DEPARTMENT OF BUDGET & FINANCE

Adoption of Chapter 6-77

Hawaii Administrative Rules

April 15, 1994

SUMMARY

Chapter 6-77, Hawaii Administrative Rules, entitled "Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards," is adopted.

HAWAII ADMINISTRATIVE RULES

TITLE 6

DEPARTMENT OF BUDGET AND FINANCE

PUBLIC UTILITIES COMMISSION

TRANSPORTATION OF NATURAL AND OTHER GAS BY

PIPELINE: MINIMUM SAFETY STANDARDS

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Historical note: This chapter is substantially based upon Parts 191 and 192, 49 Code of Federal Regulations (October 1, 1990 edition).

Subchapter 1

General

'6-77-1 Scope of chapter. (a) This chapter prescribes minimum safety requirements for pipeline facilities and the transportation of gas, including pipeline facilities and the transportation of gas within the limits of the outer continental shelf as that term is defined in the Outer Continental Shelf Lands Act (43 U.S.C. 1331).

(b) This chapter does not apply to:

(1) Offshore gathering of gas upstream from the outlet flange of each facility on the outer continental shelf where hydrocarbons are produced or where produced hydrocarbons are first separated, dehydrated, or otherwise processed, whichever facility is farther downstream; and

(2) Onshore gathering of gas outside of the following areas:

(A) An area within the limits of any incorporated or unincorporated city, town, or village;

(B) Any designated residential or commercial area such as a subdivision, business or shopping center, or community development. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.1, October 1, 1990 edition)

'6-77-2 Definitions.

"Commission" means the public utilities commission of the State or any person to whom it has delegated authority in the matter concerned.

"Distribution line" means a pipeline other than a gathering or transmission line.

"Gas" means natural gas, flammable gas, or gas which is toxic or corrosive.

"Gathering line" means a pipeline that transports gas from a current production facility to a transmission line or main.

"High pressure distribution system" means a distribution system in which the gas pressure in the main is higher than the pressure provided to the customer.

"Incident" means any of the following events:

(1) An event that involves a release of gas from a pipeline or of liquefied natural gas or gas from an LNG facility and

(A) A death, or personal injury necessitating in-patient hospitalization; or

(B) Estimated property damage, including cost of gas lost, of the operator or others, or both, of $50,000 or more.

(2) An event that results in an emergency shutdown of an LNG facility;

(3) An event that is significant, in the judgement of the operator, even though it did not meet the criteria of paragraphs (1) or (2).

"Listed specification" means a specification listed in section I of Appendix B of this chapter.

"LNG facility" means a liquefied natural gas facility as defined in section 193.2007 of Part 193 of the Code of Federal Regulations (C.F.R.).

"Low-pressure distribution system" means a distribution system in which the gas pressure in the main is substantially the same as the pressure provided to the customer.

"Main" means a distribution line that serves as a common source of supply for more than one service line.

"Master meter system" means a pipeline system for distributing gas within, but not limited to, a definable area, such as a mobile home park, housing project, or apartment complex, where the operator purchases metered gas from an outside source for resale through a gas distribution pipeline system. The gas distribution pipeline system supplies the ultimate consumer who either purchases the gas directly through a meter or by other means, such as by rents.

"Maximum actual operating pressure" means the maximum pressure that occurs during normal operations over a period of one year.

"Maximum allowable operating pressure (MAOP)" means the maximum pressure at which a pipeline may be operated under this chapter.

"Municipality" means a city, county, or any other political subdivision of a state.

"Offshore" means beyond the line of ordinary low water along that portion of the coast of the United States that is in direct contact with the open seas and beyond the line marking the seaward limit of inland waters.

"Operator" means a person who engages in the transportation of gas.

"Person" means any individual, firm, joint venture, partnership, corporation, association, state, municipality, cooperative association, or joint stock association, and including any trustee, receiver, assignee, or personal representative thereof.

"Pipe" means any pipe or tubing used in the transportation of gas, including pipe-type holders.

"Pipeline" or "pipeline system" means all parts of those physical facilities through which gas moves in transportation, including, but not limited to, pipe, valves, and other appurtenances attached to pipes, compressor units, metering stations,

regulator stations, delivery stations, holders, and fabricated assemblies.

"Pipeline facility" means new and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

"Service line" means a distribution line that transports gas from a common source of supply to

(1) A customer meter or the connection to a customer's piping, whichever is farther downstream; or

(2) The connection to a customer's piping if there is no customer meter. A customer meter is the meter that measures the transfer of gas from an operator to a consumer.

"SMYS" means specified minimum yield strength is:

(1) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with section 6-77-30(b);

(2) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with section 6-77-30(b).

"State" means the State of Hawaii.

"Transmission line" means a pipeline, other than a gathering line, that:

(1) Transports gas from a gathering line or storage facility to a distribution center or storage facility;

(2) Operates at a hoop stress of twenty percent or more SMYS; or

(3) Transports gas within a storage field.

"Transportation of gas" means the gathering, transmission, or distribution of gas by pipeline or the storage of gas, in or affecting interstate or foreign commerce.
[Eff] (Auth:

HRS '269-6) (Imp: 49 C.F.R. ''191.3, 192.3; October 1, 1990)

'6-77-3 Incorporation by reference. (a) Any documents or parts thereof incorporated by reference in this chapter are a part of this chapter as though set out in full.

(b) All incorporated documents are available for inspection at the commission's office at 465 South King Street, Room 103, Honolulu, HI, in the Research and Special Programs Administration, Washington, D.C., or at the Office of the Federal Register, 1100 L Street, N.W., Washington, D.C. In addition, the documents are available at the addresses provided in Appendix A.

(c) The full titles for the publications incorporated by reference are provided in Appendix A. Numbers in parentheses indicate applicable editions. Earlier editions of documents listed in Appendix A or documents formerly listed in the commission's General Order No. 9 may be used for materials and components manufactured, designed, or installed in accordance with those earlier editions or earlier documents at the time they were listed. The appropriate previous edition of 49 C.F.R. shall be referred to for a listing of the earlier listed editions or documents in Appendix A. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.7, October 1, 1990)

Subchapter 2

Annual Reports, Incident Reports and

Safety-Related Condition Reports

'6-77-4 Telephonic notice of certain incidents. (a) At the earliest practicable moment following discovery, each operator shall give notice in accordance with subsection (b) of each incident as defined in section 6-77-2.

(b) Each notice required by subsection (a) shall be made by telephone to the commission at (808) 586-2020 and to the U.S. Department of Transportation at (800) 424-8802. Both notices shall include the following information:

(1) Names of operator and person making report and their telephone numbers;

(2) The location of the incident;

(3) The time of the incident;

(4) The number of fatalities and personal injuries, if any;

(5) All other significant facts that are known by the operator that are relevant to the cause of the incident or extent of the damages. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.5, October 1, 1990)

'6-77-5 Addressee for written reports. Each written report required by this chapter must be made to the commission with further transmittal of a copy within ten days for incident reports and not later than March 15 for annual reports to the Information Resources Manager, Office of Pipeline Safety, Research and Special Programs Administration, U.S. Department of Transportation, Room 8417, 400 Seventh Street S.W., Washington, DC 20590.

'6-77-5

Safety related condition reports required by section 6 77-12 and 49 C.F.R. '191.23 for intrastate pipeline transportation must be submitted concurrently to the commission, and to the Information Resources Manager, Office of Pipeline Safety, Research and Special Programs Administration, U.S. Department of Transportation, at the address stated above. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.7, October 1, 1990)

'6-77-6 Distribution system: incident report. (a) Except as provided in subsection (c), each operator of a distribution pipeline system shall submit Department of Transportation Form RSPA F 7100.1 as soon as practicable but not more than thirty days after detection of an incident required to be reported under section 6 77-4 and 49 C.F.R. '191.5.

(b) When additional relevant information is obtained after the report is submitted under subsection (a), the operator shall make supplementary reports as deemed necessary with a clear reference by date and subject to the original report.

(c) The incident report required by this section need not be submitted with respect to master meter systems or LNG facilities. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.9, October 1, 1990)

'6-77-7 Distribution system: annual report. (a) Except as provided in subsection (b), each operator of a distribution pipeline system shall submit an annual report for that system on Department of Transportation Form RSPA F 7100.1-1. This report must be

submitted each year, not later than March 15, for the preceding calendar year.

'6-77-9

(b) The annual report required by this section need not be submitted with respect to:

(1) Petroleum gas systems which serve fewer than 100 customers from a single source;

(2) Master meter systems; or

(3) LNG facilities. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.11, October 1, 1990)

'6-77-8 Distribution systems reporting: transmission pipelines, transmission or gathering systems reporting distribution pipelines. Each operator, primarily engaged in gas distribution, who also operates gas transmission or gathering pipelines shall submit separate reports for these pipelines as required by sections 6-77-9 and 6 77 10 and 49 C.F.R. "191.15 and 191.17. Each operator, primarily engaged in gas transmission or gathering, who also operates gas distribution pipelines, shall submit separate reports for these pipelines as required by sections 6-77-6 and 6-77-7 and 49 C.F.R. "191.9 and 191.11. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.13, October 1, 1990)

'6-77-9 Transmission and gathering systems: incident report. (a) Except as provided in subsection (c), each operator of a transmission or a gathering pipeline system shall submit Department of Transportation Form RSPA F 7100.2 as soon as practicable but

not more than thirty days after detection of an incident required to be reported under section 6-77-4 and 49 C.F.R. '191.5.

(b) Where additional related information is obtained after a report is submitted under subsection (a), the operator shall make a

'6-77-9

supplemental report as soon as practicable with a clear reference by date and subject to the original report.

(c) The incident report required by subsection (a) need not be submitted with respect to LNG facilities. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.15, October 1, 1990)

'6-77-10 Transmission and gathering systems: annual report. (a) Except as provided in subsection (b), each operator of a transmission or a gathering pipeline system shall submit an annual report to the commission and the U.S. Department of Transportation for that system on Department of Transportation Form RSPA 7100.2 1. This report must be submitted each year, not later than March 15, for the preceding calendar year.

(b) The annual report required by subsection (a) need not be submitted with respect to LNG facilities. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.17, October 1, 1990)

'6-77-11 Report forms. Copies of the prescribed report forms are available without charge upon request from the commission. Additional copies in this prescribed format

may be reproduced and used if the same size and kind of paper is used. In addition, the information required by these forms may be submitted by any other means that is acceptable to the commission. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '191.19, October 1, 1990)

'6-77-12 Reporting safety-related conditions. (a) Except as provided in subsection (b), each

operator shall report in accordance with section 6 77 13 and 49 C.F.R. '191.25 the existence of any of the following safety-related conditions involving facilities in service:

(1) In the case of a pipeline (other than an LNG facility) that operates at a hoop stress of twenty percent or more of its specified minimum yield strength, general corrosion that has reduced the wall thickness to less than that required for the maximum allowable operating pressure, and localized corrosion pitting to a degree where leakage might result;

(2) Unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability of a pipeline or the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;

(3) Any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;

(4) Any material defect or physical damage that impairs the serviceability of a pipeline that operates at a hoop stress of twenty percent or more of its specified minimum yield strength;

(5) Any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its maximum allowable

operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;

(6) A leak in a pipeline or LNG facility that contains or processes gas or LNG that constitutes an emergency;

(7) Inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;

(8) Any safety-related condition that could lead to an imminent hazard and causes (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a twenty percent or more reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility that contains or processes gas or LNG.

(b) A report is not required for any safety related condition that:

(1) Exists on a master meter system or a customer owned service line;

(2) Is an incident or results in an incident before the deadline for filing the safety related condition report;

(3) Exists on a pipeline (other than an LNG facility) that is more than 220 yards from any building intended for human occupancy or outdoor place of assembly, except that reports are required for conditions within the right of-way of an active railroad, paved road, street, or highway; or

(4) Is corrected by repair or replacement in accordance with applicable safety standards before the deadline for filing the safety related condition report, except that reports are required for conditions under subsection (a)(1) other than localized corrosion pitting on an effectively coated and cathodically protected pipeline.
[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '191.23, October 1, 1990)

'6-77-13 Filing safety-related condition reports. (a) Each report of safety-related condition under section 6-77-12(a) must be filed (received by the commission) in writing within five working days (not including Saturdays, Sundays, or federal holidays) after the day a representative of the operator first determines that the condition exists, but not later than ten working days after the day a representative of the operator discovers the condition. Separate conditions may be described in a single report if they are closely related.

(b) The report must be headed "Safety-Related Condition Report" and provide the following information:

(1) Name and principal address of operator;

(2) Date of report;

(3) Name, job title, and business telephone number of person submitting the report;

(4) Name, job title, and business telephone number of person who determined that the condition exists;

(5) Date condition was discovered and date condition was first determined to exist;

(6) Location of condition, with reference to the State (and town, city, or county) or offshore site, and as appropriate, nearest street address, offshore platform, survey station number, milepost, landmark, or name of pipeline;

(7) Description of the condition, including circumstances leading to its discovery, any significant effects of the condition on safety, and the name of the commodity transported or stored;

(8) The corrective action taken (including reduction of pressure or shutdown) before the report is submitted and the planned follow-up or future corrective action, including the anticipated schedule for starting and concluding such action.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '191.25, October 1, 1990)

Subchapter 3

Minimum Safety Standards - General

'6-77-14 Class locations. (a) Offshore is Class 1 location. The class location onshore is determined by applying the criteria set forth in this section: The class location unit is an area that extends 220 yards on either side of the centerline of any continuous one-mile length of pipeline. Except as provided in subsections (d)(2) and (f), the class location is determined by the buildings in the class location unit. For the purposes of this section, each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.

(b) A Class 1 location is any class location unit that has ten or less buildings intended for human occupancy.

(c) A Class 2 location is any class location unit that has more than ten but less than forty six buildings intended for human occupancy.

(d) A Class 3 location is:

(1) Any class location unit that has forty six or more buildings intended for human occupancy;

(2) An area where the pipeline lies within 100 yards of either a building or a small, well defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by twenty or more persons on at least five days a week for ten weeks in any twelve month period.

(The days and weeks need not be consecutive.)

(e) A Class 4 location is any class location unit where buildings with four or more stories above ground are prevalent.

(f) The boundaries of the class locations determined in accordance with subsections (a) through (e) may be adjusted as follows:

(1) A Class 4 location ends 220 yards from the nearest building with four or more stories above ground;

(2) When a cluster of buildings intended for human occupancy requires a Class 3 location, the Class 3 location ends 220 yards from the nearest building in the cluster;

(3) When a cluster of buildings intended for human occupancy requires a Class 2 location, the Class 2 location ends 220 yards from the nearest building in the cluster. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.5, October 1, 1990)

'6-77-15 Gathering lines. Each gathering line must comply with the requirements of this chapter applicable to transmission lines. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.9, October 1, 1990)

'6-77-16 Petroleum gas systems. (a) No operator may transport petroleum gas in a system that services ten or more customers, or in a system, any portion of which is located in a public place (such as a highway), unless that system meets the requirements of this chapter and of NFPA Standards No. 58 and No. 59. In the event of

a conflict, the requirements of this chapter prevail.

'6-77-16

(b) Each petroleum gas system covered by subsection (a) must comply with the following:

(1) Aboveground structures must have open vents near the floor level;

(2) Belowground structures must have forced ventilation that will prevent any accumulation of gas;

(3) Relief valve discharge vents must be located so as to prevent any accumulation of gas at or below ground level;

(4) Special precautions must be taken to provide adequate ventilation where excavations are made to repair an underground system.

(c) For the purpose of this section, petroleum gas means propane, butane, or mixtures of these gases, other than a gas air mixture that is used to supplement supplies in a natural gas distribution system. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.11, October 1, 1990)

'6-77-17 General. (a) No person may operate a segment of pipeline that is readied for service after March 12, 1971, or in the case of an offshore gathering line, after July 31, 1977, unless:

(1) The pipeline has been designed, installed, constructed; initially inspected, and initially tested in accordance with this chapter; or

(2) The pipeline qualifies for use under this chapter in accordance with section 6 77 18.

(b) No person may operate a segment of pipeline that is replaced, relocated, or

otherwise changed after November 12, 1970, or in the case of an offshore gathering line, after July 31, 1977, unless that replacement, relocation, or change has been made in accordance with this chapter.

(c) Each operator shall maintain, modify as appropriate, and follow the plans, procedures, and

programs that it is required to establish under this chapter. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.13, October 1, 1990)

'6-77-18 Conversion to service subject to this chapter. (a) A steel pipeline previously used in service not subject to this chapter qualifies for use under this chapter if the operator prepares and follows a written procedure to carry out the following requirements:

(1) The design, construction, operation, and maintenance history of the pipeline must be reviewed and, where sufficient historical records are not available, appropriate tests must be performed to determine if the pipeline is in a satisfactory condition for safe operation;

(2) The pipeline right-of-way, all aboveground segments of the pipeline, and appropriately selected underground segments must be visually inspected for physical defects and operating conditions which reasonably could be expected to impair the strength or tightness of the pipeline;

(3) All known unsafe defects and conditions must be corrected in accordance with this chapter;

(4) The pipeline must be tested in accordance with subchapter 12 to substantiate the maximum allowable operating pressure permitted by subchapter 14.

(b) Each operator must keep for the life of the pipeline a record of the investigations, tests, repairs, replacements, and alterations made under the requirements of subsection (a). [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.14, October 1, 1990)

'6-77-19

Subchapter 4

Minimum Safety Standards - Materials

'6-77-19 Scope. This subchapter prescribes minimum requirements for the selection and qualification of pipe and components for use in pipelines. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.51, October 1, 1990)

'6-77-20 General. Materials for pipe and components must be:

(1) Able to maintain the structural integrity of the pipeline under temperature and other conditions that may be anticipated;

(2) Chemically compatible with any gas that they transport and with any other material

in the pipeline with which they are in contact; and

(3) Qualified in accordance with the applicable requirements of this subchapter.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.53, October 1, 1990)

'6-77-21 Steel pipe. (a) New steel pipe is qualified for use under this chapter if:

(1) It was manufactured in accordance with a listed specification;

(2) It meets the requirements of:

(A) Section II of Appendix B; or

(B) If it was manufactured before November 12, 1970, either section II or III of Appendix B;

(3) It is used in accordance with subsection (c) or (d).

'6-77-22

(b) Used steel pipe is qualified for use under this chapter if:

(1) It was manufactured in accordance with a listed specification and it meets the requirements of paragraph II-C of Appendix B; or

(2) It meets the requirements of:

(A) Section II of Appendix B; or

(B) If it was manufactured before November 12, 1970, either section II or III of Appendix B;

(3) It has been used in an existing line of the same or higher pressure and meets the

requirements of paragraph II-C of Appendix B; or

(4) It is used in accordance with subsection (c).

(c) New or used steel pipe may be used at a pressure resulting in a hoop stress of less than 6,000 p.s.i. where no close coiling or close bending is to be done, if visual examination indicates that the pipe is in good condition and that it is free of split seams and other defects that would cause leakage. If it is to be welded, steel pipe that has not been manufactured to a listed specification must also pass the weldability tests prescribed in paragraph II-B of Appendix B.

(d) Steel pipe that has not been previously used may be used as replacement pipe in a segment of pipeline if it has been manufactured prior to November 12, 1970, in accordance with the same specifications as the pipe used in constructing that segment of pipeline.

(e) New steel pipe that has been cold expanded must comply with the mandatory provisions of API Standard 5L. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.55, October 1, 1990)

'6-77-22 (Reserved)

'6-77-23

'6-77-23 Plastic pipe. (a) New plastic pipe is qualified for use under this chapter if:

(1) It is manufactured in accordance with a listed specification; and

(2) It is resistant to chemicals with which contact may be anticipated.

(b) Used plastic pipe is qualified for use under this chapter if:

(1) It was manufactured in accordance with a listed specification;

(2) It is resistant to chemicals with which contact may be anticipated;

(3) It has been used only in natural gas service;

(4) Its dimensions are still within the tolerances of the specification to which it was manufactured; and

(5) It is free of visible defects.

