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PART 192****GAS PIPELINE TRANSMISSION
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Subpart D**Design of Pipeline Components****§ 192.141 Scope**

This subpart prescribes minimum requirements for the design and installation of pipeline components and facilities. In addition, it prescribes requirements relating to protection against accidental over pressuring.

§ 192.143 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.

ESI RESPONSE TO § 192.143

All components of piping systems including, but not expressly limited to valves, flanges, fittings, headers, special assemblies, shall be designed in accordance with the applicable requirements of ANSI/ASME B31.8 and recognized engineering practices to withstand operating pressures and other specified loadings. The components must be piggable to comply with DOT regulations.

Approved: Signature on file Date: __
Manager, Safety, Health, and Environmental

Approved: Signature on file Date: __
Environmental Manager

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Components shall be selected that are designed to withstand the specified field test pressure without failure, leakage or impairment of serviceability.

Reference ESI's "Gas Transmission Pipeline Plant Engineering Specifications" DOT-006 sections:

- 5.0 Materials and Equipment**
- 6.0 Welding Procedures**
- 7.0 Piping System Components and Fabrication Details**
- 8.0 Design, Installation, and Testing**

§ 192.144 Qualifying Metallic Components

Notwithstanding any requirement of this subpart which incorporates by reference an edition of a document listed in appendix A of this part, a metallic component manufactured in accordance with any other edition of that document is qualified for use under this part if--

- (a) 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
- (b) 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:
 - (1) Pressure Testing;
 - (2) Materials; and
 - (3) Pressure and temperature ratings.

ESI RESPONSE TO § 192.144

Line pipe for use on ESI gas transmission pipelines will be manufactured to the requirements in API 5L, "Line Pipe" and shall follow the ESI's "Gas Transmissions

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Pipeline Plant Engineering Specifications” DOT-006 section(s) 4.0 Design, Fabrication, Operation, and Testing Terms, Section 5.0 Materials and Equipment, Section 7.0 Piping System Components and Fabrication Details, and Section 8.0 Design, Installation, and Testing.

All valves, fittings, flanges, bolting, pipe, and tubing shall be marked in accordance with the marking section of the standards and specifications to which the items were manufactured or in accordance with the requirements of MSS SP-25.

Only steel pipe shall be installed on Company gas transmission pipelines and shall be manufactured to the appropriate specifications in API 5L, “Specifications for Line Pipe”. Seamless, double submerged arc, or electric resistance welded line pipe shall be specified on the purchase order.

For pipe having a specified minimum yield strength of 56,000 psi or greater, fracture toughness tests should be required.

For mechanical strength, minimum pipe wall thickness for different schedule pipe is as follows:

NPS 2 and smaller	Schedule 80
NPS 4	Schedule 40
NPS 6 and larger	0.250"

§ 192.145 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.

ESI RESPONSE TO §192.145

Valves shall conform to standards and specifications in ESI’s section 7.2 “Plant Engineering Specifications for Gas Transmission Pipelines” DOT-006 and ANSI/ASME B31.8 and shall be used only in accordance with the service recommendations of the manufacturer.

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Valves manufactured in accordance with the following standards may be used for gas transmission pipeline systems:

- | | | |
|----|-------------|-----------------|
| 1. | ANSI B16.34 | STEEL VALVES |
| 2. | API 6D | PIPELINE VALVES |

Valves having shell (body, bonnet, cover, and/or end flange) components made of cast ductile iron in compliance with ASTM A395 and having dimensions conforming to ANSI B16.34 and API 6D may be used at pressures not exceeding 80% of the pressure ratings for comparable steel valves at their listed temperature provided operating pressure is less than 1000 psi and no welding has been performed in the valve fabrication.

Valves having shell components made of cast iron shall not be used in gas piping components for compressor stations.

Threaded valves shall be threaded according to API 5L or ANSI B1.20.1.

Pressure reducing devices shall conform to the requirements for valves in comparable service conditions.

- (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:
 - (i) With the valve in the fully open position, the shell must be tested with no leakage to a pressure at least 1.5 the maximum service rating.
 - (ii) After the shell test, the seat must test to a pressure no 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.

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- (iii) After the last pressure test is completed, the valve must be operated through its full travel to demonstrate freedom from interference.
- (c) Each valve must be able to meet the anticipated operating conditions.
- (d) No valve having shell components made of ductile iron may be used at pressures exceeding 80% 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 80% of the pressure ratings for comparable steel valves at their listed temperature, if:
 - (1) The temperature-adjusted service pressure does not exceed 1,000 p.s.i.g.; and
 - (2) Welding is not used on any ductile iron component in the fabrication of the valve shells or their assembly.
- (e) No valve having pressure containing parts made of ductile iron may be used in the gas pipe components of compressor stations.

§ 192.147 Flanges and Flange Accessories

- (a) Each flange or flange accessory (other than cast iron) must meet the minimum requirements of ASME/ANSI B16.5, MSS SP-44, or the equivalent.

