



BUREAU OF INDIAN
STANDARDS
NEW DELHI

COMPENDIUM OF STANDARDS ON BOILERS AND PRESSURE VESSELS



PREPARE BY:
MECHANICAL
ENGINEERING
DEPARTMENT

TABLE OF CONTENTS

S.NO	Category	Is Identified	Page no
INTRODUCTION TO MED 01-BOILERS AND PRESSURE VESSELS			1
1.	Pressure Vessels	1.1 IS 2825:1969 Code for Unfired Pressure Vessels	2
		1.2 IS 4049 (Part 1):2024 Formed Ends for Tanks and Pressure Vessels — Specification Part 1 Based on Outside Diameter	3
		1.3 IS 4049 (Part 2):2024 Formed Ends for Tanks and Pressure Vessels — Specification Part 2 Based on Inside Diameter	3
2.	Boilers	2.1 SP 26:2021 Steam Tables in SI Units	4
		2.2 IS 8595:2023 Parameters of Stationary Steam Boilers and Waste Heat Boilers — Terminology	4-5
		2.3 IS 8596:1977 Recommended Parameters of Stationary Steam Boilers	5
		2.4 IS 9330:1979 Terminology for Parameters of Waste Heat Boilers and Boilers for Special Purposes	5
		2.5 IS 9332:1979 Recommended Parameters of Waste Heat Boilers and Boilers for Special Purposes	5
		2.6 IS 13619:1993 Industrial Steam and Hot Water Boiler Plants — Maintaining of Log and Summary Sheets — Recommendations	6
3.	Heat Exchangers	3.1 IS 4503:1967 Specification for Shell and Tube Type Heat Exchangers	6-7
		3.2 IS 10123:1982 Data Sheet for Shell and Tube Type Heat Exchangers	7
		3.3 IS 10470:1983 Specification for Air-Cooled Heat Exchangers	7

4.	Boiler Performance, Testing, and Operation	4.1 IS 8753:2024 Code for Acceptance Tests on Stationary Steam Generators of the Power Station Type	8
		4.2 IS13979:2025 Method of Calculation of Efficiency of Packaged Boilers	8
		4.3 IS 13980:2025 Acceptance Tests on Industrial Boilers — Code of Practice	9
5.	Data Sheets and Documentation Standards	5.1 IS 13445 (Part 1):2025 Industrial Water Tube Boilers — Supplier's Data Sheet Part 1 Proposal Stage	10
		5.2 IS 13445 (Part 2):2025 Industrial Water Tube Boilers — Supplier's Data Sheet Part 2 Post Order Stage	10
		5.3 IS 13477:2024 Industrial Water Tube Boiler — Purchaser's Data Sheet	10
		5.4 IS 15685:2006 Purchaser's Data Sheet for Power Boiler	11
		5.5 IS 15696:2006 Supplier's Data Sheet for Power Boiler	11
		5.6 IS 15680:2021 Guidelines for Selection of Steam Traps	11
6.	Installation and Pipeline Identification Requirements	6.1 IS 8633:2023 Location of Boiler Installations and Boiler Houses — Technical Requirements	12
		6.2 IS 9404:2002 Identification of Pipeline used in Thermal Power Plants — Colour Code	12
7.	International Harmonized Standards	7.1 IS/ISO 16528 (Part 1):2007 Boilers and Pressure Vessels Part 1 Performance Requirements	13
		7.2 IS/ISO 16528 (Part 2):2007 Boilers and Pressure Vessels Part 2 Procedures for Fulfilling the Requirements of ISO 16528-1	13

MED 01-BOILERS AND PRESSURE VESSELS

The Boilers and Pressure Vessels Sectional Committee under the Bureau of Indian Standards (BIS) is responsible for the formulation, revision, and maintenance of Indian Standards related to boilers, pressure vessels, heat exchangers, and associated thermal equipment. These systems are widely used in industries such as thermal power plants, oil and gas processing, chemical and petrochemical plants, and other manufacturing sectors where steam generation and heat transfer are essential for industrial operations. Since boilers and pressure vessels operate under high pressure and temperature conditions, it is important to establish standardized technical requirements to ensure safety, reliability, and uniform engineering practices.