(c) For the purpose of subsections (a)(1) and (b)(1), where pipe of a diameter included in a listed specification is impractical to use, pipe of a diameter between the sizes included in a listed specification may be used if it:

(1) Meets the strength and design criteria required of pipe included in that listed specification; and

(2) Is manufactured from plastic compounds which meet the criteria for material required of pipe included in that listed specification. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.59, October 1, 1990)

'6-77-24 (Reserved)

'6-77-25 Marking of materials. (a) Except as provided in subsection (d), each valve, fitting, length of pipe, and other component must be marked:

(1) As prescribed in the specification or standard to which it was manufactured; or

(2) To indicate size, material, manufacturer, pressure rating, and temperature rating, and as appropriate, type, grade, and model.

(b) Surfaces of pipe and components that are subject to stress from internal pressure may not be field die stamped.

(c) If any item is marked by die stamping, the die must have blunt or rounded edges that will minimize stress concentrations.

(d) Subsection (a) does not apply to items manufactured before November 12, 1970, that meet all of the following:

(1) The item is identifiable as to type, manufacturer, and model.

(2) Specifications or standards giving pressure, temperature, and other appropriate criteria for the use of items are readily available.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.63, October 1, 1990)

'6-77-26 Transportation of pipe. In a pipeline to be operated at a hoop stress of twenty percent or more of SMYS, an operator may not use pipe having an outer diameter to wall thickness ratio of seventy to one, or more, that is transported by railroad unless:

(1) The transportation is performed in accordance with the 1972 edition of API RP5L1, except that before February 25, 1975, the transportation may be performed in accordance with the 1967 edition of API RP5L1.

(2) In the case of pipe transported before November 12, 1970, the pipe is tested in accordance with subchapter 12 to at least

1.25 times the maximum allowable operating pressure if it is to be installed in a Class 1 location and to at least 1.5 times the maximum allowable operating pressure if it is to be installed in a Class 2, 3, or 4 location. Notwithstanding any shorter time period permitted under subchapter 12, the test pressure must be maintained for at least eight hours. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.65, October 1, 1990)

Subchapter 5

Minimum Safety Standards - Pipe Design

'6-77-27 Scope. This subchapter prescribes the minimum requirements for the design of pipe. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.101, October 1, 1990)

'6-77-28 General. Pipe must be designed with sufficient wall thickness, or must be installed with adequate protection, to withstand anticipated external pressures and loads that will be imposed on the pipe after installation. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.103, October 1, 1990)

'6-77-29 Design formula for steel pipe. (a) The design pressure for steel pipe is determined in accordance with the following formula:

'6-77-30

$$P=(2\ St/D) \times F \times E \times T$$

P = Design pressure in pounds per square inch gauge.

S = Yield strength in pounds per square inch determined in accordance with section 6-77-30.

D = Nominal outside diameter of the pipe in inches.

t = Nominal wall thickness of the pipe in inches. If this is unknown, it is determined in accordance with section 6-77-31. Additional wall thickness required for concurrent external loads in accordance with section 6-77-28 may not be included in computing design pressure.

F = Design factor determined in accordance with section 6-77-32.

E = Longitudinal joint factor determined in accordance with section 6-77-33.

T = Temperature derating factor determined in accordance with section 6-77-34.

(b) If steel pipe that has been subjected to cold expansion to meet the SMYS is subsequently heated, other than by welding or stress relieving as a part of welding, the design pressure is limited to seventy-five percent of the pressure determined under

subsection (a) if the temperature of the pipe exceeds 900E F (482E C) at any time or is held above 600E F (316E C) for more than one hour. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.105, October 1, 1990)

'6-77-30 Yield strength (S) for steel pipe. (a) For pipe that is manufactured in accordance with a specification listed in section I of Appendix B, the yield strength to be used in the design formula in section 6-77-29 is the SMYS stated in the listed specification, if that value is known.

(b) For pipe that is manufactured in accordance with a specification not listed in

'6-77-30

section I of Appendix B or whose specification or tensile properties are unknown, the yield strength to be used in the design formula in section 6-77-29 is one of the following:

(1) If the pipe is tensile tested in accordance with section II.D. of Appendix B, the lower of the following:

(A) Eighty percent of the average yield strength determined by the tensile tests;

(B) The lowest yield strength determined by the tensile tests, but not more than 52,000 p.s.i.

(2) If the pipe is not tensile tested as provided in subsection (b)(1) 24,000 p.s.i. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.107, October 1, 1990)

'6-77-31 Nominal wall thickness (t) for steel pipe. (a) If the nominal wall thickness for steel pipe is not known, it is determined by measuring the thickness of each piece of pipe at quarter points on one end.

(b) However, if the pipe is of uniform grade, size, and thickness and there are more than ten lengths, only ten percent of the individual lengths, but not less than ten lengths, need be measured. The thickness of the lengths that are not measured must be verified by applying a gauge set to the minimum thickness found by the measurement. The nominal wall thickness to be used in the design formula in section 6-77-29 is the next wall thickness found in commercial specifications that is below the average of all the measurements taken. However, the nominal wall thickness used may not be more than 1.14 times the smallest measurement taken on pipe less than twenty inches in outside diameter, nor more than 1.11 times the smallest measurement taken on pipe twenty inches or more in outside

diameter. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.109, October 1, 1990)

'6-77-32 Design factor (F) for steel pipe. (a) Except as otherwise provided in subsections (b), (c), and (d), the design factor to be used in the design formula in section 6-77-29 is determined in accordance with the following table:

Class location	Design factor (F)

1	0.72
2	0.60
3	0.50
4	0.40

(b) A design factor of 0.60 or less must be used in the design formula in section 6-77-29 for steel pipe in Class 1 locations that:

(1) Crosses the right-of-way of an unimproved public road, without a casing;

(2) Crosses without a casing, or makes a parallel encroachment on the right-of-way of either a hard surfaced road, a highway, a public street, or a railroad;

(3) Is supported by a vehicular, pedestrian, railroad, or pipeline bridge; or

(4) Is used in a fabricated assembly, (including separators, mainline valve assemblies, cross connections, and river crossing headers) or is used within five pipe diameters in any direction from the last fitting of a fabricated assembly, other than a transition piece or an elbow used in place of a pipe bend which is not associated with a fabricated assembly.

(c) For Class 2 locations, a design factor of 0.50, or less, must be used in the design formula in section 6 77-29 for uncased steel pipe that crosses

the right of way of a hard surfaced road, a highway, a public street, or a railroad.

(d) For Class 1 and Class 2 locations, a design factor of 0.50, or less, must be used in the design formula in section 6-77-29 for:

(1) Steel pipe in a compressor station, regulating station, or measuring station; and

(2) Steel pipe, including a pipe riser, on a platform located offshore or in inland navigable waters. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.111, October 1, 1990)

'6-77-33 Longitudinal joint factor (E) for steel pipe. The longitudinal joint factor to be used in the design formula in section 6-77-29 is determined in accordance with the following table:

Specification	Pipe class	Longitudinal Joint Factor (E)
ASTM A 53	Seamless	1.00
	Electric resistance welded	1.00
	Furnace butt welded	.60
ASTM A 106	Seamless	1.00
ASTM A 333	Seamless	1.00
	Electric resistance welded	1.00
ASTM A 381	Double submerged arc welded	1.00
ASTM A 671	Electric-fusion-welded	1.00

ASTM A 672	Electric-fusion-welded	1.00
ASTM A 691	Electric-fusion-welded	1.00
API 5L	Seamless	1.00
	Electric resistance welded	1.00
	Electric flash welded	1.00
	Submerged arc welded	1.00
	Furnace butt welded	.60
Other	Pipe over 14 inches	.80
Other	Pipe 4 inches or less	.60

'6-77-37

If the type of longitudinal joint cannot be determined, the joint factor to be used must not exceed that designated for "Other." [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.113, October 1, 1990)

'6-77-34 Temperature derating factor (T) for steel pipe. The temperature derating factor to be used in the design formula in section 6-77-29 is determined as follows:

Gas temperature in degrees Fahrenheit	Temperature derating factor (T)
250 or less	1.000
300	0.967
350	0.933
400	0.900
450	0.867

For intermediate gas temperatures, the derating factor is determined by interpolation.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.115, October 1, 1990)

'6-77-35 (Reserved)

'6-77-36 (Reserved)

'6-77-37 Design of plastic pipe. The design pressure for plastic pipe is determined in accordance with the following formula, subject to the limitations of section 6-77-38:

'6-77-37

$$P = 2S \frac{t}{D-t} \times 0.32$$

P = Design pressure, gage, kPa (psi).

S = For thermoplastic pipe the long-term hydrostatic strength determined in accordance with the listed specification at a temperature equal to 23E C (73E F), 38E C (100E F), 49E C (120E F), or 60E C (140E F) for reinforced thermosetting plastic pipe, 75,800 kPa (11,000 p.s.i.).

t = Specified wall thickness, mm (in.).

D = Specified outside diameter, mm (in.).

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.121, October 1, 1990)

'6-77-38 Design limitations for plastic pipe. (a) The design pressure may not exceed a gauge pressure of 689 kPa (100 p.s.i.g.) for plastic pipe used in:

(1) Distribution systems; or

(2) Class 3 and 4 locations.

(b) Plastic pipe may not be used where operating temperatures of the pipe will be:

(1) Below minus 29E C (-20E F); or

(2) In the case of thermoplastic pipe, above the temperature at which the long-term hydrostatic strength used in the design formula under '6 77-34 is determined, except that pipe manufactured before May 18, 1978, may be used at temperatures up to 38E C (100E F); or in the case of reinforced thermosetting plastic pipe, above 66E C (150E F).

(c) The wall thickness for thermoplastic pipe may not be less than 1.57 millimeters (0.062 in.).

(d) The wall thickness for reinforced thermosetting plastic pipe may not be less than that listed in the following table:

Nominal size in inches	Minimum wall thickness in millimeters (inches)
2	1.52 (0.060)
3	1.52 (0.060)
4	1.78 (0.070)
6	2.54 (0.100)

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.123, October 1, 1990)

'6-77-39 Design of copper pipe. (a) Copper pipe used in mains must have a minimum wall thickness of 0.065 inch and must be hard drawn.

(b) Copper pipe used in service lines must have wall thickness not less than that indicated in the following table:

Standard size (inch)	Nominal O.D. (inch)	Wall thickness (inch)	
		Nominal	Tolerance
2	.625	.040	.0035
5/8	.750	.042	.0035
3/4	.875	.045	.004
1	1.125	.050	.004
1-1/4	1.375	.055	.0045
1-1/2	1.625	.060	.0045

(c) Copper pipe used in mains and service lines may not be used at pressures in excess of 100 p.s.i.g.

(d) Copper pipe that does not have an internal corrosion resistant lining may not be

used to carry gas that has an average hydrogen sulfide content of more than 0.3 grains per 100 standard cubic feet of gas. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.125, October 1, 1990)

'6-77-40

Subchapter 6

Minimum Safety Standards - Design of

Pipeline Components

'6-77-40 Scope. This subchapter prescribes minimum requirements for the design and installation of pipeline components and facilities. In addition, it prescribes requirements relating to protection against accidental overpressuring. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.141, October 1, 1990)

'6-77-41 General requirements. Each component of a pipeline must be able to withstand operating pressures and other anticipated loadings without impairment of its

serviceability with unit stresses equivalent to those allowed for comparable material in pipe in the same location and kind of service. However, if design based upon unit stresses is impractical for a particular component, design may be based upon a pressure rating established by the manufacturer by pressure testing that component or a prototype of the component. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.143, October 1, 1990)

'6-77-42 Qualifying metallic components. Notwithstanding any requirement of this subchapter which incorporates by reference an edition of a document listed in Appendix A, a metallic component manufactured in accordance with any other edition of that document is qualified for use under this chapter if:

(1) It can be shown through visual inspection of the cleaned component that no defect exists which might impair the strength or tightness of the component; and

(2) The edition of the document under which the component was manufactured has equal or more stringent requirements for the following as an edition of that document currently or previously listed in Appendix A:

(A) Pressure testing;

(B) Materials; and

(C) Pressure and temperature ratings.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.144, October 1, 1990)

'6-77-43 Valves. (a) Except for cast iron and plastic valves, each valve must meet the minimum requirements, or equivalent of API 6D. A valve may not be used under operating conditions that exceed the applicable pressure-temperature ratings contained in those requirements.

(b) Each cast iron and plastic valve must comply with the following:

(1) The valve must have a maximum service pressure rating for temperatures that equal or exceed the maximum service temperature;

(2) The valve must be tested as part of the manufacturing, as follows:

(A) With the valve in the fully open position, the shell must be tested with no leakage to a pressure at least 1.5 times the maximum service rating;

(B) After the shell test, the seat must be tested to a pressure not less than 1.5 times the maximum service pressure rating. Except for swing

check valves, test pressure during the seat test must be applied successively on each side of the closed valve with the opposite side open. No visible leakage is permitted;

(C) After the last pressure test is completed, the valve must be operated through its full travel to demonstrate freedom from interference;

(3) Each valve must be able to meet the anticipated operating conditions;

(4) No valve having shell components made of ductile iron may be used at pressures exceeding eighty percent of the pressure ratings for comparable steel valves at their listed temperature. However, a valve having shell components made of ductile iron may be used at pressures up to eighty percent of the pressure ratings for comparable steel valves at their listed temperature, if:

(A) The temperature-adjusted service pressure does not exceed 1,000 p.s.i.g.; and

(B) Welding is not used on any ductile iron component in the fabrication of the valve

shells or their assembly;

(5) No valve having pressure containing parts made of ductile iron may be used in the gas pipe components of compressor stations. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.147, October 1, 1990)

'6-77-44 Flanges and flange accessories. (a) Each flange or flange accessory (other than cast iron) must meet the minimum requirements of ANSI B16.5 MSS SP-44, or the equivalent.

(b) Each flange assembly must be able to withstand the maximum pressure at which the pipeline is to be operated and to maintain its physical and chemical properties at any temperature to which it is anticipated that it might be subjected in service.

(c) Each flange on a flanged joint in cast iron pipe must conform in dimensions, drilling, face and gasket design to ANSI B16.1 and be cast integrally with the pipe, valve, or fitting. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.147, October 1, 1990)

'6-77-45 Standard fittings. (a) The minimum metal thickness of threaded fittings may not be less than specified for the pressures and temperatures in the applicable standards referenced in this chapter, or their equivalent.

(b) Each steel butt-welding fitting must have pressure and temperature ratings based on stresses for pipe of the same or equivalent material. The actual bursting strength of

the fitting must at least equal the computed bursting strength of pipe of the designated material and wall thickness, as determined by a prototype that was tested to at least the pressure required for the pipeline to which it is being added. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.149, October 1, 1990)

'6-77-46 Tapping. (a) Each mechanical fitting used to make a hot tap must be designed for at least the operating pressure of the pipeline.

(b) Where a ductile iron pipe is tapped, the extent of full-thread engagement and the need for the use of outside-sealing service connections, tapping saddles, or other fixtures must be determined by service conditions.

'6-77-46

(c) Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than twenty-five percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

(1) Existing taps may be used for replacement service, if they are free of cracks and have good threads; and

(2) A 1-1/4-inch tap may be made in a four inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on six inch or larger pipe. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.151, October 1, 1990)

'6-77-47 Components fabricated by welding. (a) Except for branch connections and assemblies of standard pipe and fittings jointed by circumferential welds, the design pressure of each component fabricated by welding, whose strength cannot be determined, must be established in accordance with paragraph UG-101 of section VIII of the ASME Boiler and Pressure Vessel Code.

(b) Each prefabricated unit that uses plate and longitudinal seams must be designated, constructed, and tested in accordance with the ASME Boiler and Pressure Vessel Code, except for the following:

(1) Regularly manufactured butt-welding fittings;

(2) Pipe that has been produced and tested under a specification listed in Appendix B;

(3) Partial assemblies such as split rings or collars;

(4) Prefabricated units that the manufacturer certifies have been tested to at least twice the maximum pressure to which they will be subjected under the anticipated operating conditions.

(c) Orange-peel bull plugs and orange-peel swages may not be used on pipelines that are to operate at a hoop stress of twenty percent or more of the SMYS of the pipe.

(d) Except for flat closures designed in accordance with section VIII of the SME Boiler and Pressure Code, flat closures and fish tails may not be used on pipe that either operates at 100 p.s.i.g., or more, or is more than three inches nominal diameter.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.153, October 1, 1990)

'6-77-48 Welded branch connections. Each welded branch connection made to pipe in

the form of a single connection, or in a header or manifold as a series of connections, must be designed to ensure that the strength of the pipeline system is not reduced, taking into account the stresses in the remaining pipe wall due to the opening in the pipe or header, the shear stresses produced by the pressure acting on the area of the branch opening, and any external loadings due to thermal movement, weight, and vibration. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.155, October 1, 1990)

'6-77-49 Extruded outlets. Each extruded outlet must be suitable for anticipated service conditions and must be at least equal to the design strength of the pipe and other fittings in the pipeline to which it is attached.

'6-77-49

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.157, October 1, 1990)

'6-77-50 Flexibility. Each pipeline must be designed with enough flexibility to prevent thermal expansion or contraction from causing excessive stresses in the pipe or components, excessive bending or unusual loads at joints, or undesirable forces or moments at points of connection to equipment, or at anchorage or guide points. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.159, October 1, 1990)

'6-77-51 Supports and anchors. (a) Each pipeline and its associated equipment must have enough anchors or supports to:

(1) Prevent undue strain on connected equipment;

(2) Resist longitudinal forces caused by a bend or offset in the pipe; and

(3) Prevent or damp out excessive vibration.

(b) Each exposed pipeline must have enough supports or anchors to protect the exposed pipe joints from the maximum end force caused by internal pressure and any additional forces caused by temperature expansion or contraction or by the weight of the pipe and its contents.

(c) Each support or anchor on an exposed pipeline must be made of durable, noncombustible material and must be designed and installed as follows:

(1) Free expansion and contraction of the pipeline between supports or anchors may not be restricted;

(2) Provision must be made for the service conditions involved; and

(3) Movement of the pipeline may not cause disengagement of the support equipment.

(d) Each support on an exposed pipeline operated at a stress level of fifty percent or more of SMYS must comply with the following:

(1) A structural support may not be welded directly to the pipe;

(2) The support must be provided by a member that completely encircles the pipe; and

(3) If an encircling member is welded to a pipe, the weld must be continuous and cover the entire circumference;

(e) Each underground pipeline that is connected to a relatively unyielding line or other fixed object must have enough flexibility to provide for possible movement, or it must

have an anchor that will limit the movement of the pipeline.

(f) Except for offshore pipelines, each underground pipeline that is being connected to new branches must have a firm foundation for both the header and the branch to prevent detrimental lateral and vertical movement. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.161, October 1, 1990)

'6-77-52 Compressor stations: design and construction. (a) Location of compressor building. Except for a compressor building on a platform located offshore or in inland navigable waters, each main compressor building of a compressor station must be located on property under the control of the operator. It must be far enough away from adjacent property, not under control of the operator, to minimize the possibility of fire being communicated to the compressor building from structures on adjacent property. There must be enough open space around the main compressor building to allow the free movement of fire-fighting equipment.

(b) Building construction. Each building on a compressor station site must be made of noncombustible materials if it contains either:

(1) Pipe more than two inches in diameter that is carrying gas under pressure; or

(2) Gas handling equipment other than gas utilization equipment used for domestic purposes.

(c) Exits. Each operating floor of a main compressor building must have at least two separated and unobstructed exits located so as to provide a convenient possibility of escape and an unobstructed passage to a place of safety. Each door latch on an exit must be of a type which can be readily opened from the inside without a key. Each swinging door located in an exterior wall must be mounted to swing outward.

(d) Fenced areas. Each fence around a compressor station must have at least two

gates located so as to provide a convenient opportunity for escape to a place of safety, or have other facilities affording a similarly convenient exit from the area. Each gate located within 200 feet of any compressor plant building must open outward and, when occupied, must be openable from the inside without a key.

(e) Electrical facilities. Electrical equipment and wiring installed in compressor stations must conform to the National Electrical Code, NFPA-70 (ANSI), so far as that code is applicable. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.163, October 1, 1990)

'6-77-53 Compressor stations: liquid removal. (a) Where entrained vapors in gas may liquefy under the anticipated pressure and temperature conditions, the compressor must be protected against the introduction of those liquids in quantities that could cause damage.