ESI RESPONSE TO § 192.147

All fittings NPS 2 and larger shall be butt welding fittings in accordance with ANSI B16.9. Weld fittings shall have physical properties equivalent to the pipe to which the fittings will be welded. Heavier wall, lower strength fittings may be used with lighter wall, higher strength pipe with transitions at the ends of the fittings in accordance with the requirements of ASME/ANSI B31.8 and ESI's "Gas Transmission Pipeline Plant Engineering Specification" DOT-006 section 7.2.3.

Flange types, facings, gaskets, and bolting shall be purchased and installed in accordance with these requirements.

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- (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 ASME/ANSI B16.1 and be cast integrally with the pipe, valve, or fitting.

ESI RESPONSE TO § 192.147**Steel Flanges and Flanged Fittings:**

Steel flanges and flanged fittings shall also conform with the requirements of MSS-6 “Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings”. The following limitations apply to steel flanges and flanged fittings:

- (a) Lap joint flanges shall not be used where vibration or lateral movement is anticipated.
- (b) Where threaded flanges are used, heavier than design wall pipe must be used to offset the loss of strength due to threads, provided that the wall thickness is not less than shown in Table C-1 of subpart C.

The bore of welding neck flanges should correspond to the inside diameter of the pipe used.

For all flange joints, the bolts or stud-bolts used shall extend completely through their nuts. It is recommended that stud-bolts be used where the pressure is greater than 500 psig.

For all flange joints, bolting shall be made of alloy steel conforming to ASTM Specification A 192, “Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service,” A 320, “Alloy-Steel Bolting Materials for Low Temperature Service,” A 449, “Heat Treated Carbon Steel,” or A 354, “Quenched and Tempered Alloy-Steel Bolts, Studs and Other Externally Threaded Fasteners,” except that bolting for Class 150 and Class 300 flanges at temperatures between minus 20° F and plus 450° F may be made of materials equal to, or

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better than Grade B of ASTM A 307, "Carbon Steel Externally Threaded Standard Fasteners."

The following are requirements which shall apply to specific applications:

- (a) Alloy-steel bolting material conforming to ASTM A 193 or A 354 shall be used for insulating flanges and such bolting may be 1/8" under size.
- (b) Where operating pressures exceed 300 psig, a torque wrench shall be used to assure that the correct force is applied. All stud and nut threads, nut faces and bearing surfaces shall be cleaned before tightening. Any nut which does not make uniform contact with the bearing surface shall be replaced.

The external condition of studs and nuts in service shall be determined carefully and regularly by visual or other means of inspection as part of normal operations.

Material for gaskets shall be capable of maintaining its physical and chemical properties while subjected to the maximum service conditions. Non-combustible gasket material shall be used at temperatures in excess of 250F. No asbestos gaskets will be used.

Except for the condition where certain alloy flanges have the same range of hardness as the ring gaskets, the material for ring gaskets shall be softer than the flange.

Spiral wound with mica graphite or non-asbestos chlorite mineral filler gaskets should be used with raised face flanges.

Metal or metal-jacketed gaskets with similar fillers as listed above (either plain or corrugated) are recommended for use with the small male-and-female or the small tongue-and-groove facings. They may also be used with steel flanges with any of the following faces; lapped, large male-and female, large tongue and groove, or raised face.

Spiral wound gaskets are recommended for use in compressor station piping with:

- (a) Flanges susceptible to excessive vibration, or
- (b) Class 400 or greater raised face or flat face flanges.

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Spiral wound gaskets shall not be used in flanged connections where electrical isolation is required. When used in locations where corrosive conditions exist, metal components of spiral wound gaskets shall be corrosion resistant.

§ 192.149 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 part, 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.

ESI RESPONSE TO § 192.149

Fittings other than Valves and Flanges shall comply with section 7.2.4 of ESI's "Gas Transmission Pipeline Plant Engineering Specification" DOT-006.

STANDARD FITTINGS:

The minimum metal thickness of flanged or threaded fittings shall not be less than specified for the pressures and temperatures in the applicable American National Standards or the MSS Standard Practice.

Steel butt welding fittings shall comply with either ANSI B16.9 or MSS SP-75 and shall have pressure/temperature ratings based on stresses for pipe of the same or equivalent material. The actual bursting strength of fittings shall equal the computed bursting strength of pipe of designated material and wall thickness. Mill hydrotesting is not required for steel butt welding fittings, but the fittings must be capable of withstanding a field pressure test to the manufacturer's test pressure.

Steel socket-welding fittings shall comply with ANSI B16.11.

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Ductile iron flanged fittings shall comply with the requirements of ANSI B16.42 or ANSI A21.14.

BRANCH CONNECTIONS:

Welded branch connections on steel pipe must meet the design requirements of sections 7.2.5 and 7.2.6 in ESI's "Gas Transmission Pipeline Plant Engineering Specification".

Mechanical fittings may be used for making hot taps on pipelines provided the fittings are designed for the operating pressure of the pipeline. (See section § 192.151 Hot Tapping Response.)