While developing these standards, the committee considers various engineering and operational aspects such as pressure design criteria, material selection, fabrication methods, welding procedures, inspection techniques, and testing requirements. The standards also provide guidance on installation practices, operating parameters, performance evaluation, and documentation including technical data sheets and operational records. These provisions help engineers, manufacturers, and plant operators follow consistent procedures in the design, manufacture, and operation of boilers and pressure vessels.

The committee also reviews international practices and technological developments so that Indian Standards remain aligned with modern engineering requirements. By establishing clear technical guidelines and safety provisions, the standards developed under MED 01 contribute to improving equipment reliability, operational safety, and efficiency in industrial systems. This compendium provides a consolidated overview of the important standards developed under MED 01 and highlights their role in supporting the safe and efficient use of boilers and pressure vessels in industry.

BOILERS AND PRESSURE VESSELS

1. Pressure Vessels:

Pressure vessels are closed containers used to store or process liquids and gases at a pressure different from atmospheric pressure. They are widely used in industries such as power plants, oil and gas processing, chemical plants, and refineries for applications like storing compressed gases, carrying out chemical processes, and heat transfer operations. Since these vessels operate under pressure, they must be properly designed and manufactured to ensure safe and reliable operation.



Fig. 1 A typical picture of Pressure vessels

1.1 IS 2825:1969 Code for Unfired Pressure Vessels:

This standard provides minimum requirements for the design, fabrication, inspection, testing, and certification of fusion welded unfired pressure vessels made from ferrous and non-ferrous materials. It specifies guidelines for the selection of suitable materials, allowable stress values, and structural design of vessel components to ensure strength and safety during operation. The standard also covers approved welding procedures, heat treatment requirements, and non-destructive examination methods to maintain the quality of welded joints. In addition, it includes hydrostatic testing requirements to confirm that the vessel can safely withstand the intended operating pressure. The standard applies to industrial pressure vessels within specified pressure and size limits while excluding boilers, gas cylinders, nuclear vessels, and equipment covered under other regulations. Overall, it helps

ensure the safe construction, reliable performance, and regulatory compliance of unfired pressure vessels.

1.2 IS 4049 (Part 1):2024 Formed Ends for Tanks and Pressure Vessels — Specification Part 1 Based on Outside Diameter (Second Revision)

This standard specifies the dimensional requirements, profile dimensions, tolerances, and technical delivery conditions for formed ends used as closures in tanks, pressure vessels, receivers, and similar equipment when designed on the basis of outside diameter. It covers dished and flanged, pressed or spun ends to ensure proper fitment, dimensional accuracy, and reliable performance. The standard also includes manufacturing requirements and recommends that ends with reinforced or flanged-in manholes should maintain the same geometric shape as plain ends. Overall, it helps ensure uniform fabrication, interchangeability, and safe service performance of vessel end closures.

1.3 IS 4049 (Part 2):2024 Formed Ends for Tanks and Pressure Vessels — Specification Part 2 Based on Inside Diameter (Second Revision)

This standard (part 2) specifies the dimensional requirements, profile dimensions, tolerances, and technical delivery conditions for formed ends used as closures in tanks, pressure vessels, receivers, and similar equipment when designed on the basis of inside diameter. It covers dished and flanged, pressed or spun ends to ensure proper fitment, dimensional accuracy, and reliable performance. The standard also includes manufacturing requirements and recommends that ends with reinforced or flanged-in manholes should maintain the same geometric shape as plain ends. Overall, it helps ensure uniform fabrication, interchangeability, and safe service performance of vessel end closures.

