YOUR COMPANY'S GUIDE TO GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS

Helping your organization understand and properly apply the B31.8 Code to pipeline designs.

ASME L&D LEARNING & DEVELOPMENT

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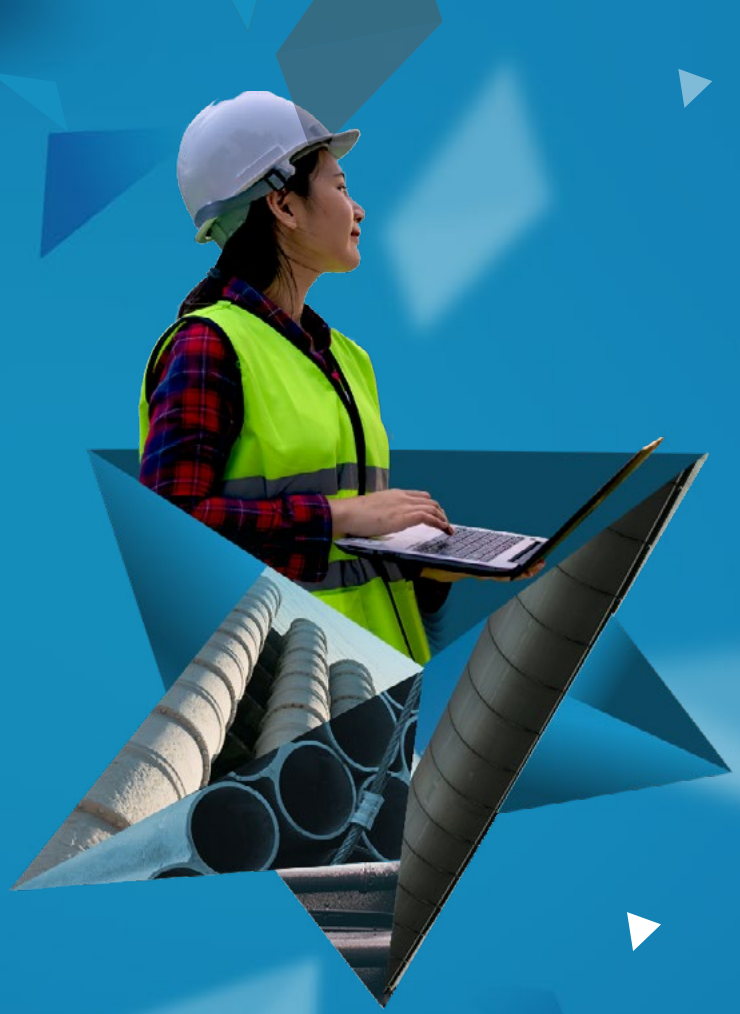


GAS TRANSMISSION AND DISTRIBUTION PIPELINES

Offshore pipelines and onshore gathering lines connect areas of gas production to facilities that process gas to be commercially usable. Transmission pipelines then transport processed gas to industrial users and gas distribution systems. These distribution systems are responsible for transporting gas in and around communities to commercial and residential customers.

The pressure at which different pipelines operate varies greatly. Gathering and transmission pipelines may operate at high pressures (often over 1000 psi). However, distribution systems are often associated with gas mains that can operate up to 200 psi, with lines that transport gas to individual homes typically operating much lower than 10 psi.

This guide explores how engineers can apply codes and standards to design a wide range of gas transmission and distribution piping systems. Discover some common challenges for pipeline engineers, as well as the principles and benefits of understanding the B31.8 code. Plus, learn more from our expert, who answers some of our most frequently asked questions about gas transmission and distribution pipelines.

MODERN DAY PIPELINES IN THE US

The United States pipeline network comprises 65% of the two million miles of pipelines across the world.[1]

There are currently just over 100,000 miles of pipelines in planning or under construction[2] – meaning it's crucial for engineers working on those pipelines to be qualified to keep them operating safely. Engineers can keep pipelines safe and secure by conducting diligent inspection and maintenance, attending damage prevention programs and complying with regulations and best practices.

A clear and consistent understanding of the relevant design codes will enable engineers to apply design best practices every time.

Neglecting to apply codes and standards to pipeline design and operation can result in dangerous failures.

The most commonly used code for gas transmission and distribution piping systems is the B31.8 code.