Special components fabricated by welding, pressure design of other pressure containing components, closures, reinforcement of welded branch connections, etc., is covered in detail in ESI's "Gas Transmission Pipeline Plant Engineering Specification" DOT-006.

§ 192.150 Passage of Internal Inspection Devices

- (a) Except as provided in paragraph (b) and (c) of this section, each new transmission line and each line section of a transmission line where the line pipe, valve, fitting, or other line component is replaced must be designed and constructed to accommodate the passage of instrumented internal inspection devices.
- (b) This section does not apply to:
 - (1) Manifolds;
 - (2) Station piping such as at compressor stations, meter stations, or regulator stations;
 - (3) Piping associated with storage facilities, other than a continuous run of transmission line between a compressor station and storage facilities;
 - (4) Cross-overs;
 - (5) Sizes of pipe for which an instrumented internal inspection device is not commercially available;

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- (6) Transmission lines, operated in conjunction with a distribution system which are installed in Class 4 locations;
 - (7) Offshore pipelines, other than transmission lines 10 inches or greater in nominal diameter, that transport gas to onshore facilities; and
 - (8) Other piping that, under CFR Part 190.9 and LAC43:XII, the Administrator finds in a particular case would be impracticable to design and construct to accommodate the passage of instrumented internal inspection devices.
- (c) An operator encountering emergencies, construction time constraints or other unforeseen construction problems need not construct a new or replacement segment of a transmission line to meet paragraph (a) of this section, if the operator determines and documents why an impracticability prohibits compliance with paragraph (a) of this section. Within 30 days after discovering the emergency or construction problem the operator must petition, under CFR Part 190.9 and LAC 43:XII, for approval that design and construction to accommodate passage of instrumented internal inspection devices would be impracticable. If the petition is denied, within one year after the date of the notice of the denial, the operator must modify that segment to allow passage of instrumented internal inspection devices.

ESI RESPONSE TO § 192.150

Reference DOT-003 “Pipeline Pigging Operating Procedures” for specific pipeline pigging information.

§ 192.151 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.

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- (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 25% 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 4-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 6-inch or larger pipe.

ESI RESPONSE TO § 192.151

All hot taps shall be installed by trained and experienced crews in accordance with ESI's Safety and Health Procedure No. 1.19 "Hot Tapping", written engineering specifications and procedures which are unique for each job. Hot tapping will not be performed on the Hydrogen, Ethylene or VCM Vapor Lines except with the LCCC Operations Managers approval.

§ 192.153 Components Fabricated by Welding

- (a) Except for branch connections and assemblies of standard pipe and fittings joined 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, Division 1, of the ASME Boiler and Pressure Vessel Code.
- (b) Each prefabricated unit that uses plate and longitudinal seams must be designed, constructed, and tested in accordance with section VIII, Division 2 of the ASME Boiler and Pressure Vessel Code, except for the following:
 - (1) Regularly manufactured butt-welding fittings.

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- (2) Pipe that has been produced and tested under a specification listed in appendix B to this part.
- (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 20% or more of the SMYS of the pipe.
- (d) Except for flat closures designed in accordance with section VIII of the ASME 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 3 inches nominal diameter.

ESI RESPONSE TO § 192.153

Pipeline components are covered in ESI's "Gas Transmission Pipeline Plant Engineering Specification" DOT-006 sections 6.0 Welding, 7.0 Piping System Components and Fabrication Details, and 7.2.4.3 Special Components Fabricated by Welding:

All welding shall be performed using procedures and welders that are qualified to section 6.0. Welding in ESI's "Gas Transmission Pipeline Plant Engineering Specification" DOT-006.

Branch connections shall meet the design requirements in ASME/ANSI B31.8, paragraphs 831.4, 831.5, and 831.6. Prefabricated units, other than regularly manufactured butt welding fittings, which use plate and longitudinal seams shall be designed, constructed, and tested under requirements of the ASME BPV Code. Every prefabricated unit produced under this part shall be hydrotested to a pressure equal to the test pressure equal to the test pressure for the system in which the unit will be installed. For installation in existing facilities, the fabricated unit shall withstand a leak test at the operating pressure of the line.

§ 192.155 Welded Branch Connections

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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.

ESI RESPONSE TO § 192.155

For integrally reinforced fittings, the maximum size weldolets, threadolets, or similar branch fittings are 2 inch nominal outside diameter.

Welded branch connections on steel pipe must meet the design requirements of paragraphs 7.2.5 and 7.2.6 of section 7.0 Piping System Components in ESI's "Gas Transmission Pipelines Plant Engineering Specification" DOT-006.

§ 192.157 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.

ESI RESPONSE TO § 192.157

Extruded Outlets to steel extruded outlets in which reinforcement is integral must meet the requirements of paragraph 7.2.7 in section 7.0 Piping System Components and Fabrication Details in ESI's "Gas Transmission Pipelines Plant Engineering Specification" DOT-006.

§ 192.159 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.

