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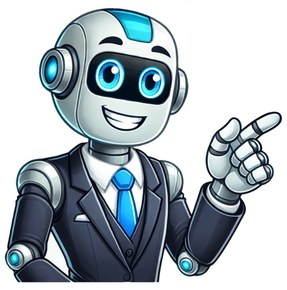

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The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. The integrity of a piping system depends on the considerations and principles used in design, construction and maintenance of the system. Piping systems are made of components as pipes, flanges, supports, gaskets, bolts, valves, strainers, flexible and expansion joints. The components can be made in a variety of materials, in different types and sizes and may be manufactured to common national standards or according a manufacturers proprietary item. Some companies even publish their own internal piping standards based upon national and industry sector standards. Piping codes and standards from standardization organizations as and others, are the most common used. The difference between piping codes and piping standards can be summarized: Piping Codes Piping codes defines the requirements of design, fabrication, use of materials, tests and inspection of pipes and piping systems - what you need to do. A code has a limited jurisdiction defined by the code. A code is not law, but can be adopted into law. Example: "ASME B31.1 (2007), Code for Pressure Piping, Section on Power Piping, as required by the laws of the States of Arizona, Alaska, Colorado, Illinois, Iowa, Kansas, Michigan, Missouri, Minnesota, Nebraska, Nevada, North Dakota, Ohio, Oregon, Wisconsin, et. alia." Piping Standards Piping standards define application design and construction rules and requirements for piping components as flanges, elbows, tees, valves etc. - how to do it. A standard has a limited scope defined by the standard. ANSI provides a forum for development of American national standards. ASME is one of the leading organizations in the world developing codes and standards. The ASME Performance Test Codes provide standard directions and rules for conducting and reporting tests. A survey of one of the most important pressure pipe codes - ASME B31, earlier known as ANSI B31. Construction Specifications Institute's 2004 Master-Format Edition. DIN - the German Institute for Standardization. ISO - the International Organization for Standardization. International Organization for Standardization - ISO - pipe, tube and fittings standards and specifications. ASME - American Society of Mechanical Engineers - is a 120,000-member professional organization focused on technical, educational and research issues of the engineering and technology community. ASME conducts one of the world's largest technical publishing operations, holds numerous technical conferences worldwide, and offers hundreds of professional development courses each year. ASME sets internationally recognized industrial and manufacturing codes and standards that enhance public safety. The work of the Society is performed by its member-elected Board of Governors and through its five Councils, 44 Boards and hundreds of Committees in 13 regions throughout the world. Technical Divisions and Subdivisions Advancing the science and practice of mechanical engineering is the responsibility of the Society's 37 Technical Divisions and Subdivisions, which span a vast array of disciplines, technologies and industries: Advanced Energy Systems - Promotes the advancement of emerging energy conversion devices and processes, such as hydrogen technologies, fuel cells and heat pumps, and understanding of thermo economics. Aerospace - Concerns mechanical engineering of aircraft and manned/unmanned spacecraft design, including adaptive structures and materials, propulsion systems and life support equipment. Applied Mechanics - Advances the study of how media, including solids, fluids and systems, respond to external stimuli, as well as the specialized areas of shock and vibration and computer applications. Bioengineering - Focused on the application of mechanical engineering principles to the conception, design, development, analysis and operation of biomechanical systems. Computers & Information in Engineering - Concerned with the application of emerging computer simulation technology to enhance the entire engineering process. Design Engineering - Addresses the design concepts of machines and mechanisms, such as fastening/joining methods and gearing, as well as design aspects affecting reliability and manufacturability. Dynamic Systems & Control - Concentrates on control methods and devices, from servomechanisms and regulators to automatic controls, for dynamic systems involving forces, motion and/or the flow of energy or material. Electronic & Photonic Packaging - Fosters cooperation on mechanical engineering considerations of microelectronics, photonics, microwave and microelectromechanical systems design and manufacturing. Environmental Engineering - Concerns air, ground and water pollution control technologies, including environmental remediation and mixed hazardous/radioactive waste management. Fluids Engineering - Involved in fluid mechanics in all types of systems and processes involving fluid flow, including pumps, turbines, compressors, pipelines, biological fluid elements and hydraulic structures. Fluid Power Systems & Technology - Advances the design and analysis of fluid power components, such as hydraulic and pneumatic actuators, pumps, motors and modulating components, in various systems and applications. Fuels & Combustion Technologies - Dedicated to the understanding of fuels and combustion systems in modern utility and industrial power plants, including fuels handling, preparation, processing and by-product emissions controls. Heat Transfer - Enhances the theory and application of heat transfer in equipment and thermodynamic processes in all fields of mechanical engineering and related technologies. Information Storage & Processing Systems - Focuses on the mechanics of electronic information storage devices and their manufacture, with primary focus on rigid and floppy disks, magnetic tape, VCR and optical disk technologies. Internal Combustion Engine - Furthers mechanical engineering of all types of reciprocating combustion engines, including diesel and spark ignited engines for mobile, marine, rail and stationary power generation applications. International Gas Turbine Institute - Supports the design, manufacture and operation of gas turbine and aeroengine machinery in various applications, including aircraft, marine and electric power generation. Management - Concerns the management of the engineering process to control resources, both human and material, to improve the quality of products and services provided by organizations. Manufacturing Engineering - Fosters the transfer of technology related to manufacturing systems for improved production performance, including machine tools, computer integrated manufacturing and robotics. Materials - Focuses on the properties of materials, such as metals, ceramics, composites and polymers, and its influence on design consideration in materials selection for engineering structures. Materials Handling Engineering - Promotes the dissemination and application of technological advancements in material transport systems through mechanical engineering, systems engineering and information technology. Microelectromechanical Systems Subdivision - Furthers developments of miniature devices combining electrical, mechanical, optical, chemical and/or biological components fabricated via integrated circuit or similar manufacturing techniques. Noise Control & Acoustics - Advances the application of physical principles of acoustics to the solution of noise control problems, as well as the uses of acoustics in industrial applications. NonDestructive Evaluation Engineering - Covers the evaluation of critical system components for material/defect/structure characterization through nondestructive methods, such as ultrasonics, radiography and other techniques. Nuclear Engineering - Concerns the design, development, testing, operation and maintenance of nuclear reactor systems and components, fusion, heat transport, nuclear fuels technology and radioactive waste. Ocean, Offshore & Arctic Engineering - Promotes international technological progress in the recovery of energy resources in offshore and arctic environments, as well as systems, equipment and vehicles for underwater sea usage. Petroleum - Covers mechanical systems used in the entire area of petroleum drilling, production, refining, processing, and transportation, as well as management and environmental concerns. Pipeline Systems Division - Promotes pipeline systems technology, including automation, rotating equipment, geotechnics, heat transfer, offshore, materials, GIS, database, environmental issues, design, construction, and integrity. Plant Engineering & Maintenance - Focuses on the design, fabrication, installation, operation and maintenance of manufacturing systems, equipment, processes and facilities to create products of enhanced value. Power - Disseminates information on the research, design, operation, economics, and environmental effects of fossil-fired thermal power generation systems, including hydroelectric. Pressure Vessels & Piping - Concerns the design, fabrication, inspection, operation and failure prevention of power boilers, heating boilers, pipelines, pumps, valves and other pressure-bearing components and vessels. Process Industries - Focuses on the design of systems and machines for heating, cooling or treating industrial fluids and gases, including the efficient management and control of the processes themselves. Rail Transportation - Covers the mechanical design, construction, operation and maintenance of locomotives, freight, passenger and commuter cars in railroads and mass transit systems. Safety Engineering & Risk Analysis - Promotes practices that lead to reduced risk and loss prevention by creating safer products, processes, and occupational environments. Solar Energy - Concerned with all aspects of solar-derived