मानकः पथप्रदर्शकः

COMPENDIUM OF INDIAN STANDARDS ON

RENEWABLE ENERGY SOURCES

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NEW DELHI

INTRODUCTION

India, being one of the fastest-growing economies in the world, has recognized the critical importance of transitioning towards sustainable and clean energy. To ensure the safe, reliable, and efficient development and utilization of renewable energy sources such as solar, wind, biomass, and small hydro, India has established comprehensive standards through the Bureau of Indian Standards (BIS) and other regulatory bodies.

The formulation of Indian Standards on renewable energy sources is a structured and collaborative process that aims to promote consistency, safety, and quality across the sector. These standards support the development of renewable technologies, facilitate trade, enhance consumer confidence, and help achieve national and international climate goals.

This compendium offers an overview of Indian Standards related to Renewable Energy Sources and aims to enhance efficiency and performance of equipment.

It serves as a single, consolidated source that summarizes all relevant standards pertaining to the Renewable Energy Sources.

By establishing and updating standards for renewable energy sources, India is not only strengthening its domestic infrastructure but also contributing to the global fight against climate change while working towards its ambitious targets under initiatives like the National Solar Mission and the broader National Action Plan on Climate Change (NAPCC).

TABLE OF CONTENTS

SOLAR WATER HEATING SYSTEMS

Scope: These standards focus on parameters influencing solar water Heating systems including material selection, general characteristics of all types of solar water heating systems with flat plate or tubular collectors and their performance evaluation methods. They include testing for solar domestic water heating systems for thermal performance, under benchmark conditions and method of transforming the test results from the particular climate conditions of the test to long-term average conditions for the test location or for other location with similar solar irradiation conditions.

Key Considerations:

- Provides guidelines for design, installation, operation, and maintenance of solar water heating systems.
- Covers both passive and active systems using flat plate or tubular collectors.
- Specifies components like collectors, storage tanks, piping, and auxiliary devices.
- Includes performance evaluation, system sizing, and safety measures.
- **Standardized Indoor Testing:** Outlines procedures for indoor testing of solar water heating systems to determine their thermal performance.
- **Benchmark Conditions:** Specifies controlled conditions under which tests should be conducted to ensure consistency.

The Standards covered are:

1. Solar Energy — Water Heating Systems — Guide to Material Selection with Regard to Internal Corrosion (IS/ISO/TR 10217: 1989)
2. Solar Water Heating Systems — Code of Practice (IS 12976 : 2023)
3. Solar Heating — Domestic Water Heating Systems Part 1 Performance Rating Procedure Using Indoor Test Methods (IS 13129 (Part 1) : 2023)
4. Solar Heating — Domestic Water Heating Systems Part 2 Procedure for System Performance Characterization and Yearly Performance Predication [IS 13129 (Part 2) : 2023]
5. Solar Heating — Domestic Water Heating Systems Part 3 Procedures for System Component Characterization and Predication for Yearly Performance Using Component Performance Data (IS 13129 (Part 3) : 2024)
6. Solar Heating — Domestic Water Heating Systems Part 4 Determination of Durability and Reliability (IS 13129 (Part 4) : 2023)
7. Test Procedure for Thermosyphon Type Domestic Solar Hot Water Heating Systems (IS 16368 : 2015)
8. All Glass Evacuated Tubes Solar Water Heating System (IS 16544 : 2016)

SOLAR THERMAL COLLECTORS

Scope: These standards specify the requirements for solar flat plate and glass - evacuated tube collectors used for water heating. It excludes collectors involving phase change fluids (above 100 °C), concentrating collectors for mechanical/electrical energy generation, integrated storage collectors, unglazed flat plate collectors, installation or mounting practices, and sun-tracking mechanisms.

Key Provisions:

Material and Construction Requirements:

- Use of high-quality materials such as toughened glass, copper, and aluminum.
- Emphasis on corrosion resistance and weatherproof construction.

Design Criteria:

- Specifications for insulation, cover plates, and absorber plate design to ensure durability and efficiency.
- Requirements for weatherproofing and overall assembly.