ESI RESPONSE TO § 192.159

ESI requires Company pipelines to be designed in accordance with ASME/ANSI B31.8. Appendix E "Flexibility and Stress Intensification Factors" provide factors for typical

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pipeline components. Paragraph 832 of B31.8 provides guidance for expansion/contraction design in straight-runs of pipe above grade. Reference section 7.3 Expansion and Flexibility and 7.4 Combined Stress Calculations of ESI's "Gas Transmission Pipeline Plant Engineering Specification" DOT-006.

§ 192.161 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.
 - (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 50% or more of SMYS must comply with the following:
 - (1) A structural support may not be welded directly to the pipe.

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

ESI RESPONSE TO § 192.161

Reference section 7.0 Piping System Components and Fabrication Details, paragraph(s) 7.5 and 7.6 Supports and Anchorage for Exposed Piping as well as section 8.0 Design, Installation and Testing in the ESI "Gas Transmission Pipeline Plant Engineering Specification" DOT-006. Piping and equipment shall be supported to prevent or dampen excessive vibration, and shall be anchored to prevent undue strains on connected equipment.

Secondary Stress Design - Buried Piping:

Longitudinal forces caused by bends or offsets in buried piping must be resisted by anchorage at the bend, by restraint due to soil friction, or by longitudinal stresses in the pipe.

Anchorage at Bends:

If pipe is anchored by bearing at a bend, care shall be taken to distribute the load so that the bearing pressure of the soil is within safe limits.

Restraint Due to Soil Friction:

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Where there is doubt as to the adequacy of anchorage by soil friction, calculations shall be made.

Forces on Pipe Joints:

If anchorage is not provided at the bend, pipe joints which are close to the points of thrust origin shall be designed to sustain the longitudinal pullout force. If not, suitable bracing or strapping of a sufficient number of joints must be provided and the indicated anchoring installed.

Support:

Uniform and adequate support of the pipe in the trench is essential. Unequal settlements may produce added bending stresses in the pipe. Lateral thrusts at branch connections may greatly increase the stresses in the branch connection itself, unless the fill is thoroughly consolidated or other provisions are made to resist the thrust. Where vertical branch connections, such as blow-offs, are used, thrust blocks should be installed to absorb reaction thrusts.

Applications of Supports and Anchors:

Suitable spring hangers, sway bracing, etc., shall be provided where necessary. If compression or sleeve-type couplings are used, provision shall be made for the longitudinal forces noted in 192.161 (b). Suitable bracing or strapping shall be provided if such provisions are not made in the manufacture of the coupling. However, such design must not interfere with the normal performance of the coupling or with its proper maintenance.

Applications of Supports and Anchors:

Structural supports or anchors may be welded directly to piping designed to operate at a hoop stress of less than 50 percent of the Specified Minimum Yield Strength, provided no vibration or pulsation is present or anticipated. The connection of the structural supports to the pipe shall be by continuous, rather than intermittent welds.

§ 192.163 Compressor Stations: Design and Construction

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- (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 2 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, ANSI/NFPA 70 (ANSI, so far as that code is applicable).

ESI RESPONSE TO § 192.163**Layout, Construction and Testing:**

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All gas piping in the working area of a compressor station shall be installed in accordance with the requirements of 49 CFR subpart G and section 8.3 Compressor Stations of ESI's "Gas Transmission Pipeline Plant Engineering Standard" DOT-006.

Each transmission compressor station shall be provided with an emergency shutdown system to block gas from the station and the station gas piping can be blown down.

Pressure relief devices shall be installed and maintained to assure the MAOP of station piping and equipment is not exceeded by more than 10%.

Building Construction:

For the purpose of this Manual, "noncombustible" and "limited noncombustible" are the same. Limited combustible as applied to a building construction material means a material which, in the form in which it is used, does not have a potential heat value exceeding 3500 Btu per pound and falls in one of the following groups (a) through (c). No material which is subject to increase in combustibility or flame spread rating beyond the limits herein established, through the effects of age, moisture or other atmospheric condition shall be classed as a limited combustible material.

Flame spread rating as used herein means the average rating obtained by evaluating the spread of flame over the surface of a material as determined by a fire test conducted in accordance with the 'The Standard Method of Test for Surface Burning Characteristics of Building Materials', ASTM 84 or U.L. 723 or NFPA 255.

- (a) Materials will not ignite and burn when subjected to fire. Any material which liberates flammable gas when heated to any temperature up to 1,380°F., for five minutes shall not be considered a limited combustible material within the meaning of this group.
- (b) Material having a structural base of limited combustible material, as defined in (a), with a surfacing not exceeding a thickness of 1/8 of an inch which has a flame spread rating not greater than 50.
- (c) Materials in the form and thickness used, other than as described in (a) or (b),

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having a flame spread rating not greater than 25 without evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would not have a flame spread rating greater than 25 without evidence of continued progressive combustion.

A minimum of two exits shall be provided for each operating floor of a main compressor building, basements and any elevated walkways or platforms 10 feet or more above ground or floor level. These exits may be fixed ladders, stairways, etc. The maximum distance from any point on an operating floor to an exit shall not exceed 75 feet measured along the center-line of aisles or walkways.

