

# **APPLYING THE ASME CODES: PLANT PIPING AND PRESSURE VESSELS**

By

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## VOLUME TWO

### Applying the ASME Codes: Plant Piping and Pressure Vessels

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<b>Chapter 1: ASME B31.3 Process Piping Stress Analysis Requirements</b>	<b>1</b>
Complete listing, definition, and description of the equations dictated for pipe stress analysis code compliance; pipe wall thickness, flange pressure/temperature rating, thermal expansion restraint—anchor displacement strain, cyclic fatigue, sustained and occasional longitudinal loads, correlation of design loads with failure mode and method of analysis, condensed correlation table; allowable excursions above operational design temperature and pressure.	
<b>Chapter 2: Bellows-Type Pipe Expansion Joints: Pressure Thrust and Other Pitfalls</b>	<b>9</b>
Physical illustrations of the various types, how they work, how they must be carefully applied and installed, and why they fail when this is not done; illustrated example, requirements for safe use.	
<b>Chapter 3: Supports Determine Loads on Piping, Connecting Equipment, the Level of Pipe Stress, and Load Reactions on Supporting Structure</b>	<b>17</b>
Piping contractors, piping design and plant engineers, structural engineers, and all designers for piping and support structure MUST have a good working understanding of this material, for safety's sake! This topic is covered in great detail, designed for self-study, and you don't have to be a pipe stress analyst to understand and apply these principles.	
<b>Chapter 4: Spring Constants of Elastic Shapes in Contact</b>	<b>61</b>
Mostly for pipe support design and pipe stress analysis, models of elastic structural shapes in compression, tension, cantilevered beam in bending, sphere on flat plate, cylindrical rod between flat plates, pure torsion.	
<b>Chapter 5: Pipe Flange Leakage and Stress</b>	<b>67</b>
A complete primer, with types of flanges, their pressure-temperature ratings, allowable stresses, leakage vs. stress loadings, pipe code requirements, ring-type gasket criteria, illustrations, actual flange detail dimensions, examples and calculations.	
<b>Chapter 6: Thermal Restraint Stress</b>	<b>105</b>
Internal and external restraint of thermal expansion and contraction will induce mechanical stresses and can lead to fatigue stress cracking of various object shapes, single- and multidimensional geometry.	
<b>Chapter 7: The Types and Amounts of Mechanical Stresses to Be Expected in Common Utility Piping Systems</b>	<b>117</b>
What the everyday mechanical engineer needs to understand about piping stresses and strains to interface intelligently with piping professionals; uses basics of elasticity and Mohr's Circle to demonstrate how a common steel piping system responds to the typical loadings it receives in practice.	
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Codes, vessel test requirements, safety considerations, and tips.	
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Guidance on sizing and selecting pressure relief and safety relief devices, application tips, relationships to ASME B&PV CODES Section VIII Division 1 and the API 520-21 standards, and working data sheets for recording the flowrate/pressure calculations and device sizing criteria.	
<b>Chapter 10: Jacketed Piping Issues</b>	<b>181</b>
Identification and explanation of some of the unique, nasty problems that plague these miserable (jacketed) piping arrangements. They can be done safely, but you better know how! Based on first-hand knowledge of real-life system failures with big-bucks damage consequences.	
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**VOLUME ONE: (PUBLISHED SEPARATELY)**

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VOLUME ONE's topics cover these main areas of mechanical engineering practice:

- **HYDRAULICS OF PIPE FLOW**
- **INDUSTRIAL HVAC SPECIALTIES**
- **UTILITY SYSTEMS**
- **CHILLED WATER LOOPS, OVERALL SYSTEM DESIGN, AND CONTROL**

VOLUME ONE involves more entry-level and less specialized professional information than does VOLUME TWO. VOLUME ONE is more basic, and is intended primarily for the engineering novice, to keep him or her out of trouble on that first important job. Its contents were collected as a predecessor and companion piece to VOLUME TWO.