energy for mechanical and electrical power generation, as well as wind energy and ocean thermal energy conversion. Solid Waste Processing - Addresses the design, construction and operation of solid waste processing and disposal facilities, including waste-to-energy combustors, materials recovery/recycling, landfills and composting. Technology & Society - Covers all issues concerning the inter-relationships between technological innovation and the world community, as well as the social responsibility of the engineer. Textile Engineering - Focuses on product and process technology for the improvement of fiber, composite material, textile, and apparel manufacturing operations, machinery and instrumentation. Tribology - Involved in all aspects of friction, lubrication and wear in mechanical designs and manufacturing processes, as well as its economic impact on system reliability and maintainability. Popular Publications from ASME The ASME committees within the different divisions and subdivisions develops, updates and publish some of the worlds most used codes and standards. Some of the popular titles are: ASME 2004 Boiler & Pressure Vessel Code - The Code, which is issued once every three years, is comprised of 28 separate volumes which establish rules of safety governing the design, fabrication and inspection of boilers and pressure vessels, including nuclear power systems. The Code has been updated to incorporate advancements in boiler and pressure vessel design, materials and applications, and provides the latest information to maintain ASME Code Symbol Stamps. ASME A17-CD - CD-ROM for Elevators and Escalators. Includes: A17.1 Safety Code for Elevators and Escalators - A17.2 Guide for Inspection of Elevators, Escalators and Moving Walks - A17.3 Safety Code for Existing Elevators and Escalators ASME B31.1 - 2001 Power Piping - The code prescribes minimum requirements for the design, materials, fabrication, erection, test, and inspection of power and auxiliary service piping systems for electric generation stations, industrial institutional plants, central and district heating plants. The code covers boiler external piping for power boilers and high temperature, high pressure water boilers in which steam or vapor is generated at a pressure of more than 15 PSIG; and high temperature water is generated at pressures exceeding 160 PSIG and/or temperatures exceeding 250 degrees F. ASME B31.3 - 2002 Process Piping - The Code contains rules for piping typically found in petroleum refineries; chemical, pharmaceutical, textile, paper, semiconductor, and cryogenic plants; and related processing plants and terminals. The Code prescribes requirements for materials and components, design, fabrication, assembly, erection, examination, inspection, and testing of piping. The Code applies to piping for all fluids including: (1) raw, intermediate, and finished chemicals; (2) petroleum products; (3) gas, steam, air and water; (4) fluidized solids; (5) refrigerants; and (6) cryogenic fluids. Also included is piping which interconnects pieces or stages within a packaged equipment assembly. ASME V14.5M - 1994 DimensioningandTolerance - The standard establishes uniform practices for stating and interpreting dimensioning, tolerances, and related requirements for use on engineering drawings and in related documents. For a mathematical explanation of many of the principles in this standard, see ASME Y14.5.1m. Practices unique to architectural and civil engineering, land, welding symbology are not included. ASME B16.5 - 1996 Pipe Flanges and Flange Fittings - The Standard covers pressure-temperature ratings, materials, dimensions, tolerances, marking, testing, and methods of designating openings for pipe flanges and flanged fittings in sizes NPS 1/2 through NPS 24 and in rating Classes 150, 300, 400, 600, 900, 1500, and 2500. Flanges and flanged fittings may be cast, forged, or (for blind flanges and certain reducing flanges only) plate materials as listed in Table 1A. Requirements and recommendations regarding bolting and gaskets are also included. ASME B31.4 - 1998 - Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids - The Code prescribes requirements for the design, materials, construction, assembly, inspection, and testing of piping transporting liquids such as crude oil, condensate, natural gasoline, natural gas liquids, liquefied petroleum gas, carbon dioxide, liquid alcohol, liquid anhydrous ammonia and liquid petroleum products between producers' lease facilities, tank farms, natural gas processing plants, refineries, stations, ammonia plants, terminals (marine, rail and truck) and other delivery and receiving points. Piping consists of pipe, flanges, bolting, gaskets, valves, relief devices, fittings and the pressure containing parts of other piping components. It also includes hangers and supports, and other equipment items necessary to prevent overstressing the pressure containing parts. It does not include support structures such as frames