(b) Each liquid separator used to remove entrained liquids at a compressor station must:

(1) Have a manually operable means of removing these liquids;

(2) Where slugs of liquid could be carried into the compressors, have either automatic liquid removal facilities, an automatic compressor shutdown device, or a high liquid level alarm; and

(3) Be manufactured in accordance with section VIII of the ASME Boiler and Pressure Vessel Code, except that liquid separators constructed of pipe and fittings without internal welding must be fabricated with a design factor 0.4, or less. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.165, October 1, 1990)

'6-77-54 Compressor stations: emergency shutdown. (a) Except for unattended field compressor stations of 1,000 horsepower or less, each compressor station must have an emergency shutdown system that meets the following:

(1) It must be able to block gas out of the station and blow down the station piping;

(2) It must discharge gas from the blowdown piping at a location where the gas will not create a hazard;

(3) It must provide means for the shutdown of gas compressing equipment, gas fires, and electrical facilities in the vicinity of gas headers and in the compressor building, except, that:

(A) Electrical circuits that supply emergency lighting required to assist station personnel in evacuating the compressor building and the area in the vicinity of the gas headers must remain energized; and

(B) Electrical circuits needed to protect equipment from damage may remain energized;

'6-77-54

(4) It must be operable from at least two locations, each of which is:

(A) Outside the gas area of the station;

(B) Near the exit gates, if the station is fenced, or near emergency exits, if not fenced; and

(C) Not more than 500 feet from the limits of the station.

(b) If a compressor station supplies gas directly to a distribution system with no other adequate source of gas available, the emergency shutdown system must be designed so that it will not function at the wrong time and cause an unintended outage on the distribution system.

(c) On a platform located offshore or in inland navigable waters, the emergency shutdown system must be designed and installed to actuate automatically by each of the following events:

(1) In the case of an unattended compressor station:

(A) When the gas pressure equals the maximum allowable operating pressure plus fifteen percent; or

(B) When an uncontrolled fire occurs on the platform; and

(2) In the case of a compressor station in a building:

(A) When an uncontrolled fire occurs in the building; or

(B) When the concentration of gas in air reaches fifty percent or more of the lower explosive limit in a building which has a source of ignition.

(d) For the purpose of subsection (c)(2)(B), an electrical facility which conforms to Class 1, Group D of the National Electrical Code is not a source of ignition.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.167, October 1, 1990)

'6-77-55 Compressor stations: pressure limiting devices. (a) Each compressor station must have pressure relief or other suitable protective devices of sufficient capacity and sensitivity to ensure that the maximum allowable operating pressure of the station piping and equipment is not exceeded by more than ten percent.

(b) Each vent line that exhausts gas from the pressure relief valves of a compressor station must extend to a location where the gas may be discharged without hazard.
[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.169, October 1, 1990)

'6-77-56 Compressor stations: additional safety equipment. (a) Each compressor station must have adequate fire protection facilities. If fire pumps are a part of these facilities, their operation may not be affected by the emergency shutdown system.

(b) Each compressor station prime mover, other than an electrical induction or synchronous motor, must have an automatic device to shut down the unit before the speed of either the prime mover or the driven unit exceeds a maximum safe speed.

(c) Each compressor unit in a compressor station must have a shutdown or alarm device that operates in the event of inadequate cooling or lubrication of the unit.

(d) Each compressor station gas engine that operates with pressure gas injection must be equipped so that stoppage of the engine automatically shuts off the fuel and vents the engine distribution manifold.

(e) Each muffler for a gas engine in a compressor station must have vent slots or holes in the baffles of each compartment to prevent gas from being trapped in the muffler. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.171, October 1, 1990)

'6-77-57

'6-77-57 Compressor stations: ventilation. Each compressor station building must be ventilated to ensure that employees are not endangered by the accumulation of gas in rooms, sumps, attics, pits, or other enclosed places. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.173, October 1, 1990)

'6-77-58 Pipe-type and bottle-type holders. (a) Each pipe-type and bottle-type holder must be designated so as to prevent the accumulation of liquids in the holder, in connecting pipe, or in auxiliary equipment, that might cause corrosion or interfere with the safe operation of the holder.

(b) Each pipe-type or bottle-type holder must have minimum clearance from other holders in accordance with the following formula:

$$C = (3D \times P \times F)/1,000$$

in which:

C = Minimum clearance between pipe containers or bottles in inches.

D = Outside diameter of pipe containers or bottles in inches.

P = Maximum allowable operating pressure, p.s.i.g.

F = Design factor as set forth in section 6-77-32.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.175, October 1, 1990)

'6-77-59 Additional provisions for bottle-type holders. (a) Each bottle-type holder must be:

(1) Located on a site entirely surrounded by fencing that prevents access by unauthorized persons and with minimum clearance from the fence as follows:

Maximum allowable operating pressure	Minimum clearance (feet)
Less than 1,000 p.s.i.g.	25
1,000 p.s.i.g. or more	100

(2) Designed using the design factors set forth in section 6-77-32; and

(3) Buried with a minimum cover in accordance with section 6-77-105.

(b) Each bottle-type holder manufactured from steel that is not weldable under field conditions must comply with the following:

(1) A bottle-type holder made from alloy steel must meet the chemical and tensile requirements for the various grades of steel in ASTM A 372;

(2) The actual yield-tensile ratio of the steel may not exceed 0.85;

(3) Welding may not be performed on the holder after it has been heat treated or stress relieved, except that copper wires may be attached to the small diameter portion of the bottle end closure for cathodic protection if a localized thermit welding process is used;

(4) The holder must be given a mill hydrostatic test at a pressure that produces a hoop stress at least equal to eighty-five percent of the SMYS;

(5) The holder, connection pipe, and components must be leak tested after installation as required by subchapter 12. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.177, October 1, 1990)

'6-77-60 Transmission line valves. (a) Each transmission line, other than offshore segments,

'6-77-60

must have sectionalizing block valves spaced as follows:

(1) Each point on the pipeline in a Class 4 location must be within 2 2 miles of a valve;

(2) Each point on the pipeline in a Class 3 location must be within four miles of a valve;

(3) Each point on the pipeline in a Class 2 location must be within 7 2 miles of a valve;

(4) Each point on the pipeline in a Class 1 location must be within ten miles of a valve.

(b) Each sectionalizing block valve on a transmission line, other than offshore segments, must comply with the following:

(1) The valve and the operating device to open or close the valve must be readily accessible and protected from tampering and damage;

(2) The valve must be supported to prevent settling of the valve or movement of the pipe to which it is attached.

(c) Each section of a transmission line, other than offshore segments, between main line valves must have a low-downvalve with enough capacity to allow the transmission line to be blown down as rapidly as practicable. Each blowdown discharge must be located so the gas can be blown to the atmosphere without hazard and, if the transmission line is adjacent to an overhead electric line, so that the gas is directed away from the electrical conductors.

(d) Offshore segments of transmission lines must be equipped with valves or other components to shut off the flow of gas to an offshore platform in an emergency.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.179, October 1, 1990)

'6-77-61 Distribution line valves. (a) Each high pressure distribution system must have valves spaced so as to reduce the time to shut down a section of main in an emergency. The valve spacing is determined by the operating pressure, the size of the mains, and the local physical conditions.

(b) Each regulator station controlling the flow or pressure of gas in a distribution system must have a valve installed on the inlet piping at a distance from the regulator station sufficient to permit the operation of the valve during an emergency that might preclude access to the station.

(c) Each valve on a main installed for operating or emergency purposes must comply with the following:

(1) The valve must be placed in a readily accessible location so as to facilitate its operation in an emergency;

(2) The operating stem or mechanism must be readily accessible; and

(3) If the valve is installed in a buried box or enclosure, the box or enclosure must be installed so as to avoid transmitting external loads to the main. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.181, October 1, 1990)

'6-77-62 Vaults: structural design requirements. (a) Each underground vault or pit for valves, pressure relieving, pressure limiting, or pressure regulating stations, must be

able to meet the loads which may be imposed upon it, and to protect installed equipment.

(b) There must be enough working space so that all of the equipment required in the vault or pit can be properly installed, operated, and maintained.

(c) Each pipe entering, or within, a regulator vault or pit must be steel for sizes ten inches, and less, except that control and gage piping may be

copper. Where pipe extends through the vault or pit structure, provision must be made to prevent the passage of gasses or liquids through the opening and to avert strains in the pipe. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.183, October 1, 1990)

'6-77-63 Vaults: accessibility. Each vault must be located in an accessible location and, so far as practical, away from:

(1) Street intersections or points where traffic is heavy or dense;

(2) Points of minimum elevation, catch basins, or places where the access cover will be in the course of surface waters; and

(3) Water, electric, steam, or other facilities. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.185, October 1, 1990)

'6-77-64 Vaults: sealing, venting, and ventilation. Each underground vault or closed top pit containing either a pressure regulating or reducing station, or a pressure limiting or relieving station, must be sealed, vented or ventilated, as follows:

(1) When the internal volume exceeds 200 cubic feet:

(A) The vault or pit must be ventilated with two ducts, each having at least the ventilating effect of a pipe four inches in diameter;

(B) The ventilation must be enough to minimize the formation of combustible atmosphere in the vault or pit; and

(C) The ducts must be high enough above grade to disperse any gas-air mixtures that might be discharged;

(2) When the internal volume is more than seventy five cubic feet but less than 200 cubic feet:

(A) If the vault or pit is sealed, each opening must have a tight fitting cover without open holes through which an explosive mixture might be ignited, and there must be a means for testing the internal atmosphere before removing the cover;

(B) If the vault or pit is vented, there must be a means of preventing external sources of ignition from reaching the vault atmosphere; or

(C) If the vault or pit is ventilated, paragraph (1) or (3) applies;

(3) If a vault or pit covered by paragraph (2) is ventilated by openings in the covers or gratings and the ratio of the internal volume, in cubic feet, to the effective ventilating area of the cover or grating, in square feet, is less than twenty to one, no additional ventilation is required. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.187, October 1, 1990)

'6-77-65 Vaults: drainage and waterproofing. (a) Each vault must be designed so as to minimize the entrance of water.

(b) A vault containing gas piping may not be connected by means of a drain connection to any other underground structure.

(c) All electrical equipment in vaults must conform to the applicable requirements of Class 1, Group D, of the National Electrical Code, ANSI Standard C1. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.189, October 1, 1990)

'6-77-66

'6-77-66 Design pressure of plastic fittings. (a) Thermosetting fittings for plastic pipe must conform to ASTM D 2517.

(b) Thermoplastic fittings for plastic pipe must conform to ASTM D 2513. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.191, October 1, 1990)

'6-77-67 Valve installation in plastic pipe.

Each valve installed in plastic pipe must be designed so as to protect the plastic material against excessive torsional or shearing loads when the valve or shutoff is operated, and from any other secondary stresses that might be exerted through the valve or its enclosure. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.193, October 1, 1990)

'6-77-68 Protection against accidental overpressuring. (a) General requirements. Except as provided in section 6-77-69, each pipeline that is connected to a gas source so that the maximum allowable operating pressure could be exceeded as the result of pressure control failure or of some other type of failure, must have pressure relieving or pressure limiting devices that meet the requirements of sections 6-77-70 and 6-77-71.

(b) Additional requirements for distribution systems. Each distribution system that is supplied from a source of gas that is at a higher pressure than the maximum allowable operating pressure for the system must:

(1) Have pressure regulation devices capable of meeting the pressure, load, and other service conditions that will be experienced in normal operation of the system, and that could be activated in the

event of failure of some portion of the system; and

(2) Be designed so as to prevent accidental overpressuring. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.195, October 1, 1990)

'6-77-69 Control of the pressure of gas delivered from high-pressure distribution systems. (a) If the maximum actual operating pressure of the distribution system is under 60 p.s.i.g. and a service regulator having the following characteristics is used, no other pressure limiting device is required:

(1) A regulator capable of reducing distribution line pressure to pressures recommended for household appliances;

(2) A single port valve with proper orifice for the maximum gas pressure at the regulator inlet;

(3) A valve seat made of resilient material designed to withstand abrasion of the gas, impurities in gas, cutting by the valve, and to resist permanent deformation when it is pressed against the valve port;

(4) Pipe connections to the regulator not exceeding two inches in diameter;

(5) A regulator that, under normal operating conditions, is able to regulate the downstream pressure within the necessary limits of accuracy and to limit the build up of pressure under no-flow conditions to prevent a pressure that would cause the unsafe operation of any connected and properly adjusted gas utilization equipment;

(6) A self-contained service regulator with no external static or control lines.

(b) If the maximum actual operating pressure of the distribution system is 60 p.s.i.g., or less,

and a service regulator that does not have all of the characteristics listed in subsection (a) is used, or if the gas contains materials that seriously interfere with the operation of service regulators, there must be suitable protective devices to prevent unsafe overpressuring of the customer's appliances if the service regulator fails.

(c) If the maximum actual operating pressure of the distribution system exceeds 60 p.s.i.g., one of the following methods must be used to regulate and limit, to the maximum safe value, the pressure of gas delivered to the customer:

(1) A service regulator having the characteristics listed in subsection (a), and another regulator located upstream from the service regulator. The upstream regulator may not be set to maintain a pressure higher than 60 p.s.i.g. A device must be installed between the upstream regulator and the service regulator to limit the pressure on the inlet of the service regulator to 60 p.s.i.g. or less in case the upstream regulator fails to function properly. This device may be either a relief valve or an automatic shutoff that shuts, if the pressure on the inlet of the service regulator exceeds the set pressure (60 p.s.i.g. or less), and remains closed until manually reset;

(2) A service regulator and a monitoring regulator set to limit, to a maximum safe value, the pressure of the gas delivered to the customer;

(3) A service regulator with a relief valve vented to the outside atmosphere, with the relief valve set to open so that the pressure of gas going to the customer does not exceed a maximum safe value. The relief valve may either be built into the service regulator or it may be a separate unit installed downstream from the service

regulator. This combination may be used alone only in those cases where the inlet pressure on the service regulator does not exceed the manufacturer's safe working pressure rating of the service regulator, and may not be used where the inlet pressure on the service regulator exceeds 125 p.s.i.g. For higher inlet pressures, the methods in subsection (c)(1) or (2) must be used;

(4) A service regulator and an automatic shutoff device that closes upon a rise in pressure downstream from the regulator and remains closed until manually reset.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.197, October 1, 1990)

'6-77-70 Requirements for design of pressure relief and limiting devices. Except for rupture discs, each pressure relief or pressure limiting device must:

(1) Be constructed of materials such that the operation of the device will not be impaired by corrosion;

(2) Have valves and valve seats that are designed not to stick in a position that will make the device inoperative;

(3) Be designed and installed so that it can be readily operated to determine if the valve is free, can be tested to determine the pressure at which it will operate, and can be

tested for leakage when in the closed position;

(4) Have support made of noncombustible material;

(5) Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can

'6-77-70

be discharged into the atmosphere without undue hazard;

(6) Be designed and installed so that the size of the openings, pipe, and fittings located between the system to be protected and the pressuring relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;

(7) Where installed at a district regulator station to protect a pipeline system from overpressuring, be designed and installed to prevent any single incident such as an explosion in a vault or damage by a vehicle from affecting the operation of both the overpressure protective device and the district regulator; and

(8) Except for a valve that will isolate the system under protection from its source of pressure, be designed to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.199, October 1, 1990)

'6-77-71 Required capacity of pressure relieving and limiting stations. (a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to insure the following:

(1) In a low pressure distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted gas utilization equipment;

(2) In pipelines other than a low pressure distribution system:

'6-77-71

(A) If the maximum allowable operating pressure is 60 p.s.i.g. or more, the pressure may not exceed the maximum allowable operating pressure plus ten percent, or the pressure that produces a hoop stress of seventy five percent of SMYS, whichever is lower;

(B) If the maximum allowable operating pressure is 12 p.s.i.g. or more, but less than 60 p.s.i.g., the pressure may not exceed the maximum allowable operating pressure plus 6 p.s.i.g.; or

(C) If the maximum allowable operating pressure is less than 12 p.s.i.g., the pressure may not exceed the maximum allowable operating pressure plus fifty percent.

(b) When more than one pressure regulating or compressor station feeds into a pipeline, relief valves or other protective devices must be installed at each station to ensure that the complete failure of the largest capacity regulator or compressor, or any single run of lesser capacity regulators or compressors in that station, will not impose pressures on any part of the pipeline or distribution system in excess of those for which it was designed, or against which it was protected, whichever is lower.

(c) Relief valves or other pressure limiting devices must be installed at or near each regulator station in a low-pressure distribution system, with a capacity to limit the maximum pressure in the main to a pressure that will not exceed the safe operating pressure for any connected and properly adjusted gas utilization equipment.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.201, October 1, 1990)

'6-77-72

'6-77-72 Instrument, control, and sampling pipe and components. (a) Applicability. This section applies to the design of instrument, control, and sampling pipe and components. It does not apply to permanently closed systems, such as fluid-filled temperature-responsive devices.

(b) Materials and design. All materials employed for pipe and components must be designed to meet the particular conditions of service and the following:

(1) Each takeoff connection and attaching boss, fitting, or adapter must be made of suitable material, be able to withstand the maximum service pressure and temperature of the pipe or equipment to which it is attached, and be designed to satisfactorily withstand all stresses without failure by fatigue;

(2) A shutoff valve must be installed in each takeoff line as near as practicable to the point of takeoff. Blowdown valves must be installed where necessary;

(3) Brass or copper material may not be used for metal temperatures greater than 400E F;

(4) Pipe or components that may contain liquids must be protected by heating or other means from damage due to freezing;

(5) Pipe or components in which liquids may accumulate must have drains or drips;

(6) Pipe or components subject to clogging from solids or deposits must have suitable connections for cleaning;

(7) The arrangement of pipe, components, and supports must provide safety under anticipated operating stresses;

(8) Each joint between sections of pipe, and between pipe and valves or fittings, must be made in a manner suitable for the anticipated pressure and temperature condition. Slip type expansion joints may not be used. Expansion must be allowed

for by providing flexibility within the system itself;

(9) Each control line must be protected from anticipated causes of damage and must be designed and installed to prevent damage to any one control line from making both the regulator and the over-pressure protective device inoperative. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.203, October 1, 1990)

Subchapter 7

Minimum Safety Standards -

Welding of Steel in Pipelines

'6-77-73 Scope. (a) This subchapter prescribes minimum requirements for welding steel materials in pipelines.

(b) This subchapter does not apply to welding that occurs during the manufacture of steel pipe or steel pipeline components. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.221, October 1, 1990)

'6-77-74 Welding-general. (a) Welding must be performed by a qualified welder in accordance with welding procedures qualified to produce welds meeting the requirements of this subchapter. The quality of the test welds used to qualify the procedure shall be determined by destructive testing.

(b) Each welding procedure must be recorded in detail, including the results of the qualifying tests. This record must be retained and followed

'6-77-74

whenever the procedure is used. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.225, October 1, 1990)

'6-77-75 Qualification of welders. (a) Except as provided in subsection (b), each welder must be qualified in accordance with section 3 of API Standard 1104 or section IX of the ASME Boiler and Pressure Vessel Code. However, a welder qualified under an earlier edition than listed in Appendix A may weld but may not requalify under that earlier edition.

(b) A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than twenty percent of SMYS by performing an acceptable test weld, for the process to be used, under the test set forth in section I of Appendix C. A welder who makes welded service line connections to mains must also perform an acceptable test weld under section II of Appendix C as a part of a qualifying test. After initial qualification, a welder may not perform welding unless:

(1) Within the preceding fifteen calendar months, the welder has requalified, except that the welder must requalify at least once each calendar year; or

(2) Within the preceding 7-1/2 calendar months, but at least twice each calendar year, the welder has had:

(A) A production weld cut out, tested and found acceptable in accordance with the qualifying test; or

(B) For welders who work only on service lines two inches or smaller in diameter, two sample welds tested and found acceptable in accordance with the test in section III of Appendix C. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.227, October 1, 1990)

'6-77-76 Limitations on welders. (a) No welder whose qualification is based on nondestructive testing may weld compressor station pipe and components.

(b) No welder may weld with a particular welding process unless, within the preceding six calendar months, the welder has engaged in welding with that process.