[1] https://web.archive.org/web/20160821003050/https://www.cia.gov/library/publications/the-world-factbook/fields/2117.html

[2] https://globalenergymonitor.org/wp-content/uploads/2021/02/Pipeline-Bubble-2021.pdf

THE B31.8 CODE

The B31.8 code is the most widely used standard for the design, operation, maintenance, and repair of natural gas distribution systems.

The code prescribes solutions for materials, design, fabrication, testing and inspection of pipelines. It also serves as a companion to other B31 codes on piping systems – together, they remain essential references for piping engineers.

The B31.8 code sets out engineering requirements deemed necessary for safe design and construction of gas transmission and distribution systems.

While safety is an important consideration in piping design, it is not the only relevant factor that will govern the final specifications. The code aims to provide guidance that should go hand in hand with preexisting engineering judgment.

HAZARDS: CHALLENGES FOR GAS PIPELINES

Materials selection, welding, design and selection of fittings and components, design and installation of buried and above ground piping systems and facilities, operation, maintenance, corrosion control, and repairs can all jeopardize the safe operation of a pipeline if best practices are not followed.

Protective measures must be taken to safeguard pipelines from natural hazards or various conditions that may cause abnormal loads or stresses.

Whether it's floods, unstable soil, earthquakes or landslides, almost anything can cause a detrimental impact to a pipeline. Submerged installations must have sufficient added weight to offset buoyancy, with special attention given to the effects of water velocity, while exposed pipes must be protected with distance or barriers.

There's a lot to consider, but here are three particularly common challenges to be aware of:

Soil movement

Earthquakes, subsidence, settlement and slope instability are modes of soil movement, which can be potentially hazardous to buried pipelines. Coating failure, buckling due to strain and weld separation due to tensile strain are all three major hazards of soil movement that need to be considered in the design of piping systems.

Water currents

Flow induced drag is an inertial load-like weight, but oriented with the direction of the flow of liquid. Engineers must determine or estimate water flow velocity to calculate flow induced drag.

Seismic considerations

Movement at fault crossing, soil liquefaction, lateral spread and slope instability are all considerations to be made when designing pipelines in areas with high or regular seismic activity.

KEY BENEFITS OF ASME TRAINING FOR B31.8 CODE

Training of personnel

Every organization that uses B31.8 codes for piping systems benefits from having the relevant training to manage the qualifications of personnel who perform design, operations, maintenance and construction activities on pipelines.

Best practice consensus

The B31.8 code represents a consensus of good engineering practices, covering the full range of issues that could impact the integrity of the pipeline throughout its lifecycle — ensuring they're designed with safety in mind.

Quality assurance

The concepts within the code are reliable, risk informed and time tested through decades of experience, so engineers know that pipelines designed with this code are of industry-grade standard.

FREQUENTLY ASKED QUESTIONS

We asked our expert Michael J. Rosenfeld, P.E. some of our most frequently asked questions about gas transmission and distribution piping systems.

How can I use the B31.8 code to plan for potential stresses?

The code gives allowable stress limits due to sustained loads and thermal expansion acting in above ground piping, and for other loadings affecting buried pipelines. It also specifies design factors for differing classes and locations of construction.

In what ways does the code help me to plan for inspections and maintenance after the design stage?

The code provides for operation, maintenance, corrosion control, and repair applicable for the life of the system. Extensive guidance is given on appropriate disposition of various conditions that could be discovered in the pipeline.

What are the benefits of ASME group training for gas transmission and distribution piping systems?

Group training exposes personnel involved in a broad range of activities or responsibilities, including design, construction, operations, or maintenance, to the fundamental principles affecting the safety of the pipeline. The training will provide those attending with background on how and why certain practices are necessary and customary. The training will enhance individual careers and enable pipeline operators to demonstrate their commitment to having a technically proficient workforce.

Mr. Rosenfeld is Chief Engineer and Managing Member with RSI Pipeline Solutions, LLC.

He holds a BS in Mechanical Engineering from the University of Michigan (1979) and an MS in Mechanical Engineering from Carnegie-Mellon University (1981). Mr. Rosenfeld is an experienced consultant on the subject of oil and gas pipeline fitness-for-service; pipeline integrity; pipeline design, materials, construction, and maintenance; and pipeline regulations and standards.

Find out more about our B31.8 course here.

ASME B31.8 GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS CODE

ASME B31.8 Gas Transmission and Distribution Piping Systems Code (Virtual Classroom)

This course explains the present-day piping code provisions, the principal intentions of the code, and how the code should be used. The emphasis is primarily on transmission pipelines.

