Description	This procedure provides guidance regarding the requirements for the design and construction of compressor stations. This includes make provisions for liquid removal, emergency shutdown, pressure limiting devices, additional safety equipment and ventilation.
Regulatory Applicability	All supported aboveground pipe ☒ Regulated Transmission Pipelines ☒ Regulated Gathering Pipelines (Type A) ☒ Regulated Gathering Pipelines (Type B)[1] ☒ Regulated Distribution Pipelines
Frequency	As needed
Reference	49 CFR 192.163 *Compressor stations: Design and construction* 49 CFR 192.165 *Compressor stations: Liquid removal* 49 CFR 192.167 *Compressor stations: Emergency shutdown* 49 CFR 192.169 *Compressor stations: Pressure limiting devices* 49 CFR 192.171 *Compressor stations: Additional safety equipment* 49 CFR 192.173 *Compressor stations: Ventilation*
Forms / Record Retention	None
Safety and Environmental Precautions	Thorough review of each new compressor design is required to ensure that all design/configuration are minimizing/reducing natural gas releases.
Related Specifications	National Electrical Code ANSI/NFPA 70 Section VIII of the ASME Boiler and Pressure Vessel Code

[1] If the line is new, replaced, relocated or changed.

OQ Covered Task	None
	(In order to perform the tasks listed above; personnel must be qualified in accordance with West Texas Gas's Operator Qualification program or directly supervised by a qualified individual.)

Procedure Steps

This procedure is not intended to provide a step-by-step process for the design and construction of a compressor station. Rather, it provides guidance regarding the pipeline safety requirements for the design and construction of compressor stations mandated by 49 CFR 192.

Compressor Station Design and Construction

1. Location of compressor building
   a) Each main compressor building of a compressor station must be located on property under the control of the operator. (Exception: compressor building on a platform located offshore or in inland navigable waters.)
   b) Compressor building 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.
   c) There must be enough open space around the main compressor building to allow the free movement of fire-fighting equipment.
2. Building construction
   a) Each building on a compressor station site must be made of noncombustible materials if it contains either
      i) Pipe more than 2 inches (51 millimeters) in diameter that is carrying gas under pressure; or
      ii) Gas handling equipment other than gas utilization equipment used for domestic purposes.
3. Exits
   a) 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.
   b) Each door latch on an exit must be of a type which can be readily opened from the inside without a key.
   c) Each swinging door located in an exterior wall must be mounted to swing outward.
4. Fenced areas
   a) 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.
   b) Each gate located within 200 feet (61 meters) of any compressor plant building must open outward and, when occupied, must be able to be opened from the inside without a key.

5. Electrical facilities
    a) Electrical equipment and wiring installed in compressor stations must conform to the National Electrical Code, ANSI/NFPA 70, so far as that code is applicable.

Liquid removal

1. 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.
2. Each liquid separator used to remove entrained liquids at a compressor station must:
    a) Have a manually operable means of removing these liquids.
    b) Where slugs of liquid could be carried into the compressors, have either air operated, automatic liquid removal facilities, an automatic compressor shutdown device, or a high liquid level alarm; and
    c) 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.
    d) All liquid removal tanks that could contain combustible gas vapors must have a vent stack at a minimum of 8 feet above ground level.

Emergency shutdown

1. Except for unattended field compressor stations of 1,000 horsepower (746 kilowatts) or less, each compressor station must have an emergency shutdown system that meets the following:
    a) It must be able to block gas out of the station and blow down the station piping.
    b) It must discharge gas from the blowdown piping at a location where the gas will not create a hazard.
    c) 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.
    d) 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 (153 meters) from the limits of the station.

2. 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.
3. 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:
   a) In the case of an unattended compressor station:
      i) When the gas pressure equals the maximum allowable operating pressure plus 15 percent; or
      ii) When an uncontrolled fire occurs on the platform; and
   b) 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 percent or more of the lower explosive limit in a building which has a source of ignition[2].
4. Refer to procedure P-192.731(c) for additional information on emergency shutdown device inspection and testing.

Pressure limiting devices

1. 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 percent. (Refer to procedure P-192.731(a) for information on relief valve inspections.)
2. 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.

Additional safety equipment

1. Each compressor station must have adequate fire protection facilities. If fire pumps are a part of these facilities, their operation must not be affected by the emergency shutdown system.
2. 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.

[2] An electrical facility which conforms to Class 1, Group D, of the National Electrical Code is not a source of ignition

3. 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.
4. 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.
5. 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.

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.