(c) A welder qualified under section 6 77 75(a) may not weld unless within the preceding six calendar months the welder has had one weld tested and found acceptable under section 3 or 6 of API Standard 1104, except that a welder qualified under an earlier edition previously listed in Appendix A may weld but may not requalify under that earlier edition. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.229, October 1, 1990)

'6-77-77 Protection from weather. The welding operation must be protected from weather conditions that would impair the quality of the completed weld.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.231, October 1, 1990)

'6-77-78 Miter joints. (a) A miter joint on steel pipe to be operated at a pressure that produced a hoop stress of thirty percent or more of SMYS may not deflect the pipe more than 3E.

(b) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of less than thirty percent, but more than ten percent, of SMYS may not deflect the pipe more than 12-1/2E and must be a distance equal to one pipe diameter or more away from any other miter joint, as measured from the crotch of each joint.

'6-77-78

(c) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of ten percent or less of SMYS may not deflect the pipe more than 90E.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.233, October 1, 1990)

'6-77-79 Preparation for welding. Before beginning any welding, the welding surfaces must be clean and free of any material that may be detrimental to the weld, and the pipe or component must be aligned to provide the most favorable condition for depositing the root bead. This alignment must be preserved while the root bead is being deposited. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.235, October 1, 1990)

'6-77-80 Inspection and test of welds. (a) Visual inspection of welding must be conducted to insure that:

(1) The welding is performed in accordance with the welding procedure; and

(2) The weld is acceptable under subsection (c);

(b) The welds on a pipeline to be operated at a pressure that produces a hoop stress of twenty percent or more of SMYS must be nondestructively tested in accordance with section 6-77-81, except that welds that are visually inspected and approved by a qualified welding inspector need not be nondestructively tested if:

(1) The pipe has a nominal diameter of less than six inches; or

(2) The pipeline is to be operated at a pressure that produces a hoop stress of less than forty percent of SMYS and the welds are so limited in number that nondestructive testing is impractical.

(c) The acceptability of a weld that is nondestructively tested or visually inspected is determined according to the standards in section 6 of API Standard 1104.
[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.241, October 1, 1990)

'6-77-81 Nondestructive testing. (a) Nondestructive testing of welds must be performed by any process, other than trepanning, that will clearly indicate defects that may affect the integrity of the weld.

(b) Nondestructive testing of welds must be performed:

(1) In accordance with written procedures; and

(2) By persons who have been trained and qualified in the established procedures and

with the equipment employed in testing;

(c) Procedures must be established for the proper interpretation of each nondestructive test of a weld to ensure the acceptability of the weld under section 6 77 80(c).

(d) When nondestructive testing is required under section 6-77-80(b), the following percentages of each day's field butt welds, selected at random by the operator, must be nondestructively tested over their entire circumference:

(1) In Class 1 locations, except offshore, at least ten percent;

(2) In Class 2 locations, at least fifteen percent;

(3) In Class 3 and Class 4 locations, at crossings of major or navigable rivers, offshore, and within railroad or public highway rights of way, including tunnels, bridges, and overhead road crossings, 100 percent unless impracticable, in which case at least ninety percent. Nondestructive testing must be

impracticable for each girth weld not tested;

(4) At pipeline tie-ins, 100 percent.

(e) Except for a welder whose work is isolated from the principal welding activity, a sample of each welder's work for each day must be nondestructively tested, when nondestructive testing is required under section 6 77 80(b).

(f) When nondestructive testing is required under section 6-77-80(b), each operator must retain, for the life of the pipeline, a record showing by milepost, engineering station, or by geographic feature, the number of girth welds made, the number nondestructively tested, the number rejected, and the disposition of the rejects.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.243, October 1, 1990)

'6-77-82 Repair or removal of defects. (a) Each weld that is unacceptable under section 6 77-80(c) must be removed or repaired. Except for welds on an offshore pipeline being installed from a pipeline vessel, a weld must be removed if it has a crack that is more than eight percent of the weld length.

(b) Each weld that is repaired must have the defect removed down to sound metal and the segment to be repaired must be preheated if conditions exist which would adversely affect the quality of the weld repair. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability.

(c) Repair of a crack, or of any defect in a previously repaired area must be in accordance with written weld repair procedures that have been qualified under section 6-77-74. Repair procedures must provide that the minimum mechanical properties specified for the welding procedure used to make the original weld are met upon completion of the final

weld repair. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.245, October 1, 1990)

Subchapter 8

Minimum Safety Standards -

Joining of Materials Other Than by Welding

'6-77-83 Scope. (a) This subchapter prescribes minimum requirements for joining materials in pipelines, other than by welding.

(b) This subchapter does not apply to joining during the manufacture of pipe or pipeline components. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.271, October 1, 1990)

'6-77-84 General. (a) The pipeline must be designed and installed so that each joint will sustain the longitudinal pullout or thrust forces caused by contraction or expansion of the piping or by anticipated external or internal loading.

(b) Each joint must be made in accordance with written procedures that have been proven by test or experience to produce strong gastight joints.

(c) Each joint must be inspected to insure compliance with this subchapter. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.273, October 1, 1990)

'6-77-85 Cast iron pipe. (a) Each caulked bell and spigot joint in cast iron pipe must be sealed with mechanical leak clamps.

(b) Each mechanical joint in cast iron pipe must have a gasket made of resilient material as the

sealing medium. Each gasket must be suitably confined and retained under compression by a separate gland or follower ring.

(c) Cast iron pipe may not be joined by threaded joints.

(d) Cast iron pipe may not be joined by brazing. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.275, October 1, 1990)

'6-77-86 Ductile iron pipe. (a) Ductile iron pipe may not be jointed by threaded joints.

(b) Ductile iron pipe may not be joined by brazing. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.277, October 1, 1990)

'6-77-87 Copper pipe. Copper pipe may not be threaded except that copper pipe used for joining screw fittings or valves may be threaded if the wall thickness is equivalent to the comparable size of Schedule 40 or heavier wall pipe listed in Table C1 of ANSI B16.5. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.279, October 1, 1990)

6-77-88 Plastic pipe. (a) General. A plastic pipe joint that is joined by solvent cement, adhesive, or heat fusion may not be disturbed until it has properly set. Plastic pipe may not be joined by a threaded joint or miter joint.

(b) Solvent cement joints. Each solvent cement joint on plastic pipe must comply with the following:

(1) The mating surfaces of the joint must be clean, dry, and free of material which might be detrimental to the joint;

(2) The solvent cement must conform to ASTM Specification D 2513; and

(3) The joint may not be heated to accelerate the setting of the cement.

(c) Heat-fusion joints. Each heat-fusion joint on plastic pipe must comply with the following:

(1) A butt heat-fusion joint must be joined by a device that holds the heater element square to the ends of the piping, compresses the heated ends together, and holds the pipe in proper alignment while the plastic hardens;

(2) A socket heat-fusion joint must be joined by a device that heats the mating surfaces of the joint uniformly and simultaneously to essentially the same temperature; and

(3) Heat may not be applied with a torch or other open flame.

(d) Adhesive joints. Each adhesive joint on plastic pipe must comply with the following:

(1) The adhesive must conform to ASTM Specification D 2517; and

(2) The materials and adhesive must be compatible with each other.

(e) Mechanical joints. Each compression type mechanical joint on plastic pipe must comply with the following:

(1) The gasket material in the coupling must be compatible with the plastic; and

(2) A rigid internal tubular stiffener, other than split tubular stiffener, must be used in conjunction with the coupling.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.281, October 1, 1990)

'6-77-89 Plastic pipe; qualifying joining procedures. (a) Heat fusion, solvent cement, and adhesive joints. Before any written procedure established under section 6-77-84(b) is used for making plastic pipe joints by a heat fusion, solvent

'6-77-89

cement, or adhesive method, the procedure must be qualified by subjecting specimen joints made according to the procedure to the following tests:

(1) The burst test requirements of:

(A) In the case of thermoplastic pipe, paragraph 8.6 (Sustained Pressure Test) or paragraph 8.7 (Minimum Hydrostatic Burst Pressure) of ASTM D2513; or

(B) In the case of thermosetting plastic pipe, paragraph 8.5 (Minimum Hydrostatic Burst Pressure) or paragraph 8.9 (Sustained Static Pressure Test) of ASTM D2517;

(2) For procedures intended for lateral pipe connections, subject a specimen joint made from pipe sections joined at right angles according to the procedure to a force on the lateral pipe until failure occurs in the specimen. If failure initiates outside the joint area, the procedure qualifies for use; and

(3) For procedures intended for non-lateral pipe connections, follow the tensile test requirements of ASTM D638, except that the test may be conducted at ambient temperature and humidity. If the specimen elongates no less than twenty-five percent or failure initiates outside the joint area, the procedure qualifies for use.

(b) Mechanical joints. Before any written procedure established under section 6-77-84(b) is used for making mechanical plastic pipe joints that are designed to withstand tensile forces, the procedure must be qualified by subjecting five specimen joints made according to the procedure to the following tensile test:

(1) Use an apparatus for the test as specified in ASTM D638-77a (except for conditioning);

(2) The specimen must be of such length that the distance between the grips of the

apparatus and the end of the stiffener does not affect the joint strength;

(3) The speed of testing is 5.0 mm (0.20 in) per minute, plus or minus twenty-five percent;

(4) Pipe specimens less than 102 mm (4 in) in diameter are qualified if the pipe yields to an elongation of no less than twenty five percent or failure initiates outside the joint area;

(5) Pipe specimens 102 mm (4 in) and larger in diameter shall be pulled until the pipe is subjected to a tensile stress equal to or greater than the maximum thermal stress that would be produced by a temperature change of 55E C (100E F) or until the pipe is pulled from the fitting. If the pipe pulls from the fitting, the lowest value of the five test results or the manufacturer's rating, whichever is lower must be used in the design calculations for stress;

(6) Each specimen that fails at the grips must be retested using new pipe; and

(7) Results obtained pertain only to the specific outside diameter, and material of the pipe tested, except that testing of a heavier wall pipe may be used to qualify pipe of the same material but with a lesser wall thickness.

(c) A copy of each written procedure being used for joining plastic pipe must be available to the persons making and inspecting joints.

(d) Pipe or fittings manufactured before July 1, 1980, may be used in accordance with procedures that the manufacturer certifies will produce a joint as strong as the pipe. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.283, October 1, 1990)

'6-77-90 Plastic pipe; qualifying persons to make joints. (a) No person may make a plastic pipe joint unless that person has been qualified under the applicable joining procedure by:

(1) Appropriate training or experience in the use of the procedure; and

(2) Making a specimen joint from pipe sections joined according to the procedure that passes the inspection and test set forth in subsection (b).

(b) The specimen joint must be:

(1) Visually examined during and after assembly or joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure; and

(2) In the case of heat fusion, solvent cement, or adhesive joint:

(A) Tested under any one of the test methods listed under section 6 77 89(a) applicable to the type of joint and material being tested;

(B) Examined by ultrasonic inspection and found not to contain flaws that would cause failure; or

(C) Cut into at least three longitudinal straps, each of which is:

(i) Visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area; and

(ii) Deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

(c) A person must be requalified under an applicable procedure, if during any twelve month period that person:

(1) Does not make any joints under that procedure; or

(2) Has three joints or three percent of the joints made, whichever, is greater, under that procedure that are found unacceptable by testing under section 6-77-149.

(d) Each operator shall establish a method to determine that each person making joints in plastic pipelines in his system is qualified in accordance with this section. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.285, October 1, 1990)

'6-77-91 Plastic pipe, inspection of joints. No person may carry out the inspection of joints in plastic pipes required by sections 6-77-84(c) and 6 77 90(b) unless that person has been qualified by appropriate training or experience in evaluating the acceptability of plastic pipe joints made under the applicable joining procedure. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.287, October 1, 1990)

Subchapter 9

Minimum Safety Standards -

General Construction Requirements for

Transmission Lines and Mains

'6-77-92 Scope. This subchapter prescribes minimum requirements for constructing transmission lines and mains. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.301, October 1, 1990)

'6-77-93

'6-77-93 Compliance with specifications or standards. Each transmission line or main must be constructed in accordance with comprehensive written specifications or standards that are consistent with this chapter. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.303, October 1, 1990)

'6-77-94 Inspection: general. Each transmission line or main must be inspected to ensure that it is constructed in accordance with this chapter. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.305, October 1, 1990)

'6-77-95 Inspection of materials. Each length of pipe and each other component must be visually inspected at the site of installation to ensure that it has not sustained any visually determinable damage that could impair its serviceability. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.307, October 1, 1990)

'6-77-96 Repair of steel pipe. (a) Each imperfection or damage that impairs the serviceability of a length of steel pipe must be repaired or removed. If a repair is made by grinding, the remaining wall thickness must at least be equal to either:

(1) The minimum thickness required by the tolerances in the specification to which the pipe was manufactured; or

(2) The nominal wall thickness required for the design pressure of the pipeline.

(b) Each of the following dents must be removed from steel pipe to be operated at a pressure that produces a hoop stress of twenty percent, or more, of SMYS:

(1) A dent that contains a stress concentrator such as a scratch, gouge, groove, or arc burn;

(2) A dent that affects the longitudinal weld or a circumferential weld; and

(3) In pipe to be operated at a pressure that produces a hoop stress of forty percent or more of SMYS, a dent that has a depth of:

(A) More than one-quarter inch in pipe 12 3/4 inches or less in outer diameter; or

(B) More than two percent of the nominal pipe diameter in pipe over 12 3/4 inches in outer diameter.

For the purpose of this subsection a "dent" is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe wall thickness. The depth of a dent is measured as the gap between the lowest point of the dent and a prolongation of the original contour of the pipe.

(c) Each arc burn on steel pipe to be operated at a pressure that produces a hoop

stress of forty percent, or more, of SMYS must be repaired or removed. If a repair is made by grinding, the arc burn must be completely removed and the remaining wall thickness must be at least equal to either:

(1) The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured; or

(2) The nominal wall thickness required for the design pressure of the pipeline.

(d) A gouge, groove, arc burn, or dent may not be repaired by insert patching or by pounding out.

(e) Each gouge, groove, arc burn, or dent that is removed from a length of pipe must be removed by cutting out the damaged portion as a cylinder.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.309, October 1, 1990)

'6-77-97

'6-77-97 Repair of plastic pipe. Each imperfection or damage that would impair the serviceability of plastic pipe must be repaired by a patching saddle or removed.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.311, October 1, 1990)

'6-77-98 Bends and elbows. (a) Each field bend in steel pipe, other than a wrinkle bend made in accordance with section 6-77-99, must comply with the following:

(1) A bend must not impair the serviceability of the pipe;

(2) Each bend must have a smooth contour and be free from buckling, cracks, or any other mechanical damage; and

(3) On pipe containing a longitudinal weld, the longitudinal weld must be as near as practicable to the neutral axis of the bend unless:

(A) The bend is made with an internal bending mandrel; or

(B) The pipe is twelve inches or less in outside diameter or has a diameter to wall thickness ratio less than seventy.

(b) Each circumferential weld of steel pipe which is located where the stress during bending causes a permanent deformation in the pipe must be nondestructively tested either before or after the bending process.

(c) Wrought-steel welding elbows and transverse segments of these elbows may not be used for changes in direction on steel pipe that is two inches or more in diameter unless the arc length, as measured along the crotch, is at least one inch.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.313, October 1, 1990)

'6-77-100

'6-77-99 Wrinkle bends in steel pipe. (a) A wrinkle bend may not be made on steel pipe to be operated at a pressure that produces a hoop stress of 30 percent, or more, of SMYS.

(b) Each wrinkle bend on steel pipe must comply with the following:

(1) The bend must not have any sharp kinks;

(2) When measured along the crotch of the bend, the wrinkles must be a distance of at least one pipe diameter;

(3) On pipe sixteen inches or larger in diameter, the bend may not have a deflection of

more than 1-1/2E for each wrinkle; and

(4) On pipe containing a longitudinal weld the longitudinal seam must be as near as practicable to the neutral axis of the bend. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.315, October 1, 1990)

'6-77-100 Protection from hazards. (a) Each transmission line or main must be protected from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads. In addition, offshore pipelines must be protected from damage by mud slides, water currents, hurricanes, ship anchors, and fishing operations.

(b) Each aboveground transmission line or main, not located offshore or in inland navigable water areas, must be protected from accidental damage by vehicular traffic or other similar causes, either by being placed at a safe distance from the traffic or by installing barricades.

(c) Pipelines, including pipe risers, on each platform located offshore or in inland navigable waters must be protected from accidental damage by

vessels. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.317, October 1, 1990)

'6-77-101 Installation of pipe in a ditch. (a) When installed in a ditch, each transmission line that is to be operated at a pressure producing hoop stress of twenty

percent or more of SMYS must be installed so that the pipe fits the ditch so as to minimize stresses and protect the pipe coating from damage.

(b) When a ditch for a transmission line or main is backfilled, it must be backfilled in a manner that:

(1) Provides firm support under the pipe; and

(2) Prevents damage to the pipe and pipe coating from equipment or from the backfill material.

(c) All offshore pipe in water at least twelve feet deep but not more than 200 feet deep, as measured from the mean low tide, must be installed so that the top of the pipe is below the natural bottom unless the pipe is supported by stanchions, held in place by anchors or heavy concrete coating, or protected by an equivalent means.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.319, October 1, 1990)

'6-77-102 Installation of plastic pipe. (a) Plastic pipe must be installed below ground level.

(b) Plastic pipe that is installed in a vault or any other below grade enclosure must be completely encased in gas-tight metal pipe and fittings that are adequately protected from corrosion.

(c) Plastic pipe must be installed so as to minimize shear or tensile stresses.

'6-77-103

(d) Thermoplastic pipe that is not encased must have a minimum wall thickness of 0.090 inches, except that pipe with an outside diameter of 0.875 inches or less may have a minimum wall thickness of 0.062 inches.

(e) Plastic pipe that is not encased must have an electrically conductive wire or other

means of locating the pipe while it is underground.

(f) Plastic pipe that is being encased must be inserted into the casing pipe in a manner that will protect the plastic. The leading end of the plastic must be closed before insertion. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.321, October 1, 1990)

'6-77-103 Casing. Each casing used on a transmission line or main under a railroad or highway must comply with the following:

(1) The casing must be designed to withstand the superimposed loads;

(2) If there is a possibility of water entering the casing, the ends must be sealed;

(3) If the ends of an unvented casing are sealed and the sealing is strong enough to retain the maximum allowable operating pressure of the pipe, the casing must be designed to hold this pressure at a stress level of not more than seventy-two percent of SMYS;

(4) If vents are installed on a casing, the vents must be protected from the weather to prevent water from entering the casing.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '912.323, October 1, 1990)

'6-77-104

'6-77-104 Underground clearance. (a) Each transmission line must be installed with at least twelve inches of clearance from any other underground structure not associated with the transmission line. If this clearance cannot be attained, the transmission line

must be protected from damage that might result from the proximity of the other structure.

(b) Each main must be installed with enough clearance from any other underground structure to allow proper maintenance and to protect against damage that might result from proximity to other structures.

(c) In addition to meeting the requirements of subsection (a) or (b), each plastic transmission line or main must be installed with sufficient clearance, or must be insulated, from any source of heat so as to prevent the heat from impairing the serviceability of the pipe.

(d) Each pipe-type or bottle-type holder must be installed with a minimum clearance from any other holder as prescribed in section 6-77-58(b).

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.325, October 1, 1990)

'6-77-105 Cover. (a) Except as provided in subsections (c) and (e), each buried transmission line must be installed with a minimum cover as follows:

Location	Normal soil	Consolidated rock
	Inches	
Class 1 locations	30	18
Class 2, 3, and 4 locations ...	36	24
Drainage ditches of public roads and railroad crossings.	36	24

'6-77-105

(b) Except as provided in subsections (c) and (d), each buried main must be installed with at least twenty four inches of cover.

(c) Where an underground structure prevents the installation of a transmission line or main with the minimum cover, the transmission line or main may be installed with less cover if it is provided with additional protection to withstand anticipated external loads.

(d) A main may be installed with less than twenty four inches of cover if the law of the State or municipality:

(1) Establishes a minimum cover of less than twenty-four inches;

(2) Requires that mains be installed in a common trench with other utility lines; and

(3) Provides adequately for prevention of damage to the pipe by external forces.