Building Construction:

Building exits shall be doorways located as to provide unobstructed passage to a place of safety. Individual engine catwalks shall not require two exits.

Where gas piping is installed underneath the operating floor, a substructure shall be provided. The term sub-structure, for this purpose, is defined as a trench pit or open area of a size and depth adequate for inspection purposes.

All domestic natural gas fired appliances shall have the American Gas Association seal of approval and shall be installed in accordance with Form c 2235 CSD "Standards For Gas Piping, on Customer's Premises."

Main Compressor Units and Associated Equipment:

Each main compressor unit shall be unitized to the extent that it can be operated and held in sustained operation with complete independence from other main units.

Cooling System:

Jacket water cooling systems on all angle and auxiliary engines shall be of the closed type.

Vent Lines:

Each engine having an enclosed crankcase shall be vented to the atmosphere or other non-hazardous locations. Each compressor packing case and distance piece shall be vented to

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the atmosphere. All vent lines to the atmosphere shall be adequately supported, and protected from accumulating rain and shall not be manifolded without the approval of the Technology Manager or Project Engineering Manager.

Compressor Air Systems--General:

- (a) Compressor air systems shall be designed with adequate pressure, storage volume and connecting piping for the service for which they are intended.
- (b) Air storage bottles and receivers shall be designed, constructed, tested, stamped and equipped in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.
- (c) Equipment for cooling the air and removing the moisture and entrained oil may be installed between the air compressor and the air storage tanks.
- (d) The air compressor intake should be located in an area free of flammable vapors or gases.

Auxiliary Piping Systems:

Air piping, lubricating oil piping and hydraulic piping shall meet the requirements of ANSI B31.3, "Petroleum Refinery Piping".

Water and steam piping shall meet the requirements of ANSI B31.1 "Power Piping".

Instrument, control and sampling piping shall meet the requirements of 192.203 of this manual and section 8.4 of the ESI "Gas Transmission Pipeline Plant Engineering Specification" DOT-006. Every pipeline or compressor station shall be equipped with suitable pressure relieving or pressure limiting devices if the equipment is connected to a gas source where failure might result in a pressure which would exceed the MAOP of the facility.

Acceptance Test:

Main compressor units shall be evaluated for acceptance by field or shop test prior to the termination date of the manufacturer's guarantee. The lower net dry heating value of

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natural gas should be used for the test. A manufacturer's representative should be present during the tests.

Electrical Facilities:

Ignition systems used on internal combustion engines are excluded from these provisions. Equipment and associated wiring powered by the ignition system may be excluded from these provisions when the engine is located outdoors or in a semi-enclosed structure (enclosed wall area not more than 50 % of total wall area) that has been designed to prevent entrapment of gases.

In accordance with the National Electrical Code NFPA-70 (ANSI), equipment and associated wiring, approved as "Intrinsically Safe", shall be permitted in any classified location for which it is approved.

Emergency lighting facilities, which will function in the event of an electrical power failure, shall be installed to provide illumination for exits in buildings which house gas compressor equipment. Such facilities shall be tested quarterly. These facilities shall be automatic and operative when the emergency shutdown system is actuated.

The following types of compressor buildings may be excluded from the requirements for emergency lighting facilities if approved by the Technology Manager or Project Engineering Manager:

- (a) Buildings of the semi-enclosed type as described in the first paragraph of this section.
- (b) Buildings of stations of 1000 HP or less which are normally unattended or which are attended only during daylight hours, provided the compressor building has windows so arranged to provide an adequate level of natural light to all portions of the means of egress.

Emergency lighting and other electrical installations in classified locations, as defined in the National Electrical Code, which are to remain in operation during a compressor station emergency shutdown as provided in 192.67 (a) (3) shall be designed to conform to the specifications of National Electrical Code for Class 1, Division 1.

§ 192.165 Compressor Stations: Liquid Removal

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- (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 of 0.4, or less.

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If liquid condensate is identified as present in the inlet gas stream, liquid removal equipment shall be installed. Liquid separators shall be constructed in accordance with ASME/ANSI B31.8 with Location Class 4 requirements (Design Factor = 0.5) when using API 5L pipe or equivalent, ANSI B31.8 specified fittings, and no internal welding. Liquid separators when constructed of materials other than Section 8.3.1.1 of the Gas Pipeline Transmission Plant Engineering Specifications shall be constructed in accordance with Section VIII, Division 1, ASME Boiler and Pressure Vessel Code.

Gas cleaners shall be installed when and where they are determined to be necessary. Under certain conditions, gas cleaners equipped with mist extractors may be substituted for the liquid separator described previously. Contractors used in conjunction with a dehydration plant, installed on the suction line(s), may be used in lieu of gas cleaners. In such cases, adequate means of liquid removal shall be installed between the contractor and the compressor. Reference ESI's "Gas Transmission Pipelines Plant Engineering Specification" for information.

