supported and secured to minimize movement. During unloading, the Contractor shall lift the pipe from the truck to the ground. Do not drop or throw the pipe.

When stringing pipe along a trench, the pipe must not be rolled or pulled over sharp objects or rough surfaces.

After each handling operation, the Contractor shall carefully inspect the pipe for kinks, cuts, gouges, punctures, or any other imperfections. Any defective or damaged pipe shall be rejected or repaired by the Contractor at their own expense and to the satisfaction of the NV Energy gas inspector.

1.11.9. Locating PE Pipe: The Contractor shall install insulated locating tracer wire with the pipe. The wire shall be yellow, minimum #14 AWG (maximum #8 AWG) fully annealed, low carbon 1010 grade steel, solid CCS, 30 mil HDPE (HMWPE) for direct burial rated at 30 volts. The wire shall be taped to the pipe at intervals not exceeding 20 feet, minimized wherever possible, and at pipeline directional changes such as bends, 45's, and 90's. Tracer wire should be placed outside of any sleeving where possible and must not be wrapped around the pipe.

All wire splices shall be made using a wire connector suitable for direct underground burial per NV Energy Standards.

Test stations intended for locating purposes shall be installed approximately every 1,500 feet on PE main installations without readily available test points (see GCPI-AH). When possible, test stations shall be installed in easy to access locations that minimize traffic disruptions for personnel safety during locating and maintenance.

When a service is stubbed out, the tracer wire must be accessible from above ground. For curb valve installations, this entails bringing the wire up on the outside of the valve box and securely taping it to the box.

If only a stick excess flow valve is present or the service is stubbed out beyond the curb valve, a pipeline marker or other form of stake with a natural gas pipeline sticker or similar markings shall be securely placed near the stub cap with the wire wrapped around and taped to it. The #600 linemarker from Radar Engineers is recommended for this purpose. This shall remain in place until the service is completed. The location of the cap at the end of the stub shall also be recorded via GPS coordinates.

A 3-pound anode shall be installed at the end of each below ground wire for cathodic protection of the wire and to create a ground for locating. This includes installing anodes at the end of any PE main stub. The anode may be removed when the main stub is extended and the existing tracer wire is tied into new tracer wire or grounded with an anode further down the main.

1.11.10. Transition Joints: Steel to Polyethylene transitions must be made by using transition fittings approved by NV Energy. The Contractor shall not shorten the fitting without prior approval and shall adequately support the PE pipe adjacent to the transition. If the transition fitting is a butt weld type, the Contractor shall wrap the fitting with a wet cloth from the midpoint of the steel section. The cloth shall be kept wet during the welding process and shall be left on the fitting until the steel pipe is cool to the touch. No welding or heating shall be done on the body of the transition.

Fusions joining different pipe densities or manufacturers shall be performed utilizing an electrofusion method.

1.11.11. Shielding PE Pipe from Heat: The Contractor shall protect PE pipe from all forms and sources of heat, such as welding, by covering it with wet rags. When any welding is done in the vicinity of PE pipe, sparks must be directed away from the PE pipe and must be prevented from entering the pipe.

1.11.12. Removal of Static Electricity: Due to the nonconductive nature of PE pipe, significant static electrical charges may build up on the pipe during handling and installation. The Contractor shall remove all static electrical charges by grounding the PE pipe whenever it is squeezed off and during hot tapping, purging or emergency repair operations:

Dampen the entire working area. Use a water and liquid dishwashing detergent solution to wet the rags. Wrap the exposed pipe with wet rags. Keep the rags and working area wet during the entire operation.

Any metal tools used for cutting, tapping, or squeezing off the pipe shall be grounded using appropriate and approved methods. Squeeze-off tools shall be kept in tight contact with the wet rags.

Persons entering the work area shall ground themselves before touching the pipe by contacting the wet earth. Once a tool and worker are grounded, removal of the worker's hands from the tool may allow buildup of static charges. The worker must re-ground themself before touching the tool.

Hot Tapping and Squeeze-Offs: Any heat fusion required for hot tapping PE pipe shall be performed by an NV Energy certified heat fusion employee using NV Energy's approved heat fusion procedures. No contractor may perform hot tapping or squeeze-offs unless given prior approval. Refer to 1.5. for further details.