(e) All pipe which is installed in a navigable river, stream, or harbor must have minimum cover of forty-eight inches in soil or twenty-four inches in consolidated rock, and all pipe installed in any offshore location under water less than twelve feet deep, as measured from mean low tide, must have a minimum cover of thirty-six inches in soil or eighteen inches in consolidated rock, between the top of the pipe and the natural bottom. However, less than the minimum cover is permitted in accordance with subsection (c). [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.327, October 1, 1990)

'6-77-106

Subchapter 10

Customer Meters, Service Regulators, and Service Lines

'6-77-106 Scope. This subchapter prescribes minimum requirements for installing customer meters, service regulators, service lines, service line valves, and service line connections to mains.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.351, October 1, 1990)

'6-77-107 Customer meters and regulators: location. (a) Each meter and service regulator, whether inside or outside of a building, must be installed in a readily accessible location and be protected from corrosion and other damage. However, the upstream regulator in a series may be buried.

(b) Each service regulator installed within a building must be located as near as practicable to the point of service line entrance.

(c) Each meter installed within a building must be located in a ventilated place and not less than three feet from any source of ignition or any source of heat which might damage the meter.

(d) Where feasible, the upstream regulator in a series must be located outside the building, unless it is located in a separate metering or regulating building.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.353, October 1, 1990)

'6-77-108 Customer meters and regulators: protection from damage. (a) Protection from vacuum or back pressure. If the customer's equipment might

create either a vacuum or a back pressure, a device must be installed to protect the system.

(b) Service regulator vents and relief vents. Service regulator vents and relief vents must terminate outdoors, and the outdoor terminal must:

(1) Be rain and insect resistant;

(2) Be located at a place where gas from the vent can escape freely into the atmosphere and away from any opening into the building; and

(3) Be protected from damage caused by submergence in areas where flooding may occur.

(c) Pits and vaults. Each pit or vault that houses a customer meter or regulator at a place where vehicular traffic is anticipated, must be able to support that traffic.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.355, October 1, 1990)

'6-77-109 Customer meters and regulators: installation. (a) Each meter and each regulator must be installed so as to minimize anticipated stresses upon the connecting piping and the meter.

(b) When close all-thread nipples are used, the wall thickness remaining after the threads are cut must meet the minimum wall thickness requirements of this chapter.

(c) Connections made of lead or other easily damaged material may not be used in the installation of meters or regulators.

(d) Each regulator that might release gas in its operation must be vented to the outside atmosphere. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.357, October 1, 1990)

'6-77-110 Customer meter installations: operating pressure. (a) A meter may not be used at

'6-77-110

a pressure that is more than sixty-seven percent of the manufacturer's shell test pressure.

(b) Each newly installed meter manufactured after November 12, 1970, must have been tested to a minimum of 10 p.s.i.g.

(c) A rebuilt or repaired tinned steel case meter may not be used at a pressure that is more than fifty percent of the pressure used to test the meter after rebuilding or repairing. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.359, October 1, 1990)

'6-77-111 Service lines: installation. (a) Depth. Each buried service line must be installed with at least twelve inches of cover in private property and at least eighteen inches of cover in streets and roads. However, where an underground structure prevents installation at those depths, the service line must be able to withstand any anticipated external load.

(b) Support and backfill. Each service line must be properly supported on undisturbed or well compacted soil, and material used for backfill must be free of materials that could damage the pipe or its coating.

(c) Grading for drainage. Where condensate in the gas might cause interruption in the gas supply to the customer, the service line must be graded so as to drain into the main or into drips at the low points in the service line.

(d) Protection against piping strain and external loading. Each service line must be installed so as to minimize anticipated piping strain and external loading.

(e) Installation of service lines into buildings. Each underground service line installed below grade through the outer foundation wall of a building must:

(1) In the case of a metal service line, be protected against corrosion;

(2) In the case of a plastic service line, be protected from shearing action and backfill settlement; and

(3) Be sealed at the foundation wall to prevent leakage into the building.

(f) Installation of service lines under buildings. Where an underground service line is installed under a building:

(1) It must be encased in a gas-tight conduit;

(2) The conduit and the service line must, if the service line supplies the building it underlies, extend into a normally usable and accessible part of the building; and

(3) The space between the conduit and the service line must be sealed to prevent gas leakage into the building and, if the conduit is sealed at both ends, a vent line from the annular space must extend to a point where gas would not be a hazard, and extend above grade, terminating in a rain and insect resistant fitting. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.361, October 1, 1990)

'6-77-112 Service lines: valve requirements. (a) Each service line must have a service-line valve that meets the applicable requirements of subchapters 4 and 6. A valve incorporated in a meter bar, that allows the meter to be bypassed, may not be used as a service line valve.

(b) A soft seat service line valve may not be used if its ability to control the flow of gas could be adversely affected by exposure to anticipated heat.

(c) Each service-line valve on a high-pressure service line, installed above ground or in an area where the blowing of gas would be hazardous, must be designed and constructed to minimize the possibility of the removal of the core of the valve

'6-77-112

with other than specialized tools. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.363, October 1, 1990)

'6-77-113 Service lines: location of valves. (a) Relation to regulator or meter. Each

service line valve must be installed upstream of the regulator or, if there is no regulator, upstream of the meter.

(b) Outside valves. Each service line must have a shut-off valve in a readily accessible location, that, if feasible, is outside of the building.

(c) Underground valves. Each underground service line valve must be located in a covered durable curb box or standpipe that allows ready operation of the valve and is supported independently of the service lines. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.365, October 1, 1990)

'6-77-114 Service lines: general requirements for connections to main piping. (a) Location. Each service-line connection to a main must be located at the top of the main or, if that is not practical, at the side of the main, unless a suitable protective device is installed to minimize the possibility of dust and moisture being carried from the main into the service line.

(b) Compression-type connection to main. Each compression-type service line to main connection must:

(1) Be designed and installed to effectively sustain the longitudinal pull-out or thrust forces caused by contraction or expansion of the piping, or by anticipated external or internal loading; and

(2) If gaskets are used in connecting the service line to the main connection fitting, have gaskets that are compatible with the kind of gas in the system. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.367, October 1, 1990)

'6-77-115 Service lines: connections to cast iron or ductile iron mains. (a) Each service line connected to a cast iron or ductile iron main must be connected by a mechanical clamp, by drilling and tapping the main, or by another method meeting the requirements of section 6 77-84.

(b) If a threaded tap is being inserted, the requirements of sections 6-77-46(b) and (c) must also be met. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.369, October 1, 1990)

'6-77-116 Service lines: steel. Each steel service line to be operated at less than 100 p.s.i.g. must be constructed of pipe designed for a minimum of 100 p.s.i.g. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '193.371, October 1, 1990)

'6-77-117 Service lines: cast iron and ductile iron. (a) Cast or ductile iron pipe less than six inches in diameter may not be installed for service lines.

(b) If cast iron pipe or ductile iron pipe is installed for use in a service line, the part of the service line which extends through the building wall must be of steel pipe.

(c) A cast iron or ductile iron service line may not be installed in unstable soil or under a

building. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.373, October 1,

1990)

'6-77-118 Service lines: plastic. (a) Each plastic service line outside a building must be installed below ground level, except that it may terminate above ground and outside the building, if:

(1) The above ground part of the plastic service line is protected against deterioration and external damage; and

(2) The plastic service line is not used to support external loads.

(b) Each plastic service line inside a building must be protected against external damage.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.375, October 1, 1990)

'6-77-119 Service lines: copper. Each copper service line installed within a building must be protected against external damage.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.377 , October 1, 1990)

'6-77-120 New service lines not in use. Each service line that is not placed in service upon completion of installation must comply with one of the following until the customer is supplied with gas:

(1) the valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other means designed to prevent the opening of the valve by persons other than those authorized by the operator;

(2) A mechanical device or fitting that will prevent the flow of gas must be installed

in the service line or in the meter assembly; or

(3) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.379, October 1, 1990)

Subchapter 11

Minimum Safety Standards - Requirements for Corrosion Control

'6-77-121 Scope. This subchapter prescribes minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.451, October 1, 1990)

'6-77-122 Applicability to converted pipelines. Notwithstanding the date the pipeline was installed or any earlier deadlines for compliance, each pipeline which qualifies for use under this chapter in accordance with section 6 77 18 must meet the requirements of this subchapter specifically applicable to pipelines installed before August 1, 1971, and all other applicable requirements within one year after the pipeline is readied for service. However, the requirements of this subchapter specifically applicable to pipelines installed after July 31, 1971, apply if the pipeline substantially meets those requirements before it is readied for service or it is a segment which is replaced, relocated, or substantially altered. [Eff]

'6-77-122

(Auth: HRS '269-6) (Imp: 49 C.F.R. '192.452, October 1, 1990)

'6-77-123 General. Each operator shall establish procedures to implement the requirements of this subchapter. These procedures, including those for the design, installation, operation and maintenance of cathodic protection systems, must be carried out by, or under the direction of, a person qualified by experience and training in pipeline corrosion control methods. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.453, October 1, 1990)

'6-77-124 External corrosion control: buried or submerged pipelines installed after July 31, 1971. (a) Except as provided in subsections (b), (c), and (f), each buried or submerged pipeline installed after July 31, 1971, must be protected against external corrosion, including the following:

(1) It must have an external protective coating meeting the requirements of section 6-77-127;

(2) It must have a cathodic protection system designed to protect the pipeline in its entirety in accordance with this subchapter, installed and placed in operation within one year after completion of construction.

(b) An operator need not comply with subsection (a), if the operator can demonstrate by tests, investigation, or experience in the area of application, including, as a minimum, soil resistivity measurements and tests for corrosion accelerating bacteria, that a corrosive environment does not exist. However, within six months after an installation made pursuant to the preceding sentence, the operator shall conduct tests,

including pipe-to-soil potential measurements with respect to either a continuous reference electrode or an electrode using close spacing, not to exceed twenty feet, and soil resistivity measurements at potential profile peak locations, to adequately evaluate the potential profile along the entire pipeline. If the tests made indicate that a corrosive condition exists, the pipeline must be cathodically protected in accordance with subsection (a)(2).

(c) An operator need not comply with subsection (a), if the operator can demonstrate by tests, investigation, or experience that:

(1) For a copper pipeline, a corrosive environment does not exist; or

(2) For a temporary pipeline with an operating period of service not to exceed five years beyond installation, corrosion during the five year period of service of the pipeline will not be detrimental to public safety.

(d) Notwithstanding the provisions of subsection (b) or (c), if a pipeline is externally coated, it must be cathodically protected in accordance with paragraph (a)(2).

(e) Aluminum may not be installed in a buried or submerged pipeline if that aluminum is exposed to an environment with a natural pH in excess of eight, unless tests or experience indicate its suitability in the particular environment involved.

(f) This section does not apply to electrically isolated, metal alloy fittings in plastic

pipelines, if:

(1) For the size fitting to be used, an operator can show by tests, investigation, or experience in the area of application that adequate corrosion control is provided by alloyage; and

(2) The fitting is designed to prevent leakage caused by localized corrosion pitting.

'6-77-124

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.455, October 1, 1990)

'6-77-125 External corrosion control: buried or submerged pipelines installed before August 1, 1971. (a) Except for buried at compressor, regulator, and measuring stations, each buried or submerged transmission line installed before August 1, 1971, that has an effective external coating must be cathodically protected along the entire area that is effectively coated, in accordance with this subchapter. For the purposes of this subchapter, a pipeline does not have an effective external coating if its cathodic protection current requirements are substantially the same as if it were bare. The operator shall make tests to determine the cathodic protection current requirements.

(b) Except for cast iron or ductile iron, each of the following buried or submerged pipelines installed before August 1, 1971, must be cathodically protected in accordance with this subchapter in areas in which active corrosion is found:

(1) Bare or ineffectively coated transmission lines;

(2) Bare or coated pipes at compressor, regulator, and measuring stations; and

(3) Bare or coated distribution lines. The operator shall determine the areas of active corrosion by electrical survey, or where electrical survey is impractical, by the study of corrosion and leak history records by leak detection survey, or by other means.

(c) For the purpose of this subchapter, active corrosion means continuing corrosion which, unless controlled, could result in a condition that is detrimental to public safety.

'6-77-127

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.457, October 1, 1990)

'6-77-126 External corrosion control: examination of buried pipeline when exposed. Whenever an operator has knowledge that any portion of a buried pipeline is exposed, the exposed portion must be examined for evidence of external corrosion if the pipe is bare, or if the coating is deteriorated. If external corrosion is found, remedial action must be taken to the extent required by section 6-77-138 and the applicable provisions of sections 6-77-139, 6 77 140, 6-77-141. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.459, October 1, 1990)

'6-77-127 External corrosion control: protective coating. (a) Each external protective coating, whether conductive or insulating, applied for the purpose of external corrosion control must:

(1) Be applied on a properly prepared surface;

(2) Have sufficient adhesion to the metal surface to effectively resist underfilm migration of moisture;

(3) Be sufficiently ductile to resist cracking;

(4) Have sufficient strength to resist damage due to handling and soil stress; and

(5) Have properties compatible with any supplemental cathodic protection.

(b) Each external protective coating which is an electrically insulating type must also have low moisture absorption and high electrical resistance.

(c) Each external protective coating must be inspected just prior to lowering the pipe into the ditch and backfilling, and any damage detrimental to effective corrosion control must be repaired.

'6-77-127

(d) Each external protective coating must be protected from damage resulting from adverse ditch conditions or damage from supporting blocks.

(e) If coated pipe is installed by boring, driving, or other similar method, precautions must be taken to minimize damage to the coating during installation. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.461, October 1, 1990)

'6-77-128 External corrosion control: cathodic protection. (a) Each cathodic protection system required by this subchapter must provide a level of cathodic protection that complies with one or more of the applicable criteria contained in Appendix D. If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria.

(b) If amphoteric metals are included in a buried or submerged pipeline containing a

metal of different anodic potential:

(1) The amphoteric metals must be electrically isolated from the remainder of the pipeline and cathodically protected; or

(2) The entire buried or submerged pipeline must be cathodically protected at a cathodic potential that meets the requirements of Appendix D for amphoteric metals.

(c) The amount of cathodic protection must be controlled so as not to damage the protective coating or the pipe. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.463, October 1, 1990)

'6-77-129 External corrosion control: monitoring. (a) Each pipeline that is under

cathodic protection must be tested at least once each calendar year, but with intervals not exceeding fifteen months, to determine whether the cathodic protection meets the requirements of section 6 77 128. However, if tests at those intervals are impractical for separately protected short sections of mains or transmission lines; not in excess of 100 feet, or separately protected service lines, these pipelines may be surveyed on a sampling basis. At least ten percent of these protected structures, distributed over the entire system must be surveyed each calendar year, with a different ten percent checked each subsequent year, so that the entire system is tested in each ten-year period.

(b) Each cathodic protection rectifier or other impressed current power source must be inspected six times each calendar year, but with intervals not exceeding two and one-half months, to insure that it is operating.

(c) Each reverse current switch, each diode, and each interference bond whose failure would jeopardize structure protection must be electrically checked for proper performance six times each calendar year, but with intervals not exceeding two and one-

half months. Each other interference bond must be checked at least once each calendar year, but with intervals not exceeding fifteen months.

(d) Each operator shall take prompt remedial action to correct any deficiencies indicated by the monitoring.

(e) After the initial evaluation required by sections 6-77-124(b) and (c), and section 6 77 125(b), each operator shall, at intervals not exceeding three years, reevaluate its unprotected pipelines and cathodically protect them in accordance with this subchapter in areas in which active corrosion is found. The operator shall determine the areas of active corrosion by electrical survey, or where electrical survey is impractical, by the study of corrosion and leak history records, by leak detection survey, or by

'6-77-129

other means. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.465, October 1, 1990)

'6-77-130 External corrosion control: electrical isolation. (a) Each buried or submerged pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.

(b) One or more insulating devices must be installed where electrical isolation of a portion of a pipeline is necessary to facilitate the application of corrosion control.

(c) Except for unprotected copper inserted in ferrous pipe, each pipeline must be electrically isolated from metallic casings that are a part of the underground system. However, if isolation is not achieved because it is impractical, other measures must be taken to minimize corrosion of the pipeline inside the casing.

(d) Inspection and electrical tests must be made to assure that electrical isolation is adequate.

(e) An insulating device may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing.

(f) Where a pipeline is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in other areas where fault currents or unusual risk of lightning may be anticipated, it must be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.467, October 1, 1990)

'6-77-133

'6-77-131 External corrosion control: test stations. Each pipeline under cathodic protection required by this subchapter must have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.469, October 1, 1990)

'6-77-132 External corrosion control: test leads. (a) Each test lead wire must be connected to the pipeline so as to remain mechanically secure and electrically conductive.

(b) Each test lead wire must be attached to the pipeline so as to minimize stress concentration on the pipe.

(c) Each bared test lead wire and bared metallic area at point of connection to the pipeline must be coated with an electrical insulating material compatible with the pipe

coating and the insulation of the wire. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.471, October 1, 1990)

'6-77-133 External corrosion control: interference currents. (a) Each operator whose pipeline system is subjected to stray currents shall have in effect a continuing program to minimize the detrimental effects of such currents.

(b) Each impressed current type cathodic protection system or galvanic anode system must be designed and installed so as to minimize any adverse effects on existing adjacent underground metallic structures. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.473, October 1, 1990)

'6-77-134

'6-77-134 Internal corrosion control: general. (a) Corrosive gas may not be transported by pipeline, unless the corrosive effect of the gas on the pipeline has been investigated and steps have been taken to minimize internal corrosion.

(b) Whenever any pipe is removed from a pipeline for any reason, the internal surface must be inspected for evidence of corrosion. If internal corrosion is found:

(1) The adjacent pipe must be investigated to determine the extent of internal corrosion;

(2) Replacement must be made to the extent required by the applicable paragraphs of sections 6 77 139, 6-77-140, or 6-77-141; and

(3) Steps must be taken to minimize the internal corrosion.

(c) Gas containing more than 0.1 grain of hydrogen sulfide per 100 standard cubic feet may not be stored in pipe-type or bottle-type holders. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.475, October 1, 1990)

'6-77-135 Internal corrosion control: monitoring. If corrosive gas is being transported, coupons or other suitable means must be used to determine the effectiveness of the steps taken to minimize internal corrosion. Each coupon or other means of monitoring internal corrosion must be checked two times each calendar year, but with intervals not exceeding seven and one-half months. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.477, October 1, 1990)

'6-77-136 Atmospheric corrosion control: general. (a) Pipelines installed after July 31, 1971. Each aboveground pipeline or portion of a

pipeline installed after July 31, 1971 that is exposed to the atmosphere must be cleaned and either coated or jacketed with a material suitable for the prevention of atmospheric corrosion. An operator need not comply with this paragraph, if the operator can demonstrate by test, investigation, or experience in the area of application, that a corrosive atmosphere does not exist.

(b) Pipelines installed before August 1, 1971. Each operator having an above-ground pipeline or portion of a pipeline installed before August 1, 1971 that is exposed to the atmosphere, shall:

(1) Determine the areas of atmospheric corrosion on the pipeline;

(2) If atmospheric corrosion is found, take remedial measures to the extent required by the applicable paragraphs of sections 6 77 139, 6 77-140, or 6-77-141; and

(3) Clean and either coat or jacket the areas of atmospheric corrosion on the pipeline with a material suitable for the prevention of atmospheric corrosion. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.479, October 1, 1990)

'6-77-137 Atmospheric corrosion control: monitoring. After meeting the requirements of sections 6-77-136(a) and (b), each operator shall, at intervals not exceeding three years for onshore pipelines and at least once each calendar year, but with intervals not exceeding fifteen months, for offshore pipelines, reevaluate each pipeline that is exposed to the atmosphere and take remedial action whenever necessary to maintain protection against atmospheric corrosion. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.481, October 1, 1990)

'6-77-138

'6-77-138 Remedial measures: general. (a) Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must have a properly prepared surface and must be provided with an external protective coating that meets the requirements of section 6-77-127.

(b) Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must be cathodically protected in accordance with this subchapter.