of buildings, buildings stanchions or foundations or any equipment such as defined in para. 400.1.2(B). Requirements for offshore pipelines are found in Chapter IX. Also included within the scope of this Code are: (A) Primary and associated auxiliary liquid petroleum and liquid anhydrous ammonia piping at pipeline terminals (marine, rail and truck), tank farms, pump stations, pressure reducing stations and metering stations, including scraper traps, strainers, and prover loop; (B) Storage and working tanks including pipe-type storage fabricated from pipe and fittings, and piping interconnecting these facilities; (C) Liquid petroleum and liquid anhydrous ammonia piping located on property which has been set aside for such piping within petroleum refinery, natural gasoline, gas processing, ammonia, and bulk plants; (D) Those aspects of operation and maintenance of liquid pipeline systems relating to the safety and protection of the general public, operating company personnel, environment, property and the piping systems. Pressure (psig) and temperature ratings for steel pipe flanges and flanged fittings The International Boiler and Pressure Vessel Code safety rules governing design, fabrication, and inspection of boilers and pressure vessels, and nuclear power plant components during construction. The ASME Performance Test Codes provide standard directions and rules for conducting and reporting tests. An overview of the American Society of Mechanical Engineers - ASME - valve standards. A survey of one of the most important pressure pipe codes - ASME B31, earlier known as ANSI B31. The working pressure and temperature limits of ASME Code B31.9 - Building Services Piping. The ASME B16 standards covers pipes and fittings in cast iron , cast bronze, wrought copper and steel. Diameters and bolt circles for standard ASME B16.5 flanges - 1/4 to 24 inches - Class 150 to 2500. Pipe sizes, inside and outside diameters, wall thickness, schedules, weight and weight of pipe filled with water - Metric Units. Flange diameters, thickness, bolt circles, numbers and diameter of bolts for ASME/ANSI B16.15 - Cast Bronze Threaded Fittings - 300 lb Bronze - Flanges with plain faces. ASME/ANSI B16.5-1996 Pipe Flanges and Flanged Fittings - Class 150 Flanges - outside and inside diameters, bolt circles, numbers and diameters of bolts. ASME/ANSI B16.5-1996 Pipe Flanges and Flanged Fittings - Class 300 Flanges - outside and inside diameters, bolt circles, numbers and diameters of bolts. ASME/ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings - Class 250 Flanges - outside and inside diameters, bolt circles, numbers and diameters of bolts. API and ASME/ANSI flanges - comparing dimensions and pressure ratings. Machine processing and tolerance grades. Piping codes and standards. Pressure numbers (PN) vs. flange class designations. Dimensions, wall thickness and weights of stainless steel pipes according to ASME B36.19 Stainless Steel Pipes. World wide steel pipe standardization organizations. The huge expansion of the piping industry where it is today is mainly for the available codes, standards, and recommended practices. The main concern for designing any process plant is the safety of the personnel involved. Design of Piping systems complying with these codes, standards, or recommended practices ensures safety along with standardization of required items. Every piping engineer should possess a basic knowledge of the extensively used piping codes and standards. The following write-up will try to provide a sum-up of common piping codes and standards that are extensively used in the process piping industry.Codes in the piping industry prescribe requirements for the design, materials, fabrication, erection, examination, assembly, test, and inspection of piping systems, whereas standards contain design and construction rules and requirements for individual piping components such as elbows, tees, returns, flanges, valves, and other in-line items.Compliance with the code is generally mandated by regulations imposed by regulatory and enforcement agencies. At times, the insurance carrier for the facility leaves hardly any choice for the owner but to comply with the requirements of a code or codes to ensure the safety of the workers and the general public.On the other hand, compliance with piping standards is normally required by the rules of the applicable code or the purchaser’s specification.Recommended Practices, prepared by professional organizations or professional bodies are an optional set of documents that can be used for good engineering practice.Even though every country has its own codes and standards but still the American codes and standards are most widely used. The major codes and standards which are used in the day-to-day piping applications are listed below:This piping code normally provides rules for piping found in petroleum refineries, chemical, pharmaceutical, textile, paper, semiconductor, and cryogenic plants, and related processing plants and terminals including piping for fluids like raw, intermediate, and finished chemicals, petroleum products, gas, steam, air and water, fluidized solids, refrigerants, cryogenic fluids, etc. For process piping professionals this code is of utmost importance.This Code does not provide information on the following:(a) piping systems designed for internal gage pressures at or above zero but less than 105 kPa (15 psi), provided the fluid handled is nonflammable, nontoxic, and not damaging to human tissues and its design temperature is from −29°C (−20°F) through 186°C (366°F).