1.12. PIPELINE TESTING

1.12.1. General Requirements: The testing procedures in this specification are for pipelines that will be operated at or below 90 psig maximum allowable operating pressure (MAOP).

A written plan developed by NV Energy Gas Engineering will be developed if testing:

1.12.1.1. Mains or services that will operate above 90 psig MAOP and below 30% of the specified minimum yield strength (SMYS) of the pipe.

1.12.1.2. Mains or transmission lines that will operate at a hoop stress of 30% or more of SMYS.

Unless otherwise specified, no person may operate a new segment of pipeline or return to service a segment of pipeline that has been relocated or replaced until:

1.12.1.3. It has been tested in accordance with this specification to substantiate the proposed maximum allowable operating pressure.

1.12.1.4. All leaks have been located and eliminated.

1.12.1.5. All testing has been completed, and the results accepted by the NV Energy gas inspector.

The test medium must be air or inert gas as determined by NV Energy that is:

1.12.1.6. Compatible with the material of which the pipeline is constructed.

1.12.1.7. Free of all sedimentary materials.

1.12.1.8. Nonflammable.

1.12.2. Environmental Protection and Safety Requirements: In conducting tests under this specification, the Contractor shall ensure that all required PPE is worn and every reasonable precaution is taken to protect its employees and the general public during the testing. The Contractor shall take all practicable steps to keep persons not working on the testing operation outside of the testing area until the pressure is reduced to or below the proposed maximum allowable operating pressure.

The Contractor shall ensure that the test medium is disposed of in accordance with EPA regulations.

1.12.3. Special Requirements: NV Energy reserves the right to require special leak testing procedures as it deems necessary, i.e., extended test durations or different test pressures. The Contractor shall conduct such special test procedures as requested.

Each joint needed to tie in a tested segment of pipeline to the existing gas distribution system is excluded from the test requirements in this specification. The Contractor shall soap test and pressure test each tie in joint at the operating pressure.

If feasible, each service line connection to the main must be tested per the requirements in this specification. If not feasible, the Contractor shall soap test and pressure test each service line connection at the operating pressure.

Prior to reinstatement, each disconnected service line must be leak tested per the requirements in this specification from the point of disconnect to the service line valve. Testing need not be performed on any part of the service line that maintained operating pressure during the work. Gas engineering shall be consulted when reinstating any previously retired main or service.

If a reinstated service line is located in one of NV Energy's 40 psig pressure zones, the Contractor shall leak test the line at 60 psig instead of 135 psig.

1.12.4. Test Requirements: Unless otherwise specified, the Contractor shall leak test each segment of pipeline at minimum 135 psig but not to exceed 145 psig. Gas engineering shall be consulted on any steel pipe to be tested at more than 20% of SMYS.

When the ambient temperature exceeds 100ºF, PE pipe must be shaded, as much as possible, for a minimum of 30 minutes prior to performing a pressure test. Polyethylene pipe material must not exceed 140ºF during the leak testing operation.

Minimum test durations, based upon size and length of pipe, are provided in the following table:

	Minimum Test Duration for PE and Steel Pipe Installations*				
Pipe Size	**10 min**	**20 min**	**2 hour**	**6 hour**	**24 hour**
1-1/4" or Less	0-270'	271-550'	551-3,340'	N/A	N/A
2"	0-120'	121-240'	241-1,480'	1,481-4,460'	4,461-17,860'
4"	0-30'	31-60'	61-390'	391-1,170'	1,171-4,710'
6"	0-10'	11-20'	21-160'	161-490'	491-1,990'
8"	N/A	0-10'	11-90'	91-280'	281-1,120'
12"	N/A	N/A	0-40'	41-120'	121-500'

*** For any pipe sizes or lengths not shown, consult Gas Engineering**

For tests that have multiple pipe sizes, add the total footage and use the largest pipe size to determine test duration.

For tests less than 24 hours, a pressure gauge capable of detecting at least 3 psig increments or a pressure chart recorder shall be used. For tests 24 hours or more, a pressure chart recorder shall be used.

Under some circumstances, the duration of the test can be reduced at the discretion of NV Energy Gas Engineering, additional non-destructive testing (x-ray) may be required.

1.12.5. Contractor Requirements: The Contractor shall provide all necessary labor, material, and equipment for completing the pressure test including proper compression equipment to produce adequate gauge pressure. As each section is completed and the ends of the pipe properly closed, the test medium shall be forced into the pipeline until a gauge pressure of at least 135 psig but no greater than 145 psig is achieved and maintained for the duration of the test.