(c) Except for cast iron or ductile iron pipe, each segment of buried or submerged pipe that is required to be repaired because of external corrosion must be cathodically

protected in accordance with this subchapter. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.483, October 1, 1990)

'6-77-139 Remedial measures: transmission lines. (a) General corrosion. Each segment of transmission line with general corrosion and with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline must be replaced or the operating pressure reduced commensurate with the strength of the pipe based on actual remaining wall thickness. However, if the area of general corrosion is small, the corroded pipe may be repaired. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this subsection.

(b) Localized corrosion pitting. Each segment of transmission line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired, or the operating pressure must be reduced commensurate with the strength of the pipe, based on the actual remaining wall thickness in the pits. [Eff]

'6-77-141

(Auth: HRS '269-6) (Imp: 49 C.F.R. '192.485, October 1, 1990)

'6-77-140 Remedial measures: distribution lines other than cast iron or ductile iron lines. (a) General corrosion. Except for cast iron or ductile iron pipe, each segment of generally corroded distribution line pipe with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline, or a remaining wall thickness less than thirty percent of the nominal wall thickness, must be replaced. However, if the area of general corrosion is small, the corroded pipe may be repaired.

Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this subsection.

(b) Localized corrosion pitting. Except for cast iron or ductile iron pipe, each segment of distribution line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.487, October 1, 1990)

'6-77-141 Remedial measures: cast iron and ductile iron pipelines. (a) General graphitization. Each segment of cast iron or ductile iron pipe on which generalized graphitization is found to a degree where a fracture or any leakage might result, must be replaced.

(b) Localized graphitization. Each segment of cast iron or ductile iron pipe on which localized graphitization is found to a degree where any leakage might result, must be replaced or repaired, or sealed by internal sealing methods adequate to prevent or arrest any leakage.

'6-77-141

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.489, October 1, 1990)

'6-77-142 Corrosion control records. (a) Each operator shall maintain records or maps to show the location of cathodically protected piping, cathodic protection facilities, other than unrecorded galvanic anodes installed before August 1, 1971, and neighboring structures bonded to the cathodic protection system.

(b) Each of the following records must be retained for as long as the pipeline remains in service:

(1) Each record or map required by subsection (a);

(2) Records of each test, survey, or inspection required by this subchapter, in sufficient detail to demonstrate the adequacy of corrosion control measures or that a corrosive condition does not exist. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.491, October 1, 1990)

Subchapter 12

Test Requirements

'6-77-143 Scope. This subchapter prescribes minimum leak-test and strength-test requirements for pipelines. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.501, October 1, 1990)

'6-77-144 General requirements. (a) 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) It has been tested in accordance with this subchapter and section 6-77-166 to substantiate the maximum allowable operating pressure; and

(2) Each potentially hazardous leak has been located and eliminated.

(b) The test medium must be liquid, air, natural gas, or inert gas that is:

(1) Compatible with the material of which the pipeline is constructed;

(2) Relatively free of sedimentary materials; and

(3) Except for natural gas, nonflammable.

(c) Except as provided in section 6-77-145(a), if air, natural gas, or inert gas is used as the test medium, the following maximum hoop stress limitations apply:

Class location	Maximum hoop stress allowed as percentage of SMYS	
	Natural gas	Air or inert gas
1	80	80
2	30	75
3	30	50
4	30	40

(d) Each joint used to tie in a test segment of pipeline is excepted from the specific test requirements of this subchapter, but each non-welded joint must be leak tested at not

less than its operating pressure. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.503, October 1, 1990)

'6-77-145

'6-77-145 Strength test requirements for steel pipeline to operate at a hoop stress of thirty percent or more of SMYS. (a) Except for service lines, each segment of a steel pipeline that is to operate at a hoop stress of thirty percent or more of SMYS must be strength tested in accordance with this section to substantiate the proposed maximum allowable operating pressure. In addition, in a Class 1 or Class 2 location, if there is a building intended for human occupancy within 300 feet of a pipeline, a hydrostatic test must be conducted to a test pressure of at least 125 percent of maximum operating pressure on that segment of the pipeline within 300 feet of such a building, but in no event may the test section be less than 600 feet unless the length of the newly installed or relocated pipe is less than 600 feet. However, if the buildings are evacuated while the hoop stress exceeds fifty percent of SMYS, air or inert gas may be used as the test medium.

(b) In a Class 1 or Class 2 location, each compressor station, regulator station, and measuring station, must be tested to at least Class 3 location test requirements.

(c) Except as provided in subsection (e), the strength test must be conducted by maintaining the pressure at or above the test pressure for at least eight hours.

(d) If a component other than pipe is the only item being replaced or added to a pipeline, a strength test after installation is not required, if the manufacturer of the component certifies that:

(1) The component was tested to at least the pressure required for the pipeline to which it is being added; or

(2) The component was manufactured under a quality control system that ensures that each item manufactured is at least equal in strength to a prototype and that the

prototype was tested to at least the pressure required for the pipeline to which it is being added.

'6-77-146

(e) For fabricated units and short sections of pipe, for which a post installation test is impractical, a preinstallation strength test must be conducted by maintaining the pressure at or above the test pressure for at least four hours. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.505, October 1, 1990)

'6-77-146 Test requirements for pipelines to operate at a hoop stress less than thirty percent of SMYS and at or above 100 p.s.i.g. Except for service lines and plastic pipelines, each segment of a pipeline that is to be operated at a hoop stress less than thirty percent of SMYS and at or above 100 p.s.i.g. must be tested in accordance with the following:

(1) The pipeline operator must use a test procedure that will ensure discovery of all potentially hazardous leaks in the segment being tested;

(2) If, during the test, the segment is to be stressed to twenty percent or more of SMYS and natural gas, inert gas, or air is the test medium:

(A) A leak test must be made at a pressure between 100 p.s.i.g. and the pressure required to produce a hoop stress of 20 percent of SMYS; or

(B) The line must be walked to check for leaks while the hoop stress is held at approximately twenty percent of SMYS;

(3) The pressure must be maintained at or above the test pressure for at least one hour. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.507, October 1, 1990)

'6-77-147

'6-77-147 Test requirements for pipelines to operate below 100 p.s.i.g. Except for service lines and plastic pipelines, each segment of a pipeline that is to be operated below 100 p.s.i.g. must be leak tested in accordance with the following:

(1) The test procedure used must ensure discovery of all potentially hazardous leaks in the segment being tested; and

(2) Each main that is to be operated at less than 1 p.s.i.g. must be tested to at least 10 p.s.i.g. and each main to be operated at or above 1 p.s.i.g. must be tested to at least 90 p.s.i.g. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.509, October 1, 1990)

'6-77-148 Test requirements for service lines. (a) Each segment of a service line (other than plastic) must be leak tested in accordance with this section before being placed in service. If feasible, the service-line connection to the main must be included in the test; if not feasible, it must be given a leakage test at the operating pressure when placed in service.

(b) Each segment of a service line (other than plastic) intended to be operated at a pressure of at least 1 p.s.i.g. but not more than 40 p.s.i.g. must be given a leak test at a pressure of not less than 50 p.s.i.g.

(c) Each segment of a service line (other than plastic) intended to be operated at pressures of more than 40 p.s.i.g. must be tested to at least 90 p.s.i.g., except that each segment of a steel service line stressed to twenty percent or more of SMYS must be tested in accordance with section 6 77 146. [Eff] (Auth: HRS '269-6) (Imp:

49 C.F.R. '192.511, October 1, 1990)

'6-77-149 Test requirements for plastic pipelines. (a) Each segment of a plastic pipeline must be tested in accordance with this section.

(b) The test procedure must insure discovery of all potentially hazardous leaks in the segment being tested.

(c) The test pressure must be at least 150 percent of the maximum operating pressure or 50 p.s.i.g., whichever is greater. However, the maximum test pressure may not be more than three times the design pressure of the pipe.

(d) The temperature of thermoplastic material must not be more than 100E F during the test.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.513, October 1, 1990)

'6-77-150 Environmental protection and safety requirements. (a) In conducting tests under this subchapter, each operator shall insure that every reasonable precaution is taken to protect its employees and the general public during the testing. Whenever the hoop stress of the segment of the pipeline being tested will exceed fifty percent of SMYS, the operator shall take all practicable steps to keep persons not working on the testing operation outside the testing area until the pressure is reduced to or below the proposed maximum allowable operating pressure.

(b) The operator shall insure that the test medium is disposed of in a manner that will minimize damage to the environment. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.515, October 1, 1990)

'6-77-151 Records. Each operator shall make, and retain for the useful life of the pipeline, a record of each test performed under sections

'6-77-151

6 77 145 and 6 77 146. The record must contain at least the following information:

(1) The operator's name, the name of the operator's employee responsible for making the test, and the name of any test company used;

(2) Test medium used;

(3) Test pressure;

(4) Test duration;

(5) Pressure recording charts, or other record of pressure readings;

(6) Elevation variations, whenever significant for the particular test;

(7) Leaks and failure noted and their disposition. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.517, October 1, 1990)

Subchapter 13

Uprating

'6-77-152 Scope. This subchapter prescribes minimum requirements for increasing maximum allowable operating pressures (uprating) for pipelines. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.551, October 1, 1990)

'6-77-153 General requirements. (a) Pressure increases. Whenever the requirements of this subchapter require that an increase in operating pressure be made in increments, the pressure must be increased gradually, at a rate that can be controlled, and in accordance with the following:

(1) At the end of each incremental increase, the pressure must be held constant while

the entire segment of pipeline that is affected is checked for leaks; and

(2) Each leak detected must be repaired before a further pressure increase is made, except that a leak determined not to be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous.

(b) Records. Each operator who uprates a segment of pipeline shall retain for the life of the segment a record of each investigation required by this subchapter, of all work performed, and of each pressure test conducted, in connection with the uprating.

(c) Written plan. Each operator who uprates a segment of pipeline shall establish a written procedure to ensure compliance with each applicable requirement of this subchapter.

(d) Limitation on increase in maximum allowable operating pressure. Except as provided in section 6 77 154(c), a new maximum allowable operating pressure established under this subchapter may not exceed the maximum that would be allowed under this chapter for a new segment of pipeline constructed of the same materials in the same location. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.553, October 1, 1990)

'6-77-154 Uprating to a pressure that will produce a hoop stress of thirty percent or more of SMYS in steel pipelines. (a) Unless the requirements of this section have been met, no person may subject any segment of a steel pipeline to an operating pressure that will produce a hoop stress of thirty percent or more of SMYS and that is above the established maximum allowable operating pressure.

'6-77-154

(b) Before increasing operating pressure above the previously established maximum allowable operating pressure the operator shall:

(1) Review the design, operating, and maintenance history and previous testing of the segment of pipeline and determine whether the proposed increase is safe and consistent with the requirements of this chapter; and

(2) Make any repairs, replacements, or alterations, in the segment of pipeline that are necessary for safe operation at the increased pressure.

(c) After complying with subsection (b), an operator may increase the maximum allowable operating pressure of a segment of pipeline constructed before September 12, 1970, to the highest pressure that is permitted under section 6 77-166, using as test

pressure the highest pressure to which the segment of pipeline was previously subjected (either in a strength test or in actual operation).

(d) After complying with subsection (b), an operator that does not qualify under subsection (c) may increase the previously established maximum allowable operating pressure if at least one of the following requirements is met:

(1) The segment of pipeline is successfully tested in accordance with the requirements of this chapter for a new line of the same material in the same location;

(2) An increased maximum allowable operating pressure may be established for a segment of pipeline in a Class 1 location if the line has not previously been tested; and if:

(A) It is impractical to test it in accordance with the requirements of this chapter;

(B) The new maximum operating pressure does not exceed eighty percent of

that allowed for a new line of the same location; and

(C) The operator determines that the new maximum allowable operating pressure is consistent with the condition of the segment of pipeline and the design requirements of this chapter.

(e) Where a segment of pipeline is uprated in accordance with subsection (c) or subsection (d)(2), the increase in pressure must be made in increments that are equal to:

(1) Ten percent of the pressure before the uprating; or

(2) Twenty-five percent of the total pressure increase;

whichever produces the fewer number of increments.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.555, October 1, 1990)

'6-77-155 Uprating: steel pipelines to a pressure that will produce a hoop stress less than thirty percent of SMYS: plastic, cast iron, and ductile iron pipelines. (a) Unless the requirements of this section have been met, no person may subject:

(1) A segment of steel pipeline to an operating pressure that will produce a hoop stress less than thirty percent of SMYS and that is above the previously established maximum allowable operating pressure; or

(2) A plastic, cast iron, or ductile iron pipeline segment to an operating pressure that is above the previously established maximum allowable operating pressure.

(b) Before increasing operating pressure above the previously established maximum allowable operating pressure, the operator shall:

'6-77-155

(1) Review the design, operating, and maintenance history of the segment of pipeline;

(2) Make a leakage survey (if it has been more than one year since the last survey) and repair any leaks that are found, except that a leak determined not be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous;

(3) Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure;

(4) Reinforce or anchor offsets, bends and dent ends in pipe joined by compression couplings or bell and spigot joints to prevent failure of the pipe joint, if the offset, bend, or dead end is exposed in an excavation;

(5) Isolate the segment of pipeline in which the pressure is to be increased from any adjacent segment that will continue to be operated at a lower pressure; and

(6) If the pressure in mains or service lines, or both, is to be higher than the pressure

delivered to the customer, install a service regulator on each service line and test each regulator to determine that it is functioning. Pressure may be increased as necessary to test each regulator, after a regulator has been installed on each pipeline subject to the increased pressure.

(c) After complying with subsection (b), the increase in maximum allowable operating pressure must be made in increments that are equal to 10 p.s.i.g. or 25 percent of the total pressure increase, whichever produces the fewer number of increments. Whenever the requirements of subsection (b)(6) apply, there must be at least two approximately equal incremental increases.

(d) If records for cast iron or ductile iron pipeline facilities are not complete enough to determine stresses produced by internal pressure, trench loading, rolling loads, beam stresses, and other bending loads, in evaluating the level of safety of the pipeline when operating at the proposed increased pressure, the following procedures must be followed:

(1) In estimating the stresses, if the original laying conditions cannot be ascertained, the operator shall assume that cast iron pipe was supported on blocks with tamped backfill and that ductile iron pipe was laid without blocks with tamped backfill;

(2) Unless the actual maximum cover depth is known, the operator shall measure the actual cover in at least three places where the cover is most likely to be greatest and shall use the greatest cover measured;

(3) Unless the actual nominal wall thickness is known, the operator shall determine the wall thickness by cutting and measuring coupons from at least three separate pipe lengths. The coupons must be cut from pipe lengths in areas where the cover depth is most likely to be the greatest. The average of all measurements taken must be increased by the allowance indicated in the following table:

	Allowance (inches)

| Cast Iron Pipe |

Pipe size (inches)		Centrifugally
	Pit cast pipe	cast pipe	Ductile iron pipe
3 to 8	0.075	0.065	0.065
10 to 12	0.08	0.07	0.07
14 to 24	0.08	0.08	0.075
30 to 42	0.09	0.09	0.075
48	0.09	0.09	0.08
54 to 60	0.09	.....	.....

'6-77-155

(4) For cast iron pipe, unless the pipe manufacturing process is known, the operator shall assume that the pipe is pit case pipe with a bursting tensile strength of 11,000 p.s.i. and a modulus of rupture of 31,000 p.s.i. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.557, October 1, 1990)

Operations

'6-77-156 Scope. This subchapter prescribes minimum requirements for the operation of pipeline facilities. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.601, October 1, 1990)

'6-77-157 General provisions. (a) No person may operate a segment of pipeline unless it is operated in accordance with this subchapter.

(b) Each operator shall establish a written operating and maintenance plan meeting the requirements of this chapter and keep records necessary to administer the plan. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.603, October 1, 1990)

'6-77-158 Essentials of operating and maintenance plan. Each operator shall include the following in its operating and maintenance plan:

(1) Instructions for employees covering operating and maintenance procedures during normal operations and repairs;

(2) Items required to be included by the provisions of subchapter 15;

(3) Specific programs relating to facilities presenting the greatest hazard to public safety either in an emergency or because of extraordinary construction or maintenance requirements;

(4) A program for conversion procedures, if conversion of a low-pressure distribution system to a higher pressure is contemplated;

(5) Provision for periodic inspections to ensure that operating pressures are appropriate for the class location; and

(6) Instructions enabling personnel who perform operation and maintenance activities to recognize conditions that potentially may be safety-related conditions that are subject to the reporting requirements of section 6 77 12. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.605, October 1, 1990)

'6-77-159 Initial determination of class location and confirmation or establishment of maximum allowable operating pressure. (a) Each operator shall complete a study to determine for each segment of pipeline with a maximum allowable operating pressure that will produce a hoop stress that is more than forty percent of SMYS:

(1) The present class location of all such pipeline in its system; and

(2) Whether the hoop stress corresponding to the maximum allowable operating pressure for each segment of pipeline is commensurate with the present class location.

(b) Each segment of pipeline that has been determined under subsection (a) to have an

established maximum allowable operating pressure producing a hoop stress that is not commensurate with the class location of the segment of pipeline and that is found to be in satisfactory condition, must have the maximum allowable operating pressure confirmed or revised in accordance with section 6 77-161.

(c) Each operator required to confirm or revise an established maximum allowable operating pressure under subsection (b), shall prepare a comprehensive plan, including a schedule, for carrying out the confirmations or revisions. The comprehensive plan must also provide for confirmations or revisions determined to be necessary under section 6-77-160, to the extent that they are caused by changes in class locations taking place before July 1, 1973. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.607, October 1, 1990)

'6-77-160 Change in class location: required study. Whenever an increase in population density indicates a change in class location for a segment of an existing steel pipeline operating at hoop stress that is more than forty percent of SMYS; or indicates that the hoop stress corresponding to the established maximum allowable operating pressure for a segment of existing pipeline is not commensurate with the present class location, the operator shall immediately make a study to determine:

(1) The present class location for the segment involved;

(2) The design, construction, and testing procedures followed in the original construction, and a comparison of these procedures with those required for the present class location by the applicable provisions of this chapter;

(3) The physical condition of the segment of the extent it can be ascertained from available records;

(4) The operating and maintenance history of the segment;

(5) The maximum actual operating pressure and the corresponding hoop stress, taking pressure gradient into account, for the segment of pipeline involved; and

(6) The actual area affected by the population density increase, and physical barriers or other factors which may limit further expansion of the more densely populated area. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.609, October 1, 1990)

'6-77-161 Change in class location: confirmation or revision of maximum allowable operating pressure. (a) If the hoop stress corresponding to the established maximum allowable operating pressure of a segment of pipeline is not commensurate with the present class location, and the segment is in satisfactory physical condition, the maximum allowable operating pressure of that segment of pipeline must be confirmed or revised according to one of the following requirements:

(1) If the segment involved has been previously tested in place for a period of not less than eight hours, the maximum allowable operating pressure is 0.8 times the test pressure in Class 2 locations, 0.667 times the test pressure in Class 3 locations, or 0.555 times the test pressure in Class 4 locations. The corresponding hoop stress may not exceed seventy-two percent of the SMYS of the pipe in Class 2 locations, sixty percent of SMYS in Class 3 locations, or fifty percent of SMYS in Class 4 locations;

'6-77-161

(2) The maximum allowable operating pressure of the segment involved must be reduced so that the corresponding hoop stress is not more than that allowed by this chapter for new segments of pipelines in the existing class location;

(3) The segment involved must be tested in accordance with the applicable

requirements of subchapter 12, and its maximum allowable operating pressure must then be established according to the following criteria:

(A) The maximum allowable operating pressure after the requalification test is 0.8 times the test pressure for Class 2 locations, 0.667 times the test pressure for Class 3 locations, and 0.555 times the test pressure for Class 4 locations;

(B) The maximum allowable operating pressure confirmed or revised in accordance with this section, may not exceed the maximum allowable operating pressure established before the confirmation or revision; and

(C) The corresponding hoop stress may not exceed seventy-two percent of the SMYS of the pipe in Class 2 locations, sixty percent of SMYS in Class 3 locations, or fifty percent of SMYS in Class 4 locations.

(b) Confirmation or revision of the maximum allowable operating pressure of a segment of pipeline in accordance with this section does not preclude the application of sections 6-77-153 and 6 77-154.