(b) power boilers and boiler external piping which is required to conform to ASME B31.1.(c) tubes, tube headers, crossovers, and manifolds of fired heaters, which are internal to the heater enclosure(d) pressure vessels, heat exchangers, pumps, compressors, and other fluid handling or processing equipment, including internal piping and connections for external piping.(e) piping covered by ASME B31.4, B31.8, or B31.11, although located on the company property(f) plumbing, sanitary sewers, and storm sewers.(g) piping for fire-protection systems(h) piping covered by applicable governmental regulationsThis piping code provides requirements for piping typically found in electric power generating stations, in industrial and institutional plants, geothermal heating systems, and central and district heating and cooling systems. This code is mainly important for Power piping professionals. It does not apply to the piping systems covered by other sections of the Code for Pressure Piping, and other piping which is specifically excluded from the scope of this code.READ Types of Pipe Materials and Their Selection / Metallic PipeThis code provides requirements for piping transporting liquids between production facilities, tank farms, natural gas processing plants, plants and terminals, and within terminals, pumping, regulating, metering stations, and other delivery and receiving points.This code prescribes requirements for piping for refrigerants, heat transfer components, and secondary coolants for temperatures as low as -320 degrees F (-196 degrees C)This code covers the piping transporting products that are mostly gas (Liquefied Petroleum Gas) between sources and terminals. This code also covers the safety aspects of the operation and maintenance of those facilities.Other relevant ASME B codes for piping industries areThe ASME BPVC code contains 11 sections as mentioned below:Section I Power BoilersSection II Material SpecificationsSection III Rules for Construction of Nuclear Power Plant ComponentsSection IV Heating BoilersSection V Nondestructive ExaminationSection VI Recommended Rules for Care and Operation of Heating BoilersSection VII Recommended Rules for Care of Power BoilersSection VIII Pressure VesselsSection IX Welding and Brazing QualificationsSection X Fiber-Reinforced Plastic Pressure VesselsSection XI Rules for In-Service Inspection of Nuclear Power Plant ComponentsOut of these 11 sections, Section VIII is very important for Process Piping engineers.The major piping component standards that are used frequently are listed below:ASME B16.1: Cast Iron Pipe Flanges and Flanged FittingsASME B36.10M: Welded and Seamless Wrought Steel PipeASME B36.19M: Stainless Steel PipeASME B16.9: Factory-Made Wrought Steel Buttwelding FittingsASME B16.5: Pipe Flanges and Flanged FittingsASME B16.37: Hydrostatic Testing of Control ValvesASME B16.11: Forged Fittings, Socket Welding and ThreadedASME B16.3: Malleable Iron Threaded Fittings, Class 150 and 300ASME B16.4: Cast Iron Threaded Fittings, Classes 125 and 250ASME B1.1: Unified Inch Screw ThreadsASME B16.20: Metallic Gaskets for Pipe FlangesASME B16.21: Nonmetallic Flat Gaskets for Pipe FlangesASME B16.25: Buttwelding EndsASME B16.10: Face-to-Face and End-To-End Dimensions of ValvesASME B16.36: Orifice FlangesASME B16.34: Valves – Flanged, Threaded and Welding EndMSS SP-58: Pipe Hangers and Supports — Materials, Design, and Manufacture.BS 6501, Part 1: Flexible Metal HoseNFPA 1963: Standard for Fire Hose ConnectionsREAD What is Piping Slope and Why is it Required? Pipe Slope CalculationRefer to ASME code B31.3 for more of the component standardsThe American Society for Testing and Materials (ASTM) is a scientific and technical organization that develops and publishes voluntary standards on the characteristics and performance of materials, products, systems, and services. The standards published by the ASTM include test procedures for determining or verifying characteristics, such as chemical composition and measuring performance, such as tensile strength and bending properties. The standards cover refined materials, such as steel, and basic products, such as machinery and fabricated equipment. The standards are developed by committees drawn from a broad spectrum of professional, industrial, and commercial interests. Many of the standards are made mandatory by reference to applicable piping codes.The major ASTM standards