2. Boilers:

Boilers are closed vessels used to heat water to produce steam or hot water for industrial and power generation applications. They are commonly used in power plants, refineries, chemical industries and manufacturing processes, where steam is needed for heating, power generation, or processing. Since boilers operate at high pressure and temperature, proper design, operation, and maintenance are essential to ensure safe, efficient, and reliable performance.



Fig. 2 A typical picture of Steam boilers

2.1 SP 26:2021 Steam Tables in SI Units (Third Revision)

This standard provides the thermodynamic properties of water and steam in SI units, which are essential for boiler and thermal engineering calculations. It includes tables for parameters such as pressure, temperature, enthalpy, entropy, and specific volume of steam and water under different conditions. Engineers use these values for designing boilers, analyzing steam cycles, and calculating energy efficiency in power plants and industrial processes. The standard helps ensure accurate and uniform calculations in steam generation and heat transfer systems.

2.2 IS 8595:2023 Parameters of Stationary Steam Boilers and Waste Heat Boilers — Terminology (First Revision)

This standard defines the technical terms used for parameters of stationary steam boilers and waste heat boilers. It explains terms related to steam pressure, steam temperature, evaporation rate, feed water conditions, and heat transfer characteristics. By providing standardized definitions, the document helps

engineers, manufacturers, and operators clearly understand and communicate boiler-related parameters. It ensures uniform use of terminology in technical documents, design specifications, and operational reports.

2.3 IS 8596:1977 Recommended Parameters of Stationary Steam Boilers

This standard provides recommended operating parameters for stationary steam boilers used in industrial and power generation applications. It includes guidelines for steam pressure, temperature, evaporation capacity, and feed water conditions required for efficient boiler operation. The standard helps engineers select appropriate design and operating conditions for boilers. Following these recommended parameters helps improve boiler efficiency, reliability, and safety during operation.

2.4 IS 9330:1979 Terminology for Parameters of Waste Heat Boilers and Boilers for Special Purposes

This standard provides the terminology for parameters related to waste heat boilers and boilers designed for special purposes. It establishes uniform definitions for important operating, performance, and design terms used in these specialized boiler systems to support clear communication in design, manufacturing, testing, and operation. Terminology for general stationary steam boilers is covered separately under IS 8595. Overall, this standard helps maintain consistency and accuracy in technical understanding of special-purpose boiler applications.

2.5 IS 9332:1979 Recommended Parameters of Waste Heat Boilers and Boilers for Special Purposes

This standard provides recommended operating parameters for waste heat boilers and boilers used for special industrial purposes. It includes guidance on pressure, temperature, and operating conditions suitable for boilers that recover heat from industrial processes such as furnaces and exhaust gases. The standard helps improve energy utilization by ensuring efficient heat recovery and safe boiler operation. It also assists engineers in selecting proper design and operating conditions for such boilers.

2.6 IS 13619:1993 – Industrial Steam and Hot Water Boiler Plants – Maintaining of Log and Summary Sheets – Recommendations

This standard provides recommendations for maintaining log sheets and summary sheets for industrial steam and hot water boiler plants. It includes recording details such as pressure, temperature, fuel consumption, water level, steam output, and operating hours. Proper record keeping helps monitor boiler performance, identify problems, and plan maintenance activities. It also supports safe and efficient boiler plant operation.

3. Heat Exchangers:

Heat exchangers are devices used to transfer heat from one fluid to another without mixing them. They are widely used in power plants, refineries, chemical plants, and other industrial processes for heating, cooling, condensation, and energy recovery. Heat exchangers help improve energy efficiency by utilizing heat from one process stream to heat or cool another. Proper design, material selection, and maintenance are important to ensure efficient heat transfer and reliable operation.



Fig. 3 A typical picture of Heat Exchangers

3.1 IS 4503:1967 Specification for Shell and Tube Type Heat Exchangers

This standard specifies the requirements for the design, construction, inspection, and testing of cylindrical shell and plain tube type heat exchangers used in the petroleum and general chemical industries. It covers heat exchangers intended for both

moderate and severe operating conditions, including applications where higher-grade materials of construction are required. The standard provides guidance on structural design, fabrication quality, material selection, and performance verification to ensure reliable heat transfer and safe operation. Overall, it helps promote standardized manufacturing, durability, and efficient service performance of shell and tube heat exchangers.