The Contractor shall locate and repair all leaks discovered in the pipeline during testing. Any welds or fusions displaying leaks shall be considered as failing to meet NV Energy specifications, and the Contractor shall, at their own expense, remove the defective work and perform a new weld or fusion to the satisfaction of the NV Energy gas inspector.

Whenever it is necessary to cut out a weld or fusion and the two ends of pipe cannot be brought together conveniently or without damage to the pipe, the Contractor shall, at their own expense, install a short piece of pipe per these specifications and to the satisfaction of the NV Energy gas inspector.

1.12.6. NV Energy's Responsibilities: NV Energy will provide, install, and remove the pressure recording device to document the leak test. NV Energy will make and retain all required information of each leak test performed for the useful life of the pipeline.

1.13. PURGING STEEL AND PE PIPE

Air trapped and traveling in a gas distribution system can create a combustible mixture. Combined with static electricity, an extremely hazardous situation can develop. NV Energy shall provide all appropriate purging equipment such as risers, and the purging itself must be performed by a NV Energy gas inspector or crew. Under no circumstances will any Contractor personnel be allowed to operate valves, pressurize lines with gas, or purge lines without prior written approval from NV Energy.

When purging, the NV Energy gas inspector shall stack the riser to vent above the worker's heads. Ground the purging stack above and below the gas cock insulator by means of a #12 or heavier gauge wire. Do not purge into a bell hole, and do not allow gas to draft into buildings or other areas where it may become confined and create a combustible mixture.

As much of the pipe as is reasonable shall be buried prior to purging to decrease static build-up and possible damage to the pipe, especially for PE pipe. All applicable purging information from the Operations and Maintenance Manual must be followed.

If the improvement is to be supplied gas from more than one source, only one tie-in shall be made until all air has been purged from the entire improvement.

All non-routine purging, as described by the Operations and Maintenance Manual, shall be reviewed by Gas Engineering and a purge plan created. Gas Engineering must also review designs for purging considerations on all large diameter, excessive length, or non-linear/radial mains to ensure proper isolation points and sizing of purge location. Additional valves may be required to achieve a complete purge while preventing possible damage from excessive squeezing of PE pipe and necessity of excess labor for completing tie-ins.

1.14. CASING

1.14.1. General Information:

1.14.1.1. **Casing Definition:** A bare steel pipe encasing a gas carrying steel pipe.

1.14.1.2. **Description:** These standards provide general requirements and guidelines for installations requiring a casing within NV Energy's service territory.

1.14.1.3. **Jurisdiction:** All applicable City, County, State and Federal specifications must be met in addition to the requirements of this standard. In the case of conflict, the more rigid specification or standards shall apply.

1.14.2. Guidelines:

1.14.2.1. Steel casing for steel pipe shall only be installed as required; every effort shall be made to avoid the installation of casings. Gas Engineering shall be consulted for all casing designs.

1.14.2.2. **Application:**
- Installations involving a bore, drill, or similar situation.
- To facilitate installation of new or replacement gas facilities in specific ROWs, bridges, etc.

1.14.2.3. **Bare Steel Casing Material Requirements:** All bare steel casing pipe shall be high frequency resistance welded or seamless pipe, bare inside and outside. Gas Engineering shall be consulted for all casing designs.

1.14.2.4. **Bare Steel Casing Installations:** All necessary casings, casing appurtenances, and venting equipment shall be installed in accordance with the drawings and specifications and to the satisfaction of the NV Energy gas inspector. Additional time shall be included in the design phase in case variances are required and need to be approved by NDOT, UPRR, or other entities. NV Energy cathodic protection engineer must approve any design that includes a casing.

Prior to inserting carrier pipe, casing pipe must be free of dirt, rocks, water, or any other debris that may cause damage to the outside wall of the carrier pipe. Insulating spacers are to be installed in order to electrically isolate the casing from the carrier pipe, contact NV Energy gas engineering for distances. Carrier pipe ends must also be sealed to prevent debris from entering the carrier pipe.