are listed below:A36: Carbon Structural SteelA105: Carbon Steel Forgings, for Piping ApplicationsA106: Seamless Carbon Steel Pipe for High-Temperature ServiceA312: Seamless, Welded, and Heavily Cold-Worked Austenitic Stainless Steel PipeA335: Seamless Ferritic Alloy Steel Pipe for High-Temperature ServiceA358: Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Stainless Steel Pipe for High-Temperature Service and General ApplicationsA516: Pressure Vessel Plates, Carbon Steel, for Moderate and Lower-Temperature ServiceA671: Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower TemperaturesA672: Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate TemperaturesSuggested reading for more on ASTM standards: Refer to ASME B31.3 Specification index for Appendix A.The American Petroleum Institute (API) publishes specifications, bulletins, recommended practices, standards, and other publications as an aid to the procurement of standardized equipment and materials.The major ones are listed below for your reference:API RP 520: Recommended Practice for Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries.API 610: Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas IndustriesAPI 650: Welded Tanks for Oil StorageAPI 661: Air-Cooled Heat Exchangers for General Refinery ServiceAPI 560: Fired Heaters for General Refinery ServiceAPI 617: Axial and Centrifugal Compressors and Expander-compressors for Petroleum, Chemical, and Gas Industry ServicesAPI 618: Reciprocating Compressors for Petroleum, Chemical, and Gas Industry ServicesAPI 612: Petroleum, Petrochemical, and Natural Gas Industries-Steam Turbines-Special-purpose ApplicationsFor more API Standards refer to the API website for their catalog of published standards.There are several other codes and standards which are used in the piping industry including the AMERICAN WATER WORKS ASSOCIATION (AWWA), AMERICAN WELDING SOCIETY (AWS), AMERICAN SOCIETY OF SANITARY ENGINEERS, AMERICAN SOCIETY OF CIVIL ENGINEERS, AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING, AMERICAN IRON AND STEEL INSTITUTE, EXPANSION JOINT MANUFACTURERS ASSOCIATION, MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, NATIONAL FIRE PROTECTION ASSOCIATION, TUBULAR EXCHANGER MANUFACTURERS ASSOCIATION, etc.Also, there are non-American standards like BRITISH STANDARDS AND SPECIFICATIONS, RUSSIAN CODES, DIN STANDARDS AND SPECIFICATIONS, JAPANESE STANDARDS AND SPECIFICATIONS, ISO STANDARDS AND SPECIFICATIONS, etc. The user is requested to venture more of these standards in his own interest. Some of the Russian codes are listed below:READ Piping Design Guide of ReactorsGOST 32388-2013 Process Piping Stress Analysis, GOST 32569-2013 Process Piping Design-These codes provide requirements for process piping design and analysis. GOST 23388-2013 Code covers such aspects as vacuum piping stability, creep in high-temperature piping, cryogenic piping stress analysis requirements, seismic analysis, HDPE piping stress analysisRD 10-249-98 – Power Piping. Design and Stress AnalysisThis code provides requirements for piping typically found in electric power generating stations, in industrial and institutional plants, and geothermal heating systems except for district heating systems.GOST R 55596-2013 District Heating Systems Stress Analysis, SP 124.13330.2012 District Heating Systems DesignThis code provides requirements for buried and above-ground district heating piping systems design and analysis.SP 36.13330.2012 – Gas and Oil Transmission Piping Systems. Design and Stress AnalysisThis code provides requirements for pipelines transporting gas and oil between production facilities, tank farms, natural gas processing plants, plants and terminals and within terminals, pumping, regulating, metering stations, and other delivery and receiving.GOST 34347-2017 Boiler and Pressure Vessel Code Design Requirements,GOST 34233-2017 Boiler and Pressure Vessel Code Stress Analysis RequirementsGOST 34233.1-2017: General requirementsGOST 34233.2-2017: Cylindrical and conical shells, convex and flat bottoms and coversGOST 34233.3-2017: Reinforcement of openings in shells and bottoms under internal and external pressure. Strength calculation of shells and bottoms under external static loads on the nozzleGOST 34233.4-2017: Strength and leak-tightness calculation of flange jointsGOST 34233.5-2017: Calculation of shells and bottoms under the Influence of support loadsGOST 34233.6-2017: Strength calculation under low-cyclic loadsGOST 34233.7-2017: Heat-exchangersGOST 34233.8-2017: Jacketed vesselsGOST 34233.9-2017: Vertical Column VesselsGOST 34233.10-2017: Vessels involving hydrogen sulfide mediaGOST 34233.11-2017: Method of strength calculation of shells and bottoms according to weld misalignment, angular misalignment, and shell no roundnessGOST 34233.12-2017: Requirements for representation of the strength calculations carried out on the computerPiping Component Standards:Pipes: GOST 10705, 10706, 11068, 2095, 3262, 550, 8696, 8731, 