3.2 IS 10123:1982 Data Sheet for Shell and Tube Type Heat Exchangers

This standard provides a data sheet format for collecting the technical information required for the thermal rating and mechanical design of shell-and-tube type heat exchangers. It includes essential process, operating, and construction details needed for proper equipment selection, performance evaluation, and structural design. The standard helps ensure complete and uniform data exchange between users, designers, and manufacturers for accurate design and reliable operation of heat exchangers.

3.3 IS 10470:1983 Specification for Air-Cooled Heat Exchangers

This standard specifies the requirements for the design, construction, inspection, and testing of air-cooled heat exchangers used in the petroleum and general chemical industries. It covers essential aspects such as material selection, structural design, fabrication quality, and performance verification to ensure reliable operation under industrial service conditions. The standard helps promote safe construction, efficient heat transfer, and dependable performance of air-cooled heat exchangers in process applications.

4. Boiler Performance, Testing, and Operation:

This section covers standards related to the performance evaluation, efficiency calculation, testing procedures, and operational practices of boilers. These standards are important to ensure that boilers operate according to design conditions, achieve the required efficiency, and maintain safe and reliable performance during service. Proper testing and monitoring help in verifying equipment performance, identifying losses, improving, operation, and performance assessment of boilers in industrial and power generation applications.



Fig. 4 A typical picture of Boiler Performance, Testing, and Operation

4.1 IS 8753:2024 Code for Acceptance Tests on Stationary Steam Generators of the Power Station Type (First Revision)

This standard establishes the procedures for conducting acceptance tests on stationary steam generators of the power station type and for presenting the results in a systematic tabular form. It provides methods for determining heat output and thermal efficiency through direct measurement, complete heat balance, or loss assessment methods, depending on test conditions and accuracy requirements. The standard also covers evaluation of auxiliary equipment such as draught plants, pulverizers, and steam purity when required. It applies mainly to large direct-fired water tube steam generators equipped with components such as superheaters, reheaters, economizers, and air heaters, using solid, liquid, gaseous, or mixed fuels. Overall, it helps verify guaranteed performance, efficiency, and reliable operation of power station steam generating units.

4.2 IS 13979:2025 Method of Calculation of Efficiency of Packaged Boilers (First Revision)

This standard provides methods for calculating the thermal efficiency of packaged boilers used in industrial applications. It includes both the direct method (input-output method) and indirect method (heat loss method) for efficiency calculation. The standard identifies various heat losses such as flue gas losses, radiation and convection losses, unburnt fuel losses, and blowdown losses. It provides formulas and procedures for evaluating each type of loss to determine overall boiler efficiency.

This helps engineers analyze boiler performance, identify areas of energy loss, and improve operational efficiency.

4.3 IS 13980:2025 Acceptance Tests on Industrial Boilers — Code of Practice

This standard specifies procedures for conducting acceptance tests on industrial boilers to verify their performance. It includes guidelines for measuring operating parameters such as steam generation rate, fuel consumption, pressure, temperature, and efficiency. The standard also provides procedures for test preparation, instrumentation, data collection, and analysis of results. It ensures that the boiler meets the performance guarantees specified by the manufacturer. This standard is essential for confirming the reliability and efficiency of boilers before they are put into regular operation.

5. Data Sheets and Documentation Standards:

This section covers standards related to technical documentation, data sheets, and selection guidelines for boilers and associated thermal equipment. These standards play an important role in clearly defining design requirements, operating conditions, and technical specifications during different stages such as design, procurement, manufacturing, installation, and operation. Proper documentation ensures effective communication between the purchaser, manufacturer, and supplier, and helps avoid errors, mismatches, and delays in project execution. It also supports inspection, testing, performance evaluation, and maintenance activities throughout the lifecycle of the equipment.