(c) Confirmation or revision of the maximum allowable operating pressure that is required as a result of a study under section 6-77-160 must be completed within eighteen months of the change in class location. Pressure reduction under subsections (a)(1) or (2) within the eighteen-month

period does not preclude establishing a maximum allowable operating pressure under subsection (a)(3) at a later date. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.611, October 1, 1990)

'6-77-162 Continuing surveillance. (a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial

changes in cathodic protection requirements, and other unusual operating and maintenance conditions.

(b) If a segment of pipeline is determined to be in unsatisfactory condition but no immediate hazard exists, the operator shall initiate a program to recondition or phase out the segment involved, or, if the segment cannot be reconditioned or phased out, reduce the maximum allowable operating pressure in accordance with sections 6-77-166(a) and (b). [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.613, October 1, 1990)

'6-77-163 Damage prevention program. (a) Except for pipelines listed in subsection (c), each operator of a buried pipeline shall carry out in accordance with this section a written program to prevent damage to that pipeline by excavation activities. For the purpose of this section, "excavation activities" include excavation, blasting, boring, tunneling, backfilling, the removal of the above ground structures by either explosive or mechanical means, and other earth moving operations. An operator may perform any of the duties required by subsection (b) through participation in a public service program, such as a "one-call" system, but such participation does not

relieve the operator of responsibility for compliance with this section.

(b) The damage prevention program required by subsection (a) must, at a minimum:

(1) Include the identity, on a current basis, of persons who normally engage in excavation activities in the area in which the pipeline is located;

(2) Provide for notification of the public in the vicinity of the pipeline and actual notification of the persons, identified in paragraph (1), of the following as often as needed to make them aware of the damage prevention program:

(A) The program's existence and purpose; and

(B) How to learn the location of underground pipelines before excavation activities are begun;

(3) Provide a means of receiving and recording notification of planned excavation activities;

(4) If the operator has buried pipelines in the area of excavation activity, provide for actual notification of persons who give notice of their intent to excavate of the type of temporary marking to be provided and how to identify the markings;

(5) Provide for temporary marking of buried pipelines in the area of excavation activity before, as far as practical, the activity begins;

(6) Provide as follows for inspection of pipelines that an operator has reason to believe could be damaged by excavation activities:

(A) The inspection must be done as frequently as necessary during and after the activities to verify the integrity of the pipeline; and

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(B) In the case of blasting, any inspection must include leakage surveys.

(c) A damage prevention program under this section is not required for the following pipelines:

(1) Pipelines in a Class 1 or 2 location;

(2) Pipelines in a Class 3 location defined by section 6-77-14(d)(2) that are marked in accordance with section 6-77-176;

(3) Pipelines to which access is physically controlled by the operator;

(4) Pipelines that are part of a petroleum gas system subject to section 6-77-16 or part

of a distribution system operated by a person in connection with that person's leasing of real property or by a condominium or cooperative association. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.614, October 1, 1990)

'6-77-164 Emergency plans. (a) Each operator shall establish written procedures to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedures must provide for the following:

(1) Receiving, identifying, and classifying notices of events which require immediate response by the operator;

(2) Establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials;

(3) Prompt and effective response to a notice of each type of emergency, including the following:

(A) Gas detected inside or near a building;

(B) Fire located near or directly involving a pipeline facility;

'6-77-164

(C) Explosion occurring near or directly involving a pipeline facility; and

(D) Natural disaster;

(4) The availability of personnel, equipment, tools, and materials, as needed at the scene of an emergency;

(5) Actions directed toward protecting people first and then property;

(6) Emergency shutdown and pressure reduction in any section of the operator's pipeline system necessary to minimize hazards to life or property;

(7) Making safe any actual or potential hazard to life or property;

(8) Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency;

(9) Safely restoring any service outage; and

(10) Beginning action under section 6-77-165, if applicable, as soon after the end of the emergency as possible.

(b) Each operator shall:

(1) Furnish its supervisors who are responsible for emergency action a copy of that portion of the latest edition of the emergency procedures established under subsection (a) as necessary for compliance with those procedures;

(2) Train the appropriate operating personnel to assure that they are knowledgeable of the emergency procedures and verify that the training is effective; and

(3) Review employee activities to determine whether the procedures were effectively followed in each emergency.

(c) Each operator shall establish and maintain liaison with appropriate fire, police, and other public officials to:

'6-77-165

(1) Learn the responsibility and resources of each government organization that may respond to a gas pipeline emergency;

(2) Acquaint the officials with the operator's ability in responding to a gas pipeline emergency;

(3) Identify the types of gas pipeline emergencies of which the operator notifies the

officials; and

(4) Plan how the operator and officials can engage in mutual assistance to minimize hazards to life or property.

(d) Each operator shall establish a continuing educational program to enable customers, the public, appropriate government organizations, and persons engaged in excavation related activities to recognize a gas pipeline emergency for the purpose of reporting it to the operator or the appropriate public officials. The program and the media used must be as comprehensive as necessary to reach all areas in which the operator transports gas. The program must be conducted in English and in other languages commonly understood by a significant number and concentration of the non-English speaking population in the operator's area.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.615, October 1, 1990)

'6-77-165 Investigation of failures. Each operator shall establish procedures for analyzing accidents and failures, including the selection of samples of the failed facility or equipment for laboratory examination, where appropriate, for the purpose of determining the causes of failure and minimizing the possibility of a recurrence.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.617, October 1, 1990)

'6-77-166

'6-77-166 Maximum allowable operating pressure: steel or plastic pipelines. (a) Except as provided in subsection (c), no person may operate a segment of steel or plastic pipeline at a pressure that exceeds the lowest of the following:

(1) The design pressure of the weakest element in the segment, determined in accordance with subchapters 5 and 6;

(2) The pressure obtained by dividing the pressure to which the segment was tested after construction as follows:

(A) For plastic pipe in all locations, the test pressure is divided by a factor of 1.5;

(B) For steel pipe operated at 100 p.s.i.g. or more, the test pressure is divided by a factor determined in accordance with the following table:

Class location	Factors[1], segment-- Installed before (Nov. 12, 1970)	Installed after (Nov. 11, 1970)	Converted under '6-77-18
1	1.1	1.1	1.25
2	1.25	1.25	1.25
3	1.4	1.5	1.5
4	1.4	1.5	1.5

(3) The highest actual operating pressure to which the segment was subjected during the five years preceding July 1, 1970 (or in the case of offshore gathering lines, July 1, 1976), unless the segment was

tested in accordance with paragraph (2) after July 1, 1965 (or in the case of offshore gathering lines, July 1, 1971), or the segment was uprated in accordance with subchapter 13;

(4) For furnace butt welded steel pipe, a pressure equal to sixty percent of the mill test pressure to which the pipe was subjected;

(5) For steel pipe other than furnace butt welded pipe, a pressure equal to eighty five percent of the highest test pressure to which the pipe has been subjected, whether by mill test or by the post installation test; or

(6) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

(b) No person may operate a segment to which subsection (a)(6) is applicable, unless over pressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with section 6-77-68.

(c) Notwithstanding the other requirements of this section, an operator may operate a segment of pipeline found to be in satisfactory condition, considering its operating and maintenance history, at the highest actual operating pressure to which the segment was subjected during the five years preceding July 1, 1970, or in the case of offshore gathering lines, July 1, 1976, subject to the requirements of section 6-77-161.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.619, October 1, 1990)

'6-77-167 Maximum allowable operating pressure: high-pressure distribution systems. (a) No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following pressures, as applicable:

(1) The design pressure of the weakest element in the segment, determined in accordance with subchapters 5 and 6;

(2) 60 p.s.i.g., for a segment of a distribution system otherwise designed to operate at over 60 p.s.i.g., unless the service lines in the segment are equipped with service regulators or other pressure limiting devices in series that meet the requirements of section 6 77 69(c);

(3) 25 p.s.i.g. in segments of cast iron pipe in which there are unreinforced bell and spigot joints;

(4) The pressure limits to which a joint could be subjected without the possibility of its parting;

(5) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressures.

(b) No person may operate a segment of pipeline to which subsection (a)(5) applies, unless overpressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with section 6-77-68. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.621, October 1, 1990)

'6-77-168 Maximum and minimum allowable operating pressure: low-pressure distribution systems. (a) No person may operate a low-pressure distribution system at a pressure high enough to

make unsafe the operation of any connected and properly adjusted low-pressure gas burning equipment.

(b) No person may operate a low pressure distribution system at a pressure lower than the minimum pressure at which the safe and continuing operation of any connected and properly adjusted low pressure gas burning equipment can be assured.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. 192.623, October 1, 1990)

'6-77-169 Odorization of gas. (a) A combustible gas in a distribution line must contain a natural odorant or be odorized so that at a concentration in air of one fifth of the lower explosive limit, the gas is readily detectable by a person with a normal sense of smell.

(b) After December 31, 1976, a combustible gas in a transmission line in a Class 3 or Class 4 location must comply with the requirements of subsection (a) unless:

(1) At least fifty percent of the length of the line downstream from that location is in a Class 1 or Class 2 location;

(2) The line transports gas to any of the following facilities which received gas without an odorant from that line before May 5, 1975;

(A) An underground storage field;

(B) A gas processing plant;

(C) A gas dehydration plant; or

(D) An industrial plant using gas in a process where the presence of an odorant;

(i) Makes the end product unfit for the purpose for which it is intended;

(ii) Reduces the activity of a catalyst; or

(iii) Reduces the percentage

completion of a chemical

reaction; or

(3) In the case of a lateral line which transports gas to a distribution center, at least fifty percent of the length of that line is in a Class 1 or Class 2 location.

(c) In the concentrations in which it is used, the odorant in combustible gases must comply with the following:

(1) The odorant may not be deleterious to persons, materials, or pipe.

(2) The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

(d) The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.

(e) Equipment for odorization must introduce the odorant without wide variations in the level of odorant.

(f) Each operator shall conduct periodic sampling of combustible gases to assure the proper concentration of odorant in accordance with this section. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.625, October 1, 1990)

'6-77-170 Tapping pipelines under pressure. Each tap made on a pipeline under pressure must be performed by a crew qualified to make hot taps.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.627, October 1, 1990)

'6-77-171 Purging of pipelines. (a) When a pipeline is being purged of air by use of gas, the

gas must be released into one end of the line in a moderately rapid and continuous flow. If gas cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the gas.

(b) When a pipeline is being purged of gas by use of air, the air must be released into one end of the line in a moderately rapid and continuous flow. If air cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the air. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.629, October 1, 1990)

Subchapter 15

Maintenance

'6-77-172 Scope. This subchapter prescribes minimum requirements for maintenance of pipeline facilities. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.701, October 1, 1990)

'6-77-173 General. (a) No person may operate a segment of pipeline, unless it is maintained in accordance with this subchapter.

(b) Each segment of pipeline that becomes unsafe must be replaced, repaired, or removed from service.

(c) Hazardous leaks must be repaired promptly.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.703, October 1, 1990)

'6-77-174

'6-77-174 Transmission lines: patrolling. (a) Each operator shall have a patrol program to observe surface conditions on and adjacent to the transmission line right-of-way for indications of leaks, construction activity, and other factors affecting safety and operation.

(b) The frequency of patrols is determined by the size of the line, the operating pressures, the class location, terrain, weather, and other relevant factors, but intervals between patrols may not be longer than prescribed in the following table:

	Maximum interval between patrols	
Class Location	At highway and	

of line	railroad crossings	At all other places
1, 2	7-1/2 months; but at least twice each calendar year.	15 months; but at least once each calendar year.
3	4-1/2 months; but at least four times each calendar year.	7-1/2 months; but at least twice each calendar year.
4	4-1/2 months; but at least four times each calendar year.	4-1/2 months; but at least four times each calendar year.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.705, October 1, 1990)

'6-77-175 Transmission lines: leakage surveys. (a) Each operator of a transmission line shall provide for periodic leakage surveys of the line in its operating and maintenance plan.

(b) Leakage surveys of a transmission line must be conducted at intervals not exceeding 15 months, but at least once each calendar year. However, in the case of a transmission line which transports gas in conformity with section 6-77-169 without an odor or odorant, leakage surveys using leak detector equipment must be conducted:

(1) In Class 3 locations, at intervals not exceeding 7-1/2 months, but at least twice each calendar year; and

(2) In Class 4 locations, at intervals not exceeding 4-1/2 months, but at least four times each calendar year. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.706, October 1, 1990)

'6-77-176 Line markers for mains and transmission lines. (a) Buried pipelines. Except as provided in subsection (b), a line marker must be placed and maintained as close as practical over each buried main and transmission line:

(1) At each crossing of a public road and railroad; and

(2) Wherever necessary to identify the location of the transmission line or main to reduce the possibility of damage or interference.

(b) Exceptions for buried pipelines. Line markers are not required for buried mains and transmission lines:

(1) Located offshore or at crossings of or under waterways and other bodies of water; or

(2) In Class 3 or Class 4 locations:

(A) Where placement of a marker is impractical; or

(B) Where a damage prevention program is in effect under section 6-77-163.

(c) Pipelines aboveground. Line markers must be placed and maintained along each section of a main and transmission line that is located aboveground in an area accessible to the public.

(d) Marker warning. The following must be written legibly on a background of sharply contrasting color on each line marker:

'6-77-176

(1) The word "Warning," "Caution," or "Danger" followed by the words "Gas (or name of gas transported) Pipeline" all of which, except for markers in heavily developed urban areas, must be in letters at least one inch high with one-quarter inch stroke; and

(2) The name of the operator and the telephone number (including area code) where the operator can be reached at all times.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.707, October 1, 1990)

'6-77-177 Transmission lines: record keeping.

Each operator shall keep records covering each leak discovered, repair made, transmission line break, leakage survey, line patrol, and inspection, for as long as the segment of transmission line involved remains in service. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.709, October 1, 1990)

'6-77-178 Transmission lines: General requirements for repair procedures. (a) Each operator shall take immediate temporary measures to protect the public whenever:

(1) A leak, imperfection or damage that impairs its serviceability is found in a segment of steel transmission line operating at or above forty percent of the SMYS; and

(2) It is not feasible to make a permanent repair at the time of discovery.

As soon as feasible, the operator shall make permanent repairs.

(b) Except as provided in section 6 77 181(a)(3), no operator may use a welded

patch as a means of repair. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.711, October 1, 1990)

'6-77-179 Transmission lines: permanent field repair of imperfections and damages. (a) Except as provided in subsection (b), each imperfection or damage that impairs the serviceability of a segment of steel transmission line operating at or above forty percent of SMYS must be repaired as follows:

(1) If it is feasible to take the segment out of service, the imperfection or damage must be removed by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength;

(2) If it is not feasible to take the segment out of service, a full encirclement welded split sleeve of appropriate design must be applied over the imperfection or damage; and

(3) If the segment is not taken out service, the operating pressure must be reduced to a safe level during the repair operations.

(b) Submerged offshore pipelines and submerged pipelines in inland navigable waters may be repaired by mechanically applying a fully encirclement split sleeve of appropriate design over the imperfection or damage. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.713, October 1, 1990)

'6-77-180 Transmission lines: permanent field repair of welds. Each weld that is unacceptable under section 6-77-80(c) must be repaired as follows:

(1) If it is feasible to take the segment of transmission line out of service, the weld must be repaired in accordance with the

'6-77-180

applicable requirements of section 6 77 82.

(2) A weld may be repaired in accordance with section 6 77-82 while the segment of transmission line is in service if:

(A) The weld is not leaking;

(B) The pressure in the segment is reduced so that it does not produce a stress that is more than twenty percent of the SMYS of the pipe; and

(C) Grinding of the defective area can be limited so that at least 1/8-inch thickness in the pipe weld remains;

(3) A defective weld which cannot be repaired in accordance with paragraph (1) or (2) must be repaired by installing a full encirclement welded split sleeve of appropriate design. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.715, October 1, 1990)

'6-77-181 Transmission lines: permanent field repair of leaks. (a) Except as provided in subsection (b), each permanent field repair of a leak on a transmission line must be made as follows:

(1) If feasible, the segment of transmission line must be taken out of service and repaired by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or

greater design strength;

(2) If it is not feasible to take the segment of transmission line out of service, repairs must be made by installing a full encirclement welded split sleeve of appropriate design, unless the transmission line:

(A) Is jointed by mechanical couplings; and

(B) Operates at less than forty percent of SMYS;

(3) If the leak is due to a corrosion pit, the repair may be made by installing a properly designed bolt-on-leak clamp; or, if the leak is due to a corrosion pit and on pipe of not more than 40,000 p.s.i. SMYS, the repair may be made by fillet welding over the pitted area a steel plate patch with rounded corners, of the same or greater thickness than the pipe, and not more than one half of the diameter of the pipe in size.

(b) Submerged offshore pipelines and submerged pipelines in inland navigable waters may be repaired by mechanically applying a full encirclement split sleeve of appropriate design over the leak. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.717, October 1, 1990)

'6-77-182 Transmission lines: testing of repairs. (a) Testing of replacement pipe. If a segment of transmission line is repaired by cutting out the damaged portion of the pipe as a cylinder, the replacement pipe must be tested to the pressure required for a new line installed in the same location. This test may be made on the pipe before it is installed.

(b) Testing of repairs made by welding. Each repair made by welding in accordance with sections 6 77 178, 6 77-179 and 6-77-180 must be examined in accordance with section 6-77-80. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.719, October 1, 1990)

'6-77-183 Distribution systems: Patrolling. (a) The frequency of patrolling mains must be determined by the severity of the conditions which

'6-77-183

could cause failure or leakage, and the consequent hazards to public safety.

(b) Mains in place or on structures where anticipated physical movement or external loading could cause failure or leakage must be patrolled at intervals not exceeding 4-1/2 months, but at least four times each calendar year. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.721, October 1, 1990)

'6-77-184 Distribution systems: leakage surveys and procedures. (a) Each operator of a distribution system shall provide for periodic leakage surveys in its operating and maintenance plan.

(b) The type and scope of the leakage control program must be determined by the nature of the operations and the local conditions, but it must meet the following minimum requirements:

(1) A gas detector survey must be conducted in business districts, including tests of the atmosphere in gas, electric, telephone, sewer, and water system manholes, at cracks in pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding fifteen months, but at least once each calendar year.

(2) Leakage surveys of the distribution system outside of the principal business areas

must be made as frequently as necessary, but at intervals not exceeding five years.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.723, October 1, 1990)

'6-77-185 Test requirements for reinstating service lines. (a) Except as provided in

'6-77-186

subsection (b), each disconnected service line must be tested in the same manner as a new service line, before being reinstated.

(b) Each service line temporarily disconnected from the main must be tested from the point of disconnection to the service line valve in the same manner as a new service line, before reconnecting. However, if provisions are made to maintain continuous service, such as by installation of a bypass, any part of the original service line used to maintain continuous service need not be tested. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.725, October 1, 1990)

'6-77-186 Abandonment or inactivation of facilities. (a) Each operator shall provide in its operating and maintenance plan for abandonment or deactivation of pipelines, including provisions for meeting each of the requirements of this section.

(b) Each pipeline abandoned in place must be disconnected from all sources and supplies of gas; purged of gas; in the case of offshore pipelines, filled with water or inert materials; and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

(c) Except for service lines, each inactive pipeline that is not being maintained under this chapter must be disconnected from all sources and supplies of gas; purged of gas; in the case of offshore pipelines, filled with water or inert materials; and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

(d) Whenever service to a customer is discontinued, one of the following must be complied with:

(1) The valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other

means designed to prevent the opening of the valve by persons other than those authorized by the operator;

(2) A mechanical device or fitting that will prevent the flow of gas must be installed in the service lines or in the meter assembly; or

(3) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed.

(e) If air is used for purging, the operator shall insure that a combustible mixture is not present after purging.

(f) Each abandoned vault must be filled with a suitable compacted material.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.727, October 1, 1990)

'6-77-187 Compressor stations: procedures for gas compressor units. Each operator shall establish starting, operating, and shutdown procedures for gas compressor units.
[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.729, October 1, 1990)

'6-77-188 Compressor stations: inspection and testing of relief devices. (a) Except for rupture discs, each pressure relieving device in a compressor station must be inspected and tested in accordance with sections 6 77 192 and 6-77-194, and must be operated periodically to determine that it opens at the correct set pressure.