8733, 9940, 9941, 53383, OST series 108x, 34x, TU 14-3-1080, 14-3-1128, 14-3-1160 and lots of other standardsBends: GOST 17375, 30753, OST series 108x. 34x and lots of other standardsTees: GOST 17376, OST series 108x. 34x and lots of other standardsFlanges: GOST 33259 and lots of other standardsRecent Postslink to GRE Design Envelope and Failure Envelopelink to Effect of Coating Factor on Buried Pipeline Stress AnalysisHi There! Welcome to my space, I am Anup Kumar Dey, an experienced Piping and Pipeline engineer for the last 20 years. Through this platform, I will share my experiences and knowledge with you in an innovative way. So be with me for the next couple of years! The integrity of a piping system depends on the considerations and principles used in design, construction and maintenance of the system. Piping systems are made of components as pipes, flanges, supports, gaskets, bolts, valves, strainers, flexible and expansion joints. The components can be made in a variety of materials, in different types and sizes and may be manufactured to common national standards or according a manufacturers proprietary item. Some companies even publish their own internal piping standards based upon national and industry sector standards. Piping codes and standards from standardization organizations as and others, are the most common used. The difference between piping codes and piping standards can be summarized: Piping Codes Piping codes defines the requirements of design, fabrication, use of materials, tests and inspection of pipes and piping systems - what you need to do. A code has a limited jurisdiction defined by the code. A code is not law, but can be adopted into law. Example: "ASME B31.1 (2007), Code for Pressure Piping, Section on Power Piping, as required by the laws of the States of Arizona, Alaska, Colorado, Illinois, Iowa, Kansas, Michigan, Missouri, Minnesota, Nebraska, Nevada, North Dakota, Ohio, Oregon, Wisconsin, et. alia." Piping Standards Piping standards define application design and construction rules and requirements for piping components as flanges, elbows, tees, valves etc. - how to do it. A standard has a limited scope defined by the standard. ANSI provides a forum for development of American national standards. ASME is one of the leading organizations in the world developing codes and standards. The ASME Performance Test Codes provide standard directions and rules for conducting and reporting tests. A survey of one of the most important pressure pipe codes - ASME B31, earlier known as ANSI B31. Construction Specifications Institute's 2004 Master-Format Edition. DIN - the German Institute for Standardization. ISO - the International Organization for Standardization. International Organization for Standardization - ISO - pipe, tube and fittings standards and specifications. Piping systems are critical components of various industries, including oil and gas, power generation, chemical processing, and water treatment, etc. to name a few but not limited to. Ensuring the safety, reliability, and efficiency of these systems is essential, and this is where codes and standards come into play. In this blog article, we will explore the various widely used and most important codes and standards applicable to piping systems, their objectives, and their relevance for Engineers and Inspectors. Codes and standards for piping engineering are sets of rules and guidelines established by recognized organizations to ensure the safe and efficient design, fabrication, installation, and operation of piping systems. They provide industry best practices, technical specifications, and testing procedures to ensure that piping systems meet the required levels of performance, safety, and reliability. Several organizations are responsible for developing and maintaining codes and standards for piping systems. Some of the most well-known organizations include: American Society of Mechanical Engineers (ASME): ASME is an international organization that develops and maintains a wide range of codes and standards for various engineering disciplines, including piping systems. American Petroleum Institute (API): API is a leading organization in the oil and gas industry, responsible for developing and maintaining codes and standards related to the design, fabrication, and operation of pipelines and associated facilities. International Organization for Standardization (ISO): ISO is a global organization that develops and publishes international standards for various industries, including piping systems. European Committee for Standardization (CEN): CEN is a regional organization responsible for developing and maintaining European standards for various industries, including piping systems. Several codes and standards apply to piping systems, depending on their application, materials, and design. Some of the most widely used codes and standards include: ASME B31.1 – Power Piping: This code covers the design, fabrication, installation, inspection, testing, and