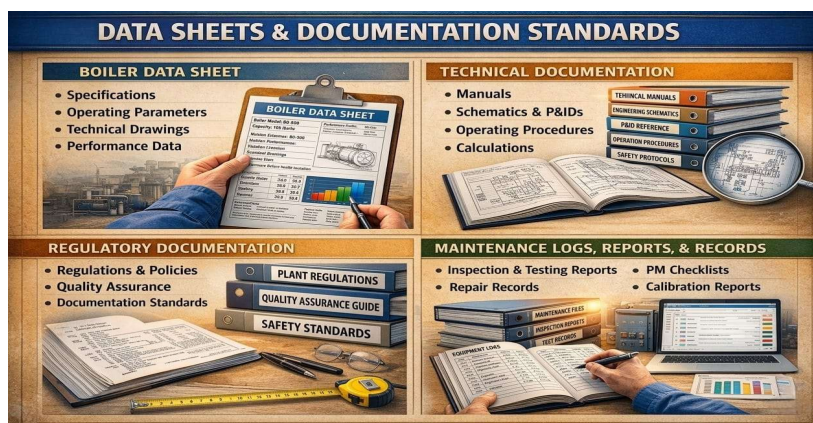


Fig. 5 A typical picture of Data Sheets and Documentation Standards

5.1 IS 13445 (Part 1):2025 Industrial Water Tube Boilers — Supplier's Data Sheet Part 1 Proposal Stage (First Revision)

This standard provides a structured format for preparing the supplier's data sheet at the proposal stage of industrial water tube boilers. It includes general technical information such as boiler type, capacity, steam pressure and temperature, fuel used, and basic design parameters. The data sheet also contains information related to major components such as drums, tubes, superheaters, and accessories. This document is used by the purchaser to evaluate different suppliers and compare their technical offers. It ensures that all suppliers provide information in a uniform format, making technical assessment easier and more accurate.

5.2 IS 13445 (Part 2):2025 Industrial Water Tube Boilers — Supplier's Data Sheet Part 2 Post Order Stage (First Revision)

This standard provides a detailed format for the supplier's data sheet after the order is finalized. It includes complete technical details such as finalized design conditions, material specifications, dimensions, fabrication details, and performance parameters. It also covers information related to auxiliary systems, instrumentation, and control features. This data sheet is used during detailed engineering, manufacturing, inspection, and installation stages. It ensures that the supplied boiler meets the agreed design specifications and provides a reference for quality control and future maintenance.

5.3 IS 13477:2024 Industrial Water Tube Boiler —Purchaser's Data Sheet (First Revision)

This standard specifies the format for the purchaser's data sheet, which is prepared by the user before procurement of an industrial water tube boiler. It includes details such as required steam capacity, pressure, temperature, type of fuel, feed water conditions, and site requirements. The document helps clearly communicate the operational needs and design expectations to the manufacturer. This ensures that the boiler is designed and supplied according to the specific requirements of the user.

5.4 IS 15685:2006 Purchaser's Data Sheet for Power Boiler

This standard provides a structured format for the purchaser's data sheet for power boilers used in large-scale power generation. It includes detailed information such as operating conditions, fuel characteristics, environmental conditions, and performance requirements. The data sheet helps in defining technical specifications clearly and ensures proper coordination between the purchaser and manufacturer during the design and procurement stages.

5.5 IS 15696:2006 Supplier's Data Sheet for Power Boiler

This standard provides the format for the supplier's data sheet for power boilers, which includes complete technical details of the boiler being supplied. It covers design parameters, materials, dimensions, performance data, and details of major components. This document is used for verification, approval, and reference during manufacturing, inspection, and commissioning. It ensures transparency and accuracy in technical communication between the supplier and purchaser.