1.14.2.5. **Test Station Design for Casings:** All casing installations shall have a test station on either side of the casing. Each test station shall have 2 wires connected to the casing and 2 wires connected to the carrier pipe (4 wires per test station.) The same setup shall be mirrored on the other side of the casing. The wires must be labeled or color-coded, and electrical isolation must be shown prior to acceptance of the pipe by an NV Energy cathodic protection engineer representative. Any carrier that is shorted to the casing must by repaired or replaced at the installers' expense. See part 1.10.10 of Volume 15 Section 4 (this document) for test wire specifications for steel carrier pipe and casing.

1.14.2.6. **Backfill:** Sections of carrier pipe not contained inside the casing, such as service taps and inspection points, shall be supported by compacted sand bedding prior to the first lift of backfill material. The pipe shall be supported to prevent vertical movement of the pipe.

1.14.2.7. **Documentation:** All sections of casing pipe must be documented on the appropriate gas main and /or service cards. Casings shall be measured for their entire length and the ends shall be measured from the nearest fitting (service tee, curb valves, risers, etc.) and documented on the notes section of the card. The ends of casings shall also be GPS located.

1.15. SLEEVING

1.15.1. General Information:

1.15.1.1. **Sleeve Definition:** A steel or plastic pipe encasing a gas carrying plastic pipe.

1.15.1.2. **Description:** These standards provide general requirements and guidelines for service replacement, insertion, and/or new construction installations using sleeving within NV Energy's service territory.

1.15.1.3. **Jurisdiction:** All applicable City, County, State and Federal specifications must be met in addition to the requirements of this standard. In the case of conflict, the more rigid specification or standards shall apply.

1.15.2. Guidelines:

1.15.2.1. **Application:**

- Installations where native material is utilized for bedding and backfill and does not meet the requirements of sand specification for gas pipe per Section 3 Part 3 (Trench Bedding and Backfill).
- To protect gas carrier pipe when minimum separation from other facilities cannot be maintained.
- To facilitate installation of new or replacement gas facilities, such as street, driveway, and sidewalk crossings.

Note: Steel pipe must NOT be inserted into polyethylene sleeve.

1.15.2.2. **Sleeve Material Requirements:** For new installations, plastic pipe sleeving shall be yellow medium density polyethylene SDR 11 and steel sleeving shall meet the requirements described in 1.14.2.3.

Note: Sleeve pipe must NOT be utilized as the gas carrying pipe.

1.15.2.3. **Installations:** Prior to inserting carrier pipe, the sleeve ends must be reamed to remove burrs and the sleeve pipe must be free of dirt, rocks, water, or any other debris that may cause damage to the outside wall of the carrier pipe.

Carrier pipe ends must be sealed to prevent debris remaining in the sleeve from entering the carrier pipe.

Carrier pipe must be hand guided into the sleeve pipe to prevent pipe wall damage or undue stress on the carrier pipe. Care must be taken when using coiled sleeve and carrier pipe to prevent undue stress on the carrier pipe.

Once the carrier pipe has been inserted, all sleeve ends shall be sealed with tape similar to 3M #50 (tape used in wrapping steel pipe in NV Energy's system). Taped ends shall not be taped to create a gas tight seal.

When sleeving terminates at or near a building, the upstream end of the sleeve nearest the downstream side of the curb valve must be sealed with a cold shrink seal. Cold shrink seal shall then be taped at each end.

1.15.2.4. **Tracer and Test Wires:** All PE gas carrying pipe must be locatable using yellow tracer wire. The tracer wire shall meet the specifications in Section 4 Part 1.11.9. Tracer wire shall be installed outside the sleeve wherever possible.

1.15.2.5. **Backfill:** For backfill requirements related to sleeving, refer to the requirements described in 1.14.2.5.

1.15.2.6. **Documentation:** All sections and type of sleeve pipe must be documented on the appropriate gas main and/or service cards. Refer to 1.14.2.6. for details on how to document the location of a sleeve.

1.15.2.7. **Sleeve Removal:** To prevent damage to the carrier pipe and tracer wire, mechanical or electric cutters must have stops that will not allow 100% cutting of sleeve pipe wall. Once the sleeve is removed, the carrier and tracer wire must be inspected to ensure that no damage has occurred. Any damaged sections must be repaired or replaced.

1.16. BORING

1.16.1. General Information:

1.16.1.1. **Description:** These standards provide general requirements and guidelines for existing or new construction installations using boring within NV Energy's service territory.