maintenance of power piping systems used in electric power generating stations, industrial and institutional plants, and district heating systems. ASME B31.3 – Process Piping: This code provides requirements for the design, fabrication, installation, testing, and inspection of process piping systems in various industries, including chemical, petroleum, pharmaceutical, and food processing. ASME B31.4 – Pipeline Transportation Systems for Liquids and Slurries: This code covers the design, construction, operation, and maintenance of pipeline systems used to transport liquids and slurries, such as crude oil, refined petroleum products, and chemical solutions. ASME B31.5 – Refrigeration Piping and Heat Transfer Components: This code provides requirements for the design, fabrication, assembly, testing, and inspection of refrigeration piping systems and heat transfer components. It covers materials, components, and joining methods used in refrigeration systems, including those used in air conditioning, heat pumps, and industrial process cooling. ASME B31.8 – Gas Transmission and Distribution Piping Systems: This code provides requirements for the design, fabrication, installation, testing, and maintenance of gas transmission and distribution piping systems, including natural gas, propane, and other fuel gases. ASME B31.9 – Building Services Piping: This code covers the design, fabrication, installation, testing, and maintenance of building services piping systems, such as those used for heating, cooling, and water distribution in commercial, institutional, and residential buildings. It addresses systems conveying fluids like steam, hot water, fuel oil, and other non-hazardous fluids. See also Basics of Piping Engineering API 5L – Specification for Line Pipe: This standard specifies the technical requirements for the manufacture of steel pipes used in the oil and gas industry. API 570 – Piping Inspection Code: This code provides guidelines for the inspection, rating, repair, and alteration of in-service piping systems in petroleum refineries, chemical processing plants, and related facilities. ISO 14692 – Petroleum and Natural Gas Industries – Glass-Reinforced Plastics (GRP) Piping: This series of standards provides requirements for the design, fabrication, installation, testing, and maintenance of GRP piping systems used in the petroleum and natural gas industries. ISO 15649 – Petroleum and Natural Gas Industries – Piping: This standard specifies the requirements for the design, materials, fabrication, installation, testing, and inspection of process piping systems in the petroleum and natural gas industries. EN 13480 – Metallic Industrial Piping: This series of standards covers the design, fabrication, installation, testing, and inspection of metallic industrial piping systems, including pressure vessels, storage tanks, and heat exchangers. ASTM International is a leading organization that develops and publishes standards and specifications for various materials, products, and industries, including piping systems. Some notable ASTM standards and specifications relevant to piping include: ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless: This specification covers seamless and welded black and hot-dipped galvanized steel pipe in nominal sizes for various applications, including structural, pressure, and mechanical purposes. ASTM A106 – Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service: This specification covers seamless carbon steel pipe for high-temperature service in nominal sizes and for various applications, such as process piping, power generation, and petrochemical industries. ASTM A312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes: This specification covers seamless, straight-seam welded, and heavily cold-worked welded austenitic stainless steel pipe intended for high-temperature and general corrosive service in various industries, including chemical, petrochemical, and power generation. ASTM A335 – Standard Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service: This specification covers seamless ferritic alloy-steel pipe for high-temperature service in nominal sizes and for various applications, such as power generation, petrochemical, and process industries. ASTM D2513 – Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings: This specification covers the requirements and test methods for material, workmanship, dimensions, and burst pressure of polyethylene (PE) gas pressure pipes, tubing, and fittings for use in fuel gas mains and services. See also Hot Tapping, Purpose, Procedure, Steps Understanding and adhering to the relevant codes and standards for piping systems is essential to ensure their safety, reliability, and efficiency. By familiarizing yourself with the various organizations, codes, and standards applicable to your industry, you can ensure that your piping systems are designed, fabricated, and installed according to the highest standards of quality and performance.