§ 192.167 Compressor Stations: Emergency Shutdown

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- (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:
 - (i) 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
 - (ii) Electrical circuits needed to protect equipment from damage may remain energized.
 - (4) It must be operable from at least two locations, each of which is:
 - (i) Outside the gas area of the station;
 - (ii) Near the exit gates, if the station is fenced, or near emergency exits, if not fenced; and
 - (iii) 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.

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- (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:
 - (i) When the gas pressure equals the maximum allowable operating pressure plus 15%; or
 - (ii) When an uncontrolled fire occurs on the platform; and
 - (2) In the case of a compressor station in a building:
 - (i) When an uncontrolled fire occurs in the building; or
 - (ii) When the concentration of gas in air reaches 50% or more of the lower explosive limit in a building which has a source of ignition.

For the purpose of paragraph (c)(2)(ii) of this section, an electrical facility which conforms to Class 1, Group D of the National Electrical Code is not a source of ignition.

ESI RESPONSE TO § 192.167**General:**

Gas pipelines which pass through a compressor station working area and which are connected to the station piping only by a standby connection shall be equipped with a shutdown valve in the tie-in section that is included in the station emergency shutdown system.

Gas pipelines which pass through a compressor station working area and are not connected to the station piping are exempt from this requirement.

Valves:

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Isolating fire valves shall be installed in all pipelines entering and leaving the compressor station. The valves shall be located at a safe distance from the compressor station and compressor building. Lubricated plug or lubricated ball valves shall be used. Isolating fire valves in discharge lines may be supplemented by check valves. (Check with the Safety Department and Technology Manager or Project Engineering Manager to determine if a fireproof valve should be used.)

The operating medium for valve operators shall be compressed air, natural gas or inert gas. The medium shall be thoroughly cleaned and dehydrated prior to introduction into the system.

The operating medium shall be stored in a separate storage vessel(s) capable of being isolated from all other service requirements and shall have a minimum capacity double that required to operate all valves in the shutdown system designed to be supplied from the storage vessel(s). When using air, the vessel(s) shall be isolated from other compressed air storage facilities by one, and preferably two, check valves on the inlet piping. The tank should be located as close to the valve setting as reasonably possible.

All operators shall be installed so the valve can be repositioned at the individual valve location. With approval of the Technology Manager or Project Engineering Manager, the emergency shutdown control system can incorporate the facilities for remotely repositioning emergency shutdown valves from the main emergency shutdown system control-annunciation panel.

The operator shall include a manual reset device. The system shall be designed so that the isolating fire valves and blowdown valves can be tested individually without shutting the station down.

All important gas pressure piping shall be identified as to functions by signs or color codes where appropriate.

Shutdown Stations:

Station security should be considered in the design and location of all emergency shutdown stations so that the possibility of activating the system by unauthorized personnel be minimized.

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The activating system may be of the pressurized, non-pressurized or fail-safe electrical type.

Extra-strong, nominal 1" diameter seamless coated piping, that is adequately cathodically protected shall be provided for all underground control lines.

§ 192.169 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 10%.
- (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.

ESI RESPONSE TO § 192.169

All gas containing facilities in compressor stations that may be over pressured shall be equipped with pressure relieving devices in accordance with § 192.199 and § 192.201, and reference section 8.4 Control and Limiting of Gas Pressure in ESI's "Gas Transmission Pipeline Plant Engineering Specifications" DOT-006. Every pipeline or compressor station shall be equipped with suitable pressure relieving or pressure limiting devices if the equipment is connected to a gas source where failure of pressure control might result in a pressure which would exceed the MAOP of the Facility. The MAOP shall not exceed the lesser of either:

- (a) The design pressure of the weakest element of the pipeline.
- (b) The pressure obtained by dividing the pressure to which the pipeline is tested after construction by the appropriate factor for the Location Class involved. For Company pipelines, test pressure is divided by 40.
- (c) The maximum safe pressure for the pipeline based on its operating and maintenance history.
- (d) The set pressure for relief valves protecting ASME code stamped ASME pressure vessel rating.

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§ 192.171 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.

ESI RESPONSE TO § 192.171

Fuel gas lines in a compressor station shall be equipped with at least one master cut-off valve.

§ 192.173 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.

ESI LAKE CHARLES CHEMICAL COMPLEX RESPONSE TO § 192.173

Currently ESI's Ethylene Terminal compressors are open to the atmosphere.

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§ 192.175 Pipe-Type and Bottle-Type Holders

NOT APPLICABLE. ESI CURRENTLY DOES NOT USE PIPE-TYPE OR BOTTLE-TYPE HOLDERS.

§ 192.177 Additional Provisions for Bottle-Type Holders

NOT APPLICABLE. ESI CURRENTLY DOES NOT USE PIPE-TYPE OR BOTTLE-TYPE HOLDERS.

§ 192.179 Transmission Line Valves

- (a) Each transmission line, other than offshore segments, must have sectionalizing block valves spaced as follows, unless in a particular case the Administrator finds that alternative spacing would provide an equivalent level of safety:
 - (1) Each point on the pipeline in a Class 4 location must be within 2 ½ miles of a valve.
 - (2) Each point on the pipeline in a Class 3 location must be within 4 miles of a valve.
 - (3) Each point on the pipeline in a Class 2 location must be within 7 ½ miles of a valve.
 - (4) Each point on the pipeline in a Class 1 location must be within 10 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.