Boring installations shall be completed using horizontal directional drilling or jack and bore operations subject to Gas Engineering approval.

1.16.1.2. **Jurisdiction:** All applicable City, County, State and Federal specifications must be met in addition to the requirements of this standard. In the case of conflict, the more rigid specification or standards shall apply.

1.16.2. Guidelines:

1.16.2.1. **Application:**

- Installations when open-trench construction is not practical such as under waterways or highways.
- Boring shall not be used in a multiple utility installation.

1.16.2.2. **Boring Methods:**

- Directional bores shall be guided by using locating equipment that displays the angle and depth of the drill head.
- Non-directional bores shall be guided by aiming, alignment and leveling.
- All receiving pits, regardless of method, shall not be backfilled until they have been approved by the NV Energy gas inspector. Any bores rejected by the NV Energy gas inspector shall not be utilized and must be supported and /or sealed by appropriate methods to prevent settlement.
- Inspection holes may be required by the NV Energy gas inspector at their discretion to determine actual bore path.
- Asphalt heave caused by bore tool shall be removed and excavated to a minimum depth of 18" below finish grade and compacted. Backfill of the affected area must be completed with base material meeting the requirements of Section 3 Part 3 (Trench Bedding and Backfill).

1.16.2.3. **Steel Pipe Coating:** For Steel pipe that will be bored, prior approval of coating materials must be made by Gas Engineering. The coating must be specially designed to withstand shear forces and damage that could be incurred by the coating during the boring process.

Additional consideration must be made for coating of the girth welds in boring applications. In general, heat shrink sleeves will not be employed for boring applications.

1.16.2.4. **Existing Utilities:** Prior to and for the duration of any boring operation, all existing underground utilities and/or structures shall be located and exposed to prevent accidental contact and to ensure minimum separation per Section 3 is maintained.

**Additional measures are to be taken to ensure sewer laterals and other known untraceable utilities are positively located prior to boring activities. If

untraceable utilities are not positively located prior to boring and are not exposed for visual inspection, other means such as internal camera inspection shall be performed to ensure integrity of the untraceable utility.

1.16.2.5. **Bore Locations:** Bore locations shall be that of trench locations. These locations are typically shown relative to street centerlines, right of way lines, or property lines in new and existing developments.

It is the responsibility of the contractor or the customer to verify that these reference lines are established and are accurate. Where such reference lines are unavailable, alignment shall be established by NV Energy.

1.16.2.6. **Bore Depth:** Depths shall meet the minimum requirements per Section 3. For bores that fall on a side slope, the depth shall be measured from the low side.

1.16.2.7. **Dewatering:** Where ground water is encountered during pit and bell hole excavation, it shall be the responsibility of the contractor or customer to adequately dewater the trench to prevent the entrance of water into the sleeve or carrier pipe and provide for safe and convenient installation of both the sleeve and carrier pipe.

1.16.2.8. **Installations:** Refer to 1.14 and/or 1.15 for boring installations that involve a casing and/or sleeving.

Coiled sleeve pipe must not exit the bore with the natural coil bend in the opposite direction of the carrier pipe. Bore entrance/exit pits must be extended along the length of the bore to the point where undue stress is eliminated.

1.16.2.9. **Backfill:** All trenches bore and receiving pits, service tie-ins, and riser bell holes shall be backfilled in accordance with Section 3.

1.17. GUIDELINES FOR BRANCHING OFF EXISTING GAS SERVICES

Provided below are conditions that must be met and guidelines that must be followed when considering the possibility of branching off an existing gas service line:

1.17.1. The UDA shall verify with Gas Engineering that the capacity of the existing service line will adequately handle the existing load plus the projected new load combined.

1.17.2. The UDA shall verify that all necessary easement concerns have been addressed.

1.17.3. Each design must be verified and approved by NV Energy's Design & Construction Facilitator before committing to customer.

When branching off an existing steel or PE gas service, the Gas Engineering team must be consulted for the design.

1.18. GAS MAIN OFFSET REQUIREMENTS

Whenever a gas main must be installed under a conflicting utility, storm drain, sewer, conduit, reinforced concrete box, or ditch, and the necessary depth from top of pipe to finish grade exceeds five feet, NV Energy may require that 45 or 90 degree offsets be installed on each side of the conflicting area.