(b) Any defective or inadequate equipment found must be promptly repaired or replaced.

(c) Each remote control shutdown device must be inspected and tested at intervals not exceeding fifteen months, but at least once each calendar year, to determine that it functions properly.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.731, October 1, 1990)

'6-77-189 Compressor stations: Isolation of equipment for maintenance or alterations. Each operator shall establish procedures for maintaining compressor stations, including provisions for isolation units or sections of pipe and for purging before returning to service. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.733, October 1, 1990)

'6-77-190 Compressor stations: Storage of combustible materials. (a) Flammable or combustible materials in quantities beyond those required for everyday use, or other than those normally used in compressor buildings, must be stored a safe distance from the compressor building.

(b) Aboveground oil or gasoline storage tanks must be protected in accordance with National Fire Protection Association Standard No. 30. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.735, October 1, 1990)

'6-77-191 Pipe-type and bottle-type holders: Plan for inspection and testing. Each operator having a pipe type or bottle-type holder shall establish a plan for the systematic, routine inspection and testing of these facilities, including the following:

(1) Provision must be made for detecting external corrosion before the strength of the container has been impaired;

(2) Periodic sampling and testing of gas in storage must be made to determine the dew point of vapors contained in the stored

gas, that if condensed, might cause internal corrosion or interfere with the safe operation of the storage plant; and

(3) The pressure control and pressure limiting equipment must be inspected and tested periodically to determine that it is in a safe operating condition and has adequate capacity. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.737, October 1, 1990)

'6-77-192 Pressure limiting and regulating stations: inspection and testing. Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment must be subjected at intervals not exceeding fifteen months, but at least once each calendar year, to inspections and tests to determine that it is:

(1) In good mechanical condition;

(2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;

(3) Set to function at the correct pressure; and

(4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.739, October 1, 1990)

'6-77-193 Pressure limiting and regulating stations: telemetering or recording gages. (a) Each distribution system supplied by more than one district pressure regulating station must be equipped with telemetering or recording pressure gages to indicate the gas pressure in the district.

(b) On distribution systems supplied by a single district pressure regulating station, the operator shall determine the necessity of installing telemetering or recording gages in the district, taking into consideration the number of customers supplied, the operating pressures, the capacity of the installation, and other operating conditions.

(c) If there are indications of abnormally high or low-pressure, the regulator and the auxiliary equipment must be inspected and the necessary measures employed to

correct any unsatisfactory operating conditions. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.741, October 1, 1990)

'6-77-194 Pressure limiting and regulating stations: testing of relief devices. (a) If feasible, pressure relief devices (except rupture discs) must be tested in place, at intervals not exceeding fifteen months, but at least once each calendar year, to determine that they have enough capacity to limit the pressure on the facilities to which they are connected to the desired maximum pressure.

(b) If a test is not feasible, review and calculation of the required capacity of the relieving device at each station must be made at intervals not exceeding fifteen months, but at least once each calendar year, and these required capacities compared with the rated or experimentally determined relieving capacity of the device for the operating conditions under which it works. After the initial calculations, subsequent calculations are not required if the review documents that parameters have not changed in a manner which would cause the capacity to be less than required.

(c) If the relieving device is of insufficient capacity, a new or additional device must be installed to provide the additional capacity

'6-77-194

required. [Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.743, October 1, 1990)

'6-77-195 Valve maintenance: transmission lines. Each transmission line valve that might be required during any emergency must be inspected and partially operated at

intervals not exceeding fifteen months, but at least once each calendar year. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.745, October 1, 1990)

'6-77-196 Valve maintenance: distribution systems. Each valve, the use of which may be necessary for the safe operation of a distribution system, must be checked and serviced at intervals not exceeding fifteen months, but at least once each calendar year. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.747, October 1, 1990)

'6-77-197 Vault maintenance. (a) Each vault housing pressure regulating and pressure limiting equipment, and having a volumetric internal content of 200 cubic feet or more, must be inspected at intervals not exceeding fifteen months, but at least once each calendar year, to determine that it is in good physical condition and adequately ventilated.

(b) If gas is found in the vault, the equipment in the vault must be inspected for leaks, and any leaks found must be repaired.

(c) The ventilating equipment must also be inspected to determine that it is functioning properly.

(d) Each vault cover must be inspected to assure that it does not present a hazard to public safety. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.749, October 1, 1990)

'6-77-198 Prevention of accidental ignition. Each operator shall take steps to minimize

the danger of accidental ignition of gas in any structure or area where the presence of gas constitutes a hazard of fire or explosion, including the following:

(1) When a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided;

(2) Gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas and air in the area of work; and

(3) Post warning signs, where appropriate.

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. '192.751, October 1, 1990)

'6-77-199 Caulked bell and spigot joints. (a) Each cast-iron caulked bell and spigot joint that is subject to pressures of 25 p.s.i.g. or more must be sealed with:

(1) A mechanical leak clamp; or

(2) A material or device which:

(A) Does not reduce the flexibility of the joint;

(B) Permanently bonds, either chemically or mechanically, or both, with the bell and spigot metal surfaces or adjacent pipe metal surfaces; and

(C) Seals and bonds in a manner that meets the strength, environmental, and chemical compatibility requirements of section 6-77-20(1) and (2) and section 6-77-41.

(b) Each cast iron caulked bell and spigot joint that is subject to pressures of less than

25 p.s.i.g. and is exposed for any reason, must be sealed by a means other than caulking. [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.753, October 1, 1990)

'6-77-200 Protecting cast-iron pipelines. When an operator has knowledge that the support for a segment of a buried cast-iron pipeline is disturbed:

(1) That segment of the pipeline must be protected, as necessary, against damage during the disturbance by:

(A) Vibrations from heavy construction equipment, trains, trucks, buses, or blasting;

(B) Impact forces by vehicles;

(C) Earth movement;

(D) Apparent future excavations near the pipeline; or

(E) Other foreseeable outside forces which may subject that segment of the pipeline to bending stress;

(2) As soon as feasible, appropriate steps must be taken to provide permanent protection for the disturbed segment from damage that might result from external loads, including compliance with applicable requirements of sections 6 77 100(a), 6 77 101, and 6 77 111(b) (d). [Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. '192.755, October 1, 1990)

Appendix A--Incorporated by Reference

I. List of organizations and addresses.

A. American National Standards Institute (ANSI), 1430 Broadway, New York, N.Y. 10018.

B. American Petroleum Institute (API), 1801 K Street N.W., Washington, D.C. 20006 or 300 Corrigan Tower Building, Dallas Tex. 75201.

C. The American Society of Mechanical Engineers (ASME), United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

D. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pa. 19103.

E. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 5203 Leesburg Pike, Suite 502, Falls Church, Va. 22041.

F. National Fire Protection Association (NFPA), Batterymarch Park, Quincy, Massachusetts 02269.

II. Documents incorporated by reference. Numbers in parentheses indicate applicable editions.

A. American Petroleum Institute:

(1) API Specification 6D "API Specification for Pipeline Valves" (1977).

(2) API Specification 5L "API Specification for Line Pipe" (1988).

(3) API Recommended Practice 5LI "API Recommended Practice for Railroad Transportation of Line Pipe" (1972)

(4) API Standard 1104 "Standard for Welding Pipelines and Related Facilities" (17th edition, 1988).

B. The American Society for Testing and Materials:

(1) ASTM Specification A53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless" (A53-79).

(2) ASTM Specification A106 "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service" (A106-79b).

(3) ASTM Specification A671 "Electric Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures" (A671 77).

(4) ASTM Specification A672 "Electric Fusion-Welded Steel Pipe for High-Pressure

Service at Moderate Temperatures" (A672-79).

(5) ASTM Specification A691 "Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures" (A691-79).

(6) ASTM Specification A333 "Standard Specification for Seamless and Welded Steel Pipe for Low Temperature Service" (A333-79).

(7) ASTM Specification A372 "Standard Specification for Carbon and Alloy Steel Forgings for Thin-Walled Pressure Vessels" (A372-78).

(8) ASTM Specification A381 "Standard Specification for Metal Arc-Welded Steel Pipe for use with High Pressure Transmission Systems" (A381-79).

(9) ASTM Specification D638 "Standard Test Method for Tensile Properties of Plastic" (D638-77a).

(10) ASTM Specification D2513 "Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings" (D2513-87).

(11) ASTM Specification D2517 "Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings" (D2517-73) (Reapproved 1979).

C. The American National Standards Institute, Inc.:

(1) ANSI B16.1 "Cast-Iron Pipe Flanges and Flanged Fittings" (1975).

(2) ANSI B16.5 "Steel Pipe Flanges and Flanged Fittings" (1977).

D. The American Society of Mechanical Engineers:

(1) ASME Boiler and Pressure Vessel Code, Section VIII "Pressure Vessels Division 1" (1977).

(2) ASME Boiler and Pressure Vessel Code, Section IX "Welding Qualifications" (1977).

E. Manufacturer's Standardization Society of the Valve and Fittings Industry;

(1) MSS SP-44 "Steel Pipe Line Flanges" (1975).

(2) [Reserved]

F. National Fire Protection Association:

(1) NFPA Standard 30 "Flammable and Combustible Liquids Code" (1977).

(2) NFPA Standard 58 "Standard for the Storage and Handling of Liquefied Petroleum Gases" (1979).

(3) NFPA Standard 59 "Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants" (1979).

(4) NFPA Standard 59A "Storage and Handling Liquefied Gas" (1979).

(5) "National Electrical Code" NFPA 70 (ANSI) (1978).

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. Ch. 1, Appendix A, October 1, 1990)

Appendix B--Qualification of Pipe

I. Listed Pipe Specifications. Numbers in parentheses indicate applicable editions.

API 5L--Steel pipe (1988).

ASTM A53--Steel pipe (1979).

ASTM A106--Steel pipe (1979).

ASTM A333--Steel pipe (1979).

ASTM A381--Steel pipe (1979).

ASTM Specification A671--Steel pipe

(1977).

ASTM Specification A672--Steel pipe

(1979).

ASTM Specification A691--Steel pipe

(1979).

ASTM D2513--Thermoplastic pipe and tubing

(1987).

ASTM D2517--Thermosetting plastic pipe and

tubing (1973).

II. Steel pipe of unknown or unlisted specification.

A. Bending Properties. For pipe 2 inches or less in diameter, a length of pipe must be cold bent through at least 90 degrees around a cylindrical mandrel that has a diameter 12 times the diameter of the pipe, without developing cracks at any portion and without opening the longitudinal weld.

For pipe more than 2 inches in diameter, the pipe must meet the requirements of the flattening tests set forth in ASTM A53, except that the number of tests must be at least equal to the minimum required in paragraph II-D of this appendix to determine yield strength.

B. Weldability. A girth weld must be made in the pipe by a welder who is qualified under subchapter 7 of this part. The weld must be made under the most severe conditions under which welding will be allowed in the field and by means of the same procedure that will be used in the field. On pipe more than 4 inches in diameter, at least one test weld must be made for each 100 lengths of pipe. On pipe 4 inches or less in diameter, at least one test weld must be made for each 400 lengths of pipe. The weld must be tested in accordance with API Standard 1104. If the requirements of API Standard 1104 cannot be met, weldability may be established by making chemical tests for carbon and manganese, and proceeding in accordance with section IX of the ASME Boiler and Pressure Vessel Code. The same number of chemical tests must be made as are required for testing a girth weld.

C. Inspection. The pipe must be clean enough to permit adequate inspection. It must be visually inspected to ensure that it is reasonably round and straight and there are no defects which might impair the strength or tightness of the pipe.

D. Tensile Properties. If the tensile properties of the pipe are not known, the minimum yield strength may be taken as 24,000 p.s.i. or less, or the tensile properties may be established by performing tensile tests as set forth in API Specification 5L. All test

specimens shall be selected at random and the following number of tests must be performed:

NUMBER OF TENSILE TESTS - ALL SIZES

10 lengths or less.....	1 set of tests for each length.
11 to 100 lengths.....	1 set of tests for each 5 lengths, but not less than 10 tests.
Over 100 lengths.....	1 set of tests for each 10 lengths, but not less than 20 tests.

If the yield-tensile ratio, based on the properties determined by those tests, exceeds 0.85, the pipe may be used only as provided in section 6-77-21(c).

III. Steel pipe manufactured before November 12, 1970, to earlier editions of listed specifications. Steel pipe manufactured before November 12, 1970, in accordance with a specification of which a later edition is listed in section I of this appendix, is qualified for use under this part if the following requirements are met:

A. Inspection. The pipe must be clean enough to permit adequate inspection. It must be visually inspected to ensure that it is reasonably round and straight and that there are no defects which might impair the strength or tightness of the pipe.

B. Similarity of specification requirements. The edition of the listed specification under which the pipe was manufactured must have substantially the same requirements with respect to the following properties as a later edition of that specification listed in section I of this appendix:

(1) Physical (mechanical) properties of pipe, including yield and tensile strength, elongation, and yield to tensile ratio, and testing requirements to verify those properties.

(2) Chemical properties of pipe and testing requirements to verify those properties.

C. Inspection or test of welded pipe. On pipe with welded seams, one of the following requirements must be met:

(1) The edition of the listed specification to which the pipe was manufactured must have substantially the same requirements with respect to nondestructive inspection of welded seams and the standards for acceptance or rejection and repair as a later edition of the specification listed in section I of this appendix.

(2) The pipe must be tested in accordance with subchapter 12 to at least 1.25 times the maximum allowable operating pressure if it is to be installed in a class 1 location and to at least 1.5 times the maximum allowable operating pressure if it is to be installed in a class 2, 3, or 4 location. Notwithstanding any shorter time period permitted under subchapter 12 the test pressure must be maintained for at least 8 hours.

[Eff] (Auth: HRS '269-6) (Imp: 49 C.F.R. Ch. 1, Appendix B, October 1, 1990)

Appendix C--Qualification of Welders for Low Stress Level Pipe

I. Basic test. The test is made on pipe 12 inches or less in diameter. The test weld must be made with the pipe in a horizontal fixed position so that the test weld includes at least one section of overhead position welding. The beveling, root opening, and other details must conform to the specifications of the procedure under which the welder is being qualified. Upon completion, the test weld is cut into four coupons and subjected to a root bend test. If, as a result of this test, two or more of the four coupons develop a crack in the weld material, or between the weld material and base metal, that is more than 1/8-inch long in any direction, the weld is unacceptable. Cracks that occur on the corner of the specimen during testing are not considered.

II. Additional tests for welders of service line connections to mains. A service line connection fitting is welded to a pipe section with the same diameter as a typical main. The weld is made in the same position as it is made in the field. The weld is unacceptable if it shows a serious undercutting or if it has rolled edges. The weld is

tested by attempting to break the fitting off the run pipe. The weld is unacceptable if it breaks and shows incomplete fusion, overlap, or poor penetration at the junction of the fitting and run pipe.

III. Periodic tests for welders of small service lines. Two samples of the welder's work, each about 8 inches long with the weld located approximately in the center, are cut from steel service line and tested as follows:

(1) One sample is centered in a guided bend testing machine and bent to the contour of the die for a distance of 2 inches on each side of the weld. If the sample shows any breaks or cracks after removal from the bending machine, it is unacceptable.

(2) The ends of the second sample are flattened and the entire joints subjected to a tensile strength test. If failure occurs adjacent to or in the weld metal, the weld is unacceptable. If a tensile strength testing machine is not available, this sample must also pass the bending test prescribed in subparagraph (1).

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. Ch. 1, Appendix C, October 1, 1990)

Appendix D--Criteria for Cathodic Protection and Determination of Measurements

I. Criteria for cathodic protection.

A. Steel, cast iron, and ductile iron structures.

(1) A negative (cathodic) voltage of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell. Determination of this voltage must be made with the protective current applied, and in accordance with sections II and IV.

(2) A negative (cathodic) voltage shift of at least 300 millivolts. Determination of this voltage shift must be made with the protective current applied, and in accordance with sections II and IV. This criterion of voltage shift applies to structures not in contact with metals of different anodic potentials.

(3) A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV.

(4) A voltage at least as negative (cathodic) as that originally established at the

beginning of the Tafel segment of the E-log-I curve. This voltage must be measured in accordance with section IV.

(5) A net protective current from the electrolyte into the structure surface as measured by an earth current technique applied at predetermined current discharge (anodic) points of the structure.

B. Aluminum structures.

(1) Except as provided in paragraphs (3) and (4), a minimum negative (cathodic) voltage shift of 150 millivolts, produced by the application of protective current. The voltage shift must be determined in accordance with sections II and IV.

(2) Except as provided in paragraphs (3) and (4), a minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV.

(3) Notwithstanding the alterative minimum criteria in paragraphs (1) and (2), aluminum, if cathodically protected at voltages in excess of 1.20 volts as measured with reference to a copper-copper sulfate half cell, in accordance with section IV, and compensated for the voltage (IR) drops other than those across the structure-electrolyte boundary may suffer corrosion resulting from the build up of alkali on the metal surface. A voltage in excess of 1.20 volts may not be used unless previous test results indicate no appreciable corrosion will occur in the particular environment.

(4) Since aluminum may suffer from corrosion under high pH conditions, and since application of cathodic protection tends to increase the pH at the metal surface, careful investigation or testing must be made before applying cathodic protection to stop pitting attack on aluminum structures in environments with a natural pH in excess of 8.

C. Copper structures. A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV.

D. Metals of different anodic potentials. A negative (cathodic) voltage, measured in accordance with section IV, equal to that required for the most anodic metal in the system must be maintained. If amphoteric structures are involved that could be damaged by high alkalinity covered by paragraphs B(3) and B(4), they must be electrically isolated with insulating flanges, or the equivalent.

II. Interpretation of voltage measurement. Voltage (IR) drops other than those across the structure electrolyte boundary must be considered for valid interpretation of the voltage measurement in paragraphs A(1) and A(2) and paragraph B(1) of section I.

III. Determination of polarization voltage shift. The polarization voltage shift must be determined by interrupting the protective current and measuring the polarization decay. When the current is initially interrupted, an immediate voltage shift occurs. The voltage reading after the immediate shift must be used as the base reading from which to measure polarization decay in paragraphs A(3), B(2), and C of section I.

IV. Reference half cells.

A. Except as provided in paragraphs B and C, negative (cathodic) voltage must be measured between the structure surface and saturated copper-copper sulfate half cell contacting the electrolyte.

B. Other standard reference half cells may be substituted for the saturated copper-copper sulfate half cell. Two commonly used reference half cells are listed below along with their voltage equivalent to 0.85 volt as referred to a saturated copper-copper sulfate half cell:

(1) Saturated KCl calomel half cell: 0.78 volt.

(2) Silver-silver chloride half cell used in sea water: -0.80 volt.

C. In addition to the standard reference half cells, an alternate metallic material or structure may be used in place of the saturated copper-copper sulfate half cell if its potential stability is assured and if its voltage equivalent referred to

a saturated copper copper sulfate half cell is established."

[Eff] (Auth: HRS '269 6) (Imp: 49 C.F.R. Ch. 1, Appendix D, October 1, 1990)

DEPARTMENT OF BUDGET AND FINANCE

Chapter 77, Hawaii Administrative Rules, State of Hawaii Public Utilities Commission rules relating to Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards on the Summary Page dated April 15, 1994, was adopted April 15, 1994, following public hearings held on March 15, 16, 17, 30, and 31, 1993 and April 1, 5, and

6, 1993, after public notice was given in the Hawaii Tribune-Herald and West Hawaii Today on February 14, 1993, the Honolulu Advertiser on February 13, 1993, The Garden Island on February 28, 1993, and the Maui News on February 28, 1993.

These rules shall take effect ten days after filing with the Office of the Lieutenant Governor.

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EUGENE S. IMAI

Director

Department of Budget and

Finance

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YUKIO NAITO

Chairperson

Public Utilities

Commission

APPROVED AS TO FORM:

_____

Deputy Attorney General

_____

JOHN WAIHEE

Chairperson

State of Hawaii

Date:

_____

Filed

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[1]For offshore segments installed, uprated or converted after July 31, 1977, that are not located on an offshore platform, the factor is 1.25. For segments installed, uprated or converted after July 31, 1977, that are located on an offshore platform or on a platform in inland navigable waters, including a pipe riser, the factor is 1.5.