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- (c) Each section of a transmission line, other than offshore segments, between main line valves must have a blow-down valve 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.

ESI RESPONSE TO § 192.179

Lists of block valves, relief valves, blow-down valves, locations, types, on the gas lines are located on the P&ID's. Information regarding the valves on the lines are located in the individual files.

§ 192.181 Distribution Line Valves

NOT APPLICABLE. ESI DOES NOT HAVE A DISTRIBUTION SYSTEM.

§ 192.183 Vaults

NOT APPLICABLE. ESI DOES NOT HAVE A VAULT.

§ 192.185 Vaults: Accessibility

NOT APPLICABLE. ESI DOES NOT HAVE VAULTS.

§ 192.187 Vaults: Sealing, Venting, and Ventilation

NOT APPLICABLE. ESI DOES NOT HAVE VAULTS.

§ 192.189 Vaults: Drainage and Waterproofing

NOT APPLICABLE. ESI DOES NOT HAVE VAULTS.

§ 192.191 Design Pressure of Plastic Fittings

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NOT APPLICABLE. ESI DOES NOT UTILIZE PLASTIC FOR DOT REGULATED PIPELINES.

§ 192.193 Valve Installation in Plastic Pipe

NOT APPLICABLE. ESI DOES NOT UTILIZE PLASTIC FOR DOT REGULATED PIPELINES.

§ 192.195 Protection Against Accidental Over pressuring

- (a) *General requirements.* Except as provided in § 192.197, 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 § 192.199 and § 192.201.

ESI RESPONSE TO § 192.195

Gas transmission pipelines operated by ESI Company will meet the requirements in paragraph 845.3 “Requirements for Design of Pressure Relief and Pressure Limiting Installations” and paragraph 845.4 “Capacity of Pressure Relieving and Pressure Limiting Station and Devices” in ASME/ANSI B31.8. Reference ESI’s “Gas Transmission Pipeline Plant Engineering Specification” DOT-006, section 8.4 Control and Limiting of Gas Pressure.

- (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 over pressuring.

§ 192.197 Control of the Pressure of Gas Delivered From High-Pressure Distribution

Systems

NOT APPLICABLE. ESI DOES NOT HAVE A HIGH-PRESSURE DISTRIBUTION SYSTEM.

§ 192.199 Requirements for Design of Pressure Relief and Limiting Devices

Except for rupture discs, each pressure relief or pressure limiting device must:

- (a) Be constructed of materials such that the operation of a device will not be impaired by corrosion;
- (b) Have valves and valve seats that are designed not to stick in a position that will make the device inoperative;
- (c) 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;
- (d) Have support made of noncombustible material;
- (e) Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can be discharged into the atmosphere without undue hazard;
- (f) Be designed and installed so that the size of the openings, pipe, and fittings located between the system to be protected and the pressure relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;
- (g) Where installed at a district regulator station to protect a pipeline system from over pressuring, 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
- (h) 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.

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ESI RESPONSE TO § 192.199

ESI will design, construct, and operate their relief valve systems in compliance with the requirements of paragraphs 845.3 and 845.4 in ASME/ANSI B31.8, and reference section 8.4.3 Requirements for Design of Pressure Relief and Pressure Limiting Installations of the ESI's "Gas Transmission Pipelines Plant Engineering Specification" DOT-006.

Requirements - General**Pressure Regulator**

The pressure regulating device shall:

- (a) Be sized and installed in accordance with the manufacturer's recommendations.
- (b) Have the required sensitivity to limit the allowable variation in pressure permitted by the type of service.
- (c) Operate without pulsation or vibration.
- (d) Be of nominal size not exceeding the size of the inlet piping.
- (e) Have a soft seat or equivalent inner valve when a positive shut-off characteristic is required.

Pressure Regulator Settings:

All Pressure regulator settings shall be:

- (a) Designed to withstand the maximum pressure on the inlet of the first-cut regulator when overpressure protective devices are not provided between pressure cuts. Where overpressure protective devices are provided between pressure cuts, all piping, valves, and pressure containing appurtenances shall be selected to withstand the maximum pressure to which they may be subjected with the overpressure protective devices in operation.

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- (b) Designed where the setting is housed so that any electrical facilities installed in the regulator building shall conform to the requirements of § 192.163 (e).
- (c) Designed and installed so that there is no open flame heating equipment in the same room with the pressure regulating equipment.
- (d) Equipped with a shut-off valve installed at the inlet and outlet of each regulator or combination of regulators in series.
- (e) Equipped with a valve on the inlet piping of each regulator station controlling the flow or pressure of gas in a transmission system. The distance between the valve and the regulator station shall be sufficient to permit the operation of the valve during an emergency that might preclude access to the station.
- (f) Tested after construction in accordance with the requirements of 49 CFR192 subpart J.

