



Bulletin PP 689

Regulatory Considerations for Polyethylene Piping for Biogas Applications

Scope

This document provides a general overview of possible criteria where polyethylene (PE) gas pipelines fall under jurisdiction of the Code of Federal Regulations (C.F.R.), Title 49, Transportation, Part 192 (49 C.F.R. 192). Aspects and requirements for component polyethylene that differentiate regulated pipelines from non-regulated pipelines are also discussed. The purpose of this bulletin is as a quick reference for end-users and designers involved in the relatively new use of PE pipe in biogas applications and is intended to be a supplemental briefing on the regulatory aspects of PE gas pipelines. However, the information is pertinent for any PE gas piping application. Note, this document is for convenience only and is without warranty or guarantee of any kind. PE pipeline system design decisions should be made by the professional engineer or persons having authority of the gas pipeline, and all recipients are encouraged to verify independently any information herein to their own satisfaction.

Code of Federal Regulations Title 49, Part 192, as governed by the Pipeline Hazardous Materials Safety Administration (PHMSA), prescribes the minimum safety requirements for the transportation of natural and other gas by pipeline 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). 49 C.F.R. §192.5 classifies pipeline locations for the purposes of Part 192, using Class locations summarized as follows:

- i. Class location unit: Any area that extends 220 yards on either side of any continuous 1-mile length of pipeline.
- ii. Class 1 location: Any class location unit that has 10 or fewer buildings intended for human occupancy
- iii. Class 2 location: Any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy
- iv. Class 3 location:
 - a. Any class location unit that has 46 or more buildings intended for human occupancy OR
 - b. 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 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. (The days and weeks need not be consecutive.)
- v. Class 4 location: Any class location unit where buildings with four or more stories above ground are prevalent



49 C.F.R. §192.8 provides guidelines to determine whether onshore gas gathering pipelines are considered as regulated based on class location. In general, PE gas pipelines in Class 3 and Class 4 locations are typically considered as regulated. Some PE gas pipelines in Class 2 locations may also be regulated. Currently, PE gas pipelines in Class 1 locations are typically not regulated, though this is subject to change.

Differentiating Regulated and Non-Regulated PE Pipelines

The differentiating factors below are some of the key requirements for regulated PE gas pipelines and how they differ from non-regulated pipelines. The information in the section below is a summary of some key points from 49 C.F.R. 192 and ASTM standards. Please refer directly to the PHMSA website and the ASTM standard for more complete design considerations for PE gas pipelines, as well as any other applicable regulations.

System Design

Design pressure equations for regulated PE pipelines are defined in 49 C.F.R. §192.121. The design factor, applied on the Hydrostatic Design Basis (HDB), for determining design pressure (49 C.F.R. §191.121(a)) in regulated pipelines is set at 0.40 for PE4710 piping products produced on or after January 22, 2019 and meeting the size and minimum wall thickness requirements (e.g. 2" DR 11, 6" DR 21, etc.). Whereas, non-regulated pipeline system design pressure may use up to a maximum of a 0.63 design factor on the HDB, as defined in Plastic Pipe Institute (PPI) TR-3. Additional factors to account for effects of elevated temperature and fluids containing liquid hydrocarbons (e.g. "wet gas", etc.) may be necessary. (See PPI Handbook of PE Pipe, Chapter 6 Section 1 and Performance Pipe's DriscoPlex® 6300 series piping brochure).

Also, 49 C.F.R. §191.121(c) notes that the maximum design pressure for regulated pipelines is 125psig for PE4710 piping products produced on or after January 22, 2019 and meeting the size and minimum wall thickness requirements. Non-regulated systems do not have this pressure limit but are instead limited by the pipe's pressure capability. For example, the maximum design pressure of an 8in. DR 11 pipe at 73°F would be 125psig in regulated areas, but 200psig in non-federally regulated areas.

Manufacturing & Testing

Piping intended for use in regulated applications is manufactured and tested in accordance with ASTM D2513-18a, which is incorporated by reference in 49 C.F.R. 192. This ASTM standard defines material requirements for PE pipe, including thresholds for physical properties for PE4710 materials. The standard also provides manufacturing guidelines for tolerances in dimensions including outside diameter and wall thickness. Required quality control tests are also defined by the standard, as well as marking requirements which define the tracking and traceability code that needs to be marked on the pipe (pipe size and system, DR, manufacturer name and trademark etc.). However, piping intended for non-regulated applications may be manufactured and tested in accordance with a different standard (e.g. ASTM F2619).



Rework Material Use

ASTM F412 defines rework as material from a manufacturer's own production that has been reground or pelletized for reuse by that same manufacturer. For pressure PE pipe, rework is limited to clean material of the same material designation that meets the requirements specified for virgin material and yields a product equal in quality to one made from only virgin material. However, 49 C.F.R. §192.59(d) specifies that no rework material shall be used in the manufacturing of pipe intended for use in regulated applications. Therefore, Performance Pipe products that meet the requirements of 49 C.F.R. 192 are manufactured with no rework and include the "NR" (no rework) identifier in the print line markings, as per the standard ASTM D2513. In contrast, Performance Pipe products manufactured for non-regulated applications may be manufactured with clean rework of the same material designation, generated in a Performance Pipe facility.

Joining

Joining requirements for PE piping in regulated applications are defined in 49 C.F.R. 192. An overview of joint requirements is defined in 49 C.F.R. §192.281. Fusion procedures used must be qualified per 49 C.F.R. §192.283 and requirements for persons to be qualified to make joints are defined in 49 C.F.R. §192.285. Inspector qualification requirements are defined in 49 C.F.R. §192.287. Whereas, joining requirements for non-regulated applications are typically detailed in the engineering project specifications as well as those defined by the authority having jurisdiction.

Conclusion

This document provided a general overview of criteria for PE gas pipelines to fall under jurisdiction of 49 C.F.R. 192; as prescribed by the pipeline's Class location. Some of the key requirements of regulated PE pipelines, as well as how they differ from non-regulated PE pipelines, were briefly outlined, but 49 C.F.R. 192 may have additional applicable requirements for PE gas pipelines. Therefore, it is recommended that designers and end-users visit the PHMSA website for additional information relating to regulated PE gas pipelines. Also, PE gas pipelines may be subject to additional jurisdiction not referenced in this document, such as state-level PE gas pipeline regulation. The designer is also encouraged to review Performance Pipe and PPI technical literature, which may assist with designing PE gas piping systems.

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