5.6 IS 15680:2021 Guidelines for Selection of Steam Traps

This standard provides guidelines for the selection of steam traps used in steam systems. It explains different types of steam traps such as mechanical, thermostatic, and thermodynamic types, along with their working principles and applications. The standard also provides selection criteria based on operating conditions such as pressure, temperature, and condensate load. Proper selection of steam traps helps in efficient removal of condensate, prevention of steam loss, and improvement of overall energy efficiency of the system.

6. Installation and Pipeline Identification Requirements:

This section covers standards related to the safe installation, layout, and identification of boiler systems and associated pipelines. Proper installation and clear identification are essential to ensure safe operation, easy maintenance, and prevention of accidents in industrial plants. These standards help in minimizing risks

such as fire hazards, explosion, leakage, and operational errors by providing structured guidelines for plant layout and system identification.

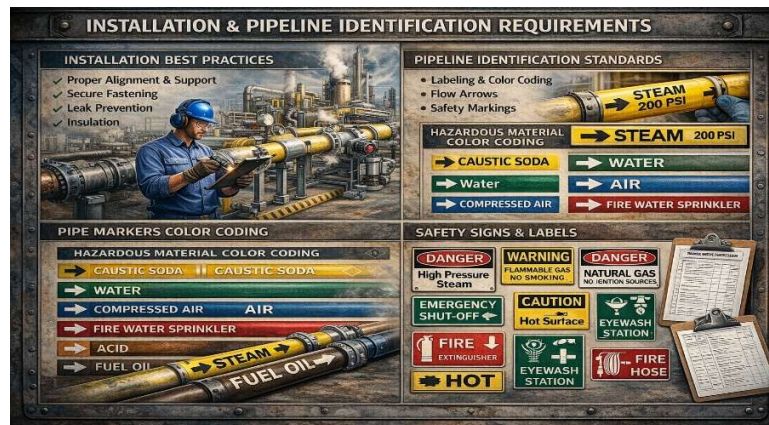


Fig. 6 A typical picture of Installation and Pipeline Identification Requirements

6.1 IS 8633:2023 Location of Boiler Installations and Boiler Houses — Technical Requirements (First Revision)

This standard specifies the technical requirements for the location and layout of boiler installations and boiler houses. It includes guidelines for safe distances from other structures, ventilation requirements, access for operation and maintenance, and safety provisions. The standard also considers factors such as fuel handling, exhaust systems, and emergency conditions. Proper location and layout help ensure safe operation and reduce risks associated with boiler installations.

6.2 IS 9404:2002 Identification of Pipeline used in Thermal Power Plants — Colour Code (First Revision)

This standard provides a color-coding system for identifying pipelines used in thermal power plants. It helps in easy identification of fluids such as steam, water, fuel, and gases flowing through pipes. The standard improves safety by reducing the risk of operational errors and helps in maintenance and emergency situations. Proper pipeline identification ensures better plant management and safer working conditions.

7. International Harmonized Standards:

This section includes standards that are aligned with international practices (ISO standards). These standards focus on overall safety principles, performance requirements, and procedures for boilers and pressure vessels. They help in harmonizing Indian Standards with global practices and ensure that equipment meets internationally accepted safety and quality levels.

7.1 IS/ISO 16528 (Part 1):2007 Boilers and Pressure Vessels Part 1 Performance Requirements

This standard specifies the general performance requirements for boilers and pressure vessels. It focuses on safety principles, risk prevention, and essential design requirements rather than detailed construction rules. The standard provides a framework to ensure that pressure equipment operates safely under different conditions. It helps align Indian practices with international safety requirements.

7.2 IS/ISO 16528 (Part 2):2007 Boilers and Pressure Vessels Part 2 Procedures for Fulfilling the Requirements of ISO 16528-1

This standard provides procedures for demonstrating compliance with the performance requirements specified in Part 1. It includes methods for design verification, inspection, testing, and documentation. The standard helps manufacturers and engineers ensure that boilers and pressure vessels meet the required safety and performance criteria. It supports uniform assessment and certification practices.