Specific Requirements:

In addition to the requirements of §§ 199.111 and 199.112, the following specific requirements shall apply:

- (a) Low pressure regulators shall be equipped with positive shut-off inner valves.
- (b) Level and weight loaded low pressure district regulators shall be equipped with auxiliary controls when the diaphragm and inner valves are directly connected to a common stem.

Freezing:

Suitable steps shall be taken to prevent interruption of service or damage to facilities when conditions are anticipated that could produce external freezing around the regulator body, outlet piping and/or internal freezing.

Overpressure Protection Requirements - Pipeline Systems**Set Pressure Criteria:**

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- (a) Where the overpressure protection criterion is 100% of the maximum allowable operating pressure, the overpressure protective device(s) may be set to relieve at a pressure slightly higher than the maximum allowable operating pressure, but in no case to exceed a set pressure of 105% of the maximum allowable operating pressure. The maximum allowable operating pressure and the specified minimum yield strength shall apply to the weakest element of the system being protected.
- (b) It should be recognized that in Class 1 Location, allowing a minimum specified minimum yield of 72%, the limitations of 199.211 (a) will not in all cases permit a set pressure as high as 105% of the maximum allowable operating pressure. The 75% of specified minimum yield strength criterion only applies where any Class Location 1 is contained in the system being protected and the maximum allowable operating pressure is 100% of the pressure permitted by the maximum design.
- (c) If a Code stamped unfired pressure vessel is contained within the pipeline system being protected, the set pressure of the overpressure protective device(s) cannot exceed the stamped pressure rating of the vessel.

Approved Types of Protective Devices:

Some suitable types of protective devices for facilities that at times might be bottle tight are:

- (a) Spring loaded relief devices of the types meeting the provisions of the ASME Boiler and Pressure Vessel Code, Section VIII.
- (b) Pilot loaded relieving devices so designed that failure of the pilot system or control lines will cause the relief device to open.
- (c) Monitoring regulator.
- (d) A series regulator.
- (e) An automatic shut-off device.

The performance specifications and requirements of these devices are contained in §199.4. When safety valves are used, they shall not be reset for any pressure change greater than $\pm 10\%$ of the badge set pressure for operating pressures of 250 psig and less. For operating

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pressure in excess of 250 psig, they shall not be reset for any pressure more than $\pm 5\%$ of the rated set pressure.

Requirements-- Compressor Stations**General**

As a minimum a pressure relieving device shall be installed between the positive displacement compressors and the first discharge block valve. The relieving device(s) shall have a capacity at least equal to the capacity of the compressors.

Approved types of overpressure protective devices for compressor stations are:

- (a) Spring loaded relief devices of the types meeting the provisions of the ASME Boiler and Pressure Vessel Code, Section VIII.
- (b) Pilot loaded relieving devices so designed that failure of the pilot system or control line will cause the relieving device to open. These devices shall meet the provisions of the ASME Boiler and Pressure Vessel Code, Section VIII.
- (c) An automatic compressor shutdown device may be used where there are no ASME unfired pressure vessels in the piping system to be protected or where such ASME pressure vessels are individually equipped with protective devices as described in (a) and (b) above.

Set Pressure

All compressor station overpressure protective devices on main gas piping facilities may be set to actuate at a pressure slightly higher than the maximum allowable operating pressure, but in no case to exceed a set pressure of 105% of the maximum allowable operating pressure.

The set pressure for relief valves protecting ASME Code stamped unfired pressure vessels shall be set at a pressure not exceeding the stamped ASME pressure vessel rating.

The set pressure for pressure limiting or pressure relieving devices for fuel gas, starting gas and other auxiliary gas supply facilities shall be the lower of:

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- (a) 105% of the maximum allowable operating pressure, or
- (b) A selected pressure above the normal operating pressure, which will not cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

The performance specifications and requirements of these devices are contained in § 199.4. When safety valves are used, they shall not be reset for any pressure greater than $\pm 10\%$ of the badged set pressure for operating pressures of 250 psig and less. For operating pressures in excess of 250 psig, they shall not be reset for any pressure more than $\pm 5\%$ of the badged set pressure.

§ 192.201 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:
 - (i) 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 10% or the pressure that produces a hoop stress of 75% of SMYS, whichever is lower;
 - (ii) 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
 - (iii) 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 50%.

ESI RESPONSE TO § 192.201

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Each pressure relief station or pressure limiting station shall have sufficient capacity and shall be set to operate to prevent the pressure from exceeding the following levels:

- (a) *Systems With Pipe or Pipeline Components Operating Over 72% of SMYS shall be set at the MAOP +4%.*
- (b) *Systems With Pipe or Pipeline Components Operating at or Below 72% SMYS. The lesser of:*
 - (1) **The MAOP + 10%**
 - (2) **The pressure which produces a hoop stress of 75% SMYS.**
- (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.

§ 192.203 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:

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- (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) Except for takeoff lines that can be isolated from sources of pressure by other valving, 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 400° 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.