Testing Requirements:

- Impact resistance to withstand hailstorms and other impacts.
- Weather durability to verify performance under varying climatic conditions.
- Corrosion resistance to confirm long-term material integrity

The Standards covered are:

1. Solar Flat Plate Collector-Specification (Part 1 Requirements) [IS 12933 (Part 1) : 2003]
2. Solar Flat Plate Collector-Specification (Part 2 Components) [IS 12933 (Part 2) : 2003]
3. Solar Flat Plate Collector-Specification (Part 3 Measuring Instruments) [IS 12933 (Part 3) : 2003]
4. Solar Flat Plate Collector – Specification (Part 5 Test Methods) [IS 12933 (Part 5) : 2003]
5. Direct Insertion Type Storage Water Tank for All Glass Evacuated Tubes Solar Collector — Specification [IS 16542 : 2016]
6. All-Glass Evacuated Solar Collector Tubes — Specification [IS 16543 : 2024]

SOLAR COOKERS

Scope: These standards specify the requirements and grades of box type solar cookers for cooking and elaborates on the requirements of various components of box type solar cooker. These standards also include various testing methods to assess the product.

Key Provisions:

Design and Construction:

- Specifies requirements for materials, dimensions, and structural integrity to ensure durability and safety.

Performance Requirements:

- Outlines performance criteria, including thermal efficiency and heat retention capabilities.

Testing and Evaluation:

- Describes methods for testing cookers to ensure compliance with the specified standards.

Safety Standards:

- Emphasizes safety features to prevent accidents during operation, including stability and heat resistance.

The Standards covered are:

1. Solar Cooker — Box Type — Specification (Part 1 Requirements) [IS 13429 (Part 1) : 2020]
2. Solar Cooker — Box Type — Specification (Part 2 Components) [IS 13429 (Part 2) : 2018]
3. Solar Cooker — Box Type — Specification (Part 3 Test Method) [IS 13429 (Part 3) : 2018]

BIOGAS AND BIOMASS

Scope: These standards specify the requirements for gas holders used in biogas plants and covers requirements of different designs and types of solid bio-mass portable cookstove (chulha) for domestic and community/commercial applications. These standards also specify the requirements for design, construction, installation and operation of small, medium and large sized biogas (biomethane) plants.

Key Provisions:

Design and Construction:

- Specifies design parameters to ensure safety, durability, and efficiency.
- Includes guidelines on materials, dimensions, and structural integrity.

Performance Requirements:

- Outlines performance criteria such as thermal efficiency, emission levels, and

Safety Standards:

- Emphasizes safety features to prevent accidents during operation.
- Includes guidelines on stability, handling, and heat resistance.

Testing and Evaluation:

- Includes procedures for assessing performance, emissions, and durability.

The Standards covered are:

1. Biogas Plants- Glass Fibre Reinforced Polyester Resin Gas Holders Specification Part 1 With Steel Frame [IS 12986 (Part 1):1990]
2. Portable Solid Biomass cookstove (Chulha) — Specification [IS 13152 (Part 1):2013]
3. Design, Construction, Installation and Operation of Biogas (Biomethane) Plant — Code of Practice [IS 9478:2023]

SOLAR CONCENTRATORS

Scope: These standards specify requirements of Solar concentrator for process heating and steam generation. The standards specify requirements for these different type of concentrators- Paraboloid dish concentrators, Scheffler Concentrators, Parabolic Trough Concentrators, Non-Imaging Concentrators and include the testing methods for assessing the performance of these Solar thermal concentrators.

Key Provisions:

- ***Material Requirements:*** Specifies the types of materials suitable for constructing the dish and receiver components, focusing on durability, thermal stability, and corrosion resistance.
- ***Optical Performance:*** Outlines the acceptable ranges for optical efficiency, reflectivity, and tracking accuracy to ensure maximum solar energy capture.
- ***Thermal Performance:*** Provides guidelines for evaluating the thermal output and efficiency of the system under standardized testing conditions.
- ***Testing and Quality Assurance:*** Mandates specific testing procedures to verify compliance with the standard's requirements, ensuring consistent quality and performance across different installations.

The Standards covered are:

1. Concentrated Solar Thermal — Specification Part 1 Paraboloid Dish Concentrator [IS 16648 (Part 1) : 2017]
2. Concentrated Solar Thermal — Specification (Part 2 Scheffler Concentrator) [IS 16648 (Part 2) : 2017]
3. Concentrated Solar Thermal — Specification (Part 3 Parabolic Trough Concentrator) [IS 16648 (Part 3) : 2017]
4. Concentrated Solar Thermal — Specification (Part 4 Non-Imaging Concentrator) [IS 16648 (Part 4):2018]
5. Concentrated Solar Thermal — Specification (Part 5 Test Methods) [IS 16648 (Part 5) : 2017]

DIGITAL PLATFORMS OF BIS

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