Topics covered

- Materials
- Welding
- Fittings, Longitudinal Stresses, Flexibility
- Pressure Design
- Fracture Control, Construction, Testing
- Corrosion
- Remaining Strength of Corroded Pipe
- Pipeline Repairs
- Offshore Pipelines
- Sour Gas Pipelines
- Appendices
- B31.8-S – IMP Supplement
- Integrity Assessments

You will learn to:

- Explain the causes and modes of pipeline failure
- Describe the considerations for material specifications, pipe manufacturing, and pipe joining
- Estimate pipeline stresses from external loadings
- Explain how to evaluate pipeline defects
- Identify pipeline repair techniques
- Identify the elements of pipeline integrity
- Explain how code requirements address these issues
- Explain the differences between B31.8 and US DOT gas pipeline regulations

ESSENTIALS: ASME B31.8 GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS CODE

ASME B31.8 Gas Transmission and Distribution Piping Systems Overview (Self Study)

This course offers an overview of the scope of B31.8, including its history, the types of systems to which it applies, its organization and the intended use of the code.

Modules

- **Module 1:**
  Introduction and History of B31.8
- **Module 2:**
  Rules and requirements covered in Chapters I and II
- **Module 3:**
  Rules and requirements covered in Chapters III and IV
- **Module 4:**
  Rules and requirements covered in Chapters V and VI
- **Module 5:**
  Rules and requirements covered in Chapters VIII and IX

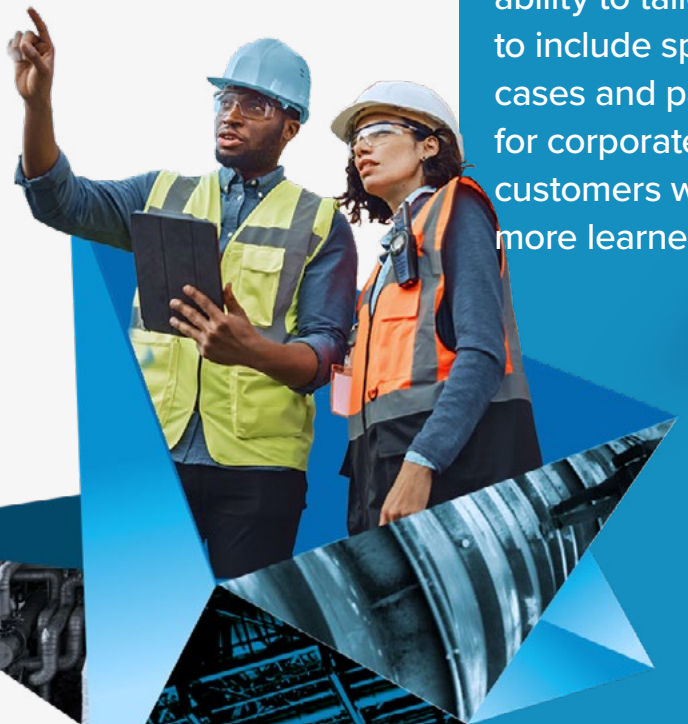
You will learn about:

- The contents and scope of B31.8
- The types of piping and materials covered by B31.8
- The requirements for safe design of piping systems
- The welding qualifications and requirements covered
- The kinds of supports necessary to ensure that the piping functions effectively in various environments
- The operation and maintenance procedures and requirements to ensure the safety and functionality of pipelines
- Requirements for offshore gas transmission and sour gas service

MORE DETAILS ABOUT OUR COURSES

ASME works with expert instructors from industry and academia to provide world-class engineering courses. We are committed to delivering high-quality training to you and your team with accreditation backed by IACET, a globally recognized independent third party.

ASME Learning & Development provides technical and management courses for individuals and teams across a range of engineering disciplines. Courses are designed for engineers of all levels from early career engineers to experienced engineers.



Our courses can be accessed either virtually or in-person – with the ability to tailor content to include specific use cases and pain points for corporate training customers with eight or more learners.

LET'S TALK ABOUT IT

ASME is the go-to expert in both fundamentals and applications of the B31.8 code, and our courses are delivered by expert engineers with extensive knowledge of the history of the code.

All ASME courses include real-world examples so that learnings can be applied to projects that your team is working on. With ASME Corporate Training, your team can address your unique challenges with an expert in a private and confidential setting.

Get in touch today to learn more about ASME Corporate Training.

- Visit corporatetraining.asme.org
- Email learningsolutions@asme.org

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