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COMPENDIUM OF INDIAN STANDARDS ON

GAS AND OIL BURNING APPLIANCES

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INTRODUCTION

Gas and oil burning appliances are devices that use LPG, PNG or oil as fuel to produce heat or energy primarily for cooking and heating. Common examples include Domestic Gas Stoves, Domestic Instantaneous Water Heater commonly used in our homes. These appliances burn fuel in a controlled way to provide heating or cooking. It's important they are installed and maintained properly to ensure safe operation. Poor ventilation or maintenance can lead to safety risks like carbon monoxide leaks.

This compendium aims at providing an overview of Indian Standards on Gas and oil burning appliances, offering insights into their varieties.

By compiling relevant standards on Gas and oil burning appliances in a single document, this compendium serves as a ready reference for professionals involved in manufacture of these appliances which are efficient, reliable and safe.

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[1.] IS 11241: 2024 – SPECIFICATION FOR PORTABLE LPG APPLIANCES OPERATING AT VAPOUR PRESSURE

Scope:

This standard specifies the construction, safety, and performance requirements for portable liquefied petroleum gas (LPG) appliances that operate at vapour pressure using ISI-marked cartridges (up to 500 ml) or gas cylinders (up to 13 litres). It applies to outdoor or well-ventilated area appliances such as cooking stoves, grills, heaters, lighting devices, blowtorches, and laboratory burners. Appliances connected to the mains electricity or using LPG in the liquid phase are excluded.

Usage: These appliances are used for outdoor cooking, lighting, heating with gas cartridges or cylinders. Ideal for camping, outdoor catering, mobile labs, field work, and use in well-ventilated non-domestic settings.

Safety and Performance Tests: Includes mandatory tests for strength, stability, soundness, overheating resistance, and safe ignition/flame stability. Appliances must pass tests for draught, liquid spillage, and CO emissions.

Key Features:

- Compact, no mains connection, ISI-marked cartridges, integrated ignition devices, pressure-type gas operation.
- Portable, energy-efficient (for stoves), safe handling features, user-friendly assembly, corrosion-resistant materials.
- Introduces minimum efficiency benchmarks for stove burners, promoting rational energy use.

[2.] IS 15558:2024 – INSTANTANEOUS DOMESTIC WATER HEATER FOR USE WITH LPG

Scope:

This Indian Standard specifies requirements for Instantaneous domestic water heaters using liquefied petroleum gas (LPG) with a nominal heat output of less than 25 kW. The standard applies to water-controlled appliances operating at a working pressure of 2.942 kN/m² (30 gf/cm²). It outlines constructional features, performance criteria, test methods, and safety provisions but excludes water boiling appliances. This standard serves to enhance safety, efficiency, and performance reliability of LPG-based domestic water heaters in India.

Usage: Supplies hot water instantly for domestic use by directly heating water with LPG as it flows through the unit. Suitable for household bathrooms, kitchens, and other domestic washing needs where instant hot water is required.

Safety: Equipped with flame supervision devices, anti-overheating features, soundness checks, and designed for proper ventilation.

Key Features:

- Compact design, no storage tank, operates at gas vapour pressure, automatic ignition, and temperature controls.
- Provides hot water on demand, energy-efficient, space-saving, and reduced gas usage compared to storage systems.

Construction Requirements: All parts in contact with water must be durable, made of corrosion-resistant materials, non-polluting, and safety devices must ensure gas shutoff during water flow interruption or overheating.

Performance Standards: Minimum thermal efficiency is 82 % minimum, and appliances meet requirements for flame stability, gas and water soundness, combustion emissions, and noise control.

Testing Procedures: Appliances are tested for combustion quality, thermal efficiency, temperature rise, and flame failure response. Specific conditions are set for test rooms, instruments, and pressure ranges.

Marking & Safety Warnings: Units are clearly marked with specifications, usage warnings, and installation guidance, including a red warning label prohibiting use in closed bathrooms.

[3.] MINI DOMESTIC WATER HEATER FOR USE WITH PIPED NATURAL GAS (PNG) AS PER (IS 17150:2019)

Scope: Covers construction and performance specifications for instantaneous water heaters (≤ 25 kW) operating on PNG at 21 mbar for domestic use, excluding boiling water appliances.

Usage: Provides hot water instantly on demand for domestic tasks like bathing and washing using piped natural gas and inlet water flow control.

Safety: Includes flame failure device, overheat cut-off at 80 °C, pilot flame supervision, ignition safeguards, and protection against gas/water leaks.

Key Features:

- Wall-mountable, sealed combustion circuit, manual reset safety systems, brass/copper water connections, adjustable water flow, and thermal efficiency ≥ 60 %.
- Energy-efficient (no standby losses), compact, durable, safe under draught, and responsive to temperature demand with stable flame and low noise operation.

Applications: Ideal for use in well-ventilated domestic bathrooms and kitchens requiring quick hot water without bulky storage systems.

[4.] DOMESTIC GAS STOVES FOR USE WITH PIPED NATURAL GAS (PNG) AS PER (IS 17153:2019)

Scope:

This standard specifies construction, operational, safety, and performance requirements for domestic gas stoves with metallic or toughened glass bodies designed to operate at a gas inlet pressure of 21 mbar using Piped Natural Gas (PNG).

Usage:

These stoves are intended for household cooking applications, providing efficient flame-based heating with easy ignition and compatibility with typical kitchen utensils.

Safety:

The stoves feature gas soundness checks, flame stability, resistance to draughts and overheating, safe ignition controls, durable materials, and optional flame failure and leak detection systems.

Key Features:

- Key components include toughened glass tops, stainless steel or brass burners, tamper-proof taps, gas-tight joints, corrosion-resistant bodies, pan supports, and thermal efficiency ≥ 50 %. Burner positioning allows safe and efficient cooking.
- They offer clean combustion with low CO/CO_2 emissions, long service life, minimal maintenance, good thermal efficiency, and enhanced safety in domestic environments with multiple burner configurations.

Applications:

Ideal for residential kitchens connected to PNG infrastructure, ensuring eco-friendly and cost-effective daily cooking with adherence to modern safety and performance standards.

[5.] IS 4246:2002 – DOMESTIC GAS STOVES FOR USE WITH LIQUEFIED PETROLEUM GASES (LPG)

Scope: Specifies construction, operation, safety requirements, and testing for domestic gas stoves with metallic bodies for use with LPG at 2942 kN/m² (30 gf/cm²) inlet pressure.

Usage: • Used for domestic cooking purposes with LPG as fuel.
• Designed to ensure reliable operation under typical household conditions.
• Suitable for Indian kitchen practices and vessel types.

Safety: • No built-in pressure regulator permitted.
- Ensures: Flame stability; Ignition safety; No flashback under varying pressure.

Fire hazard limitation (max flame temp: 500 °C at designated height).
• Optional gas leak indicators must conform to (IS 13432 Part 1 or 2).
• Burners must operate without extinguishing at pressures from 25 to 35 gf/cm².
• Protection against draught, and soot formation checks.

Key Features: • Durable metallic construction with corrosion-resistant fittings.
- Easy maintenance and cleaning design.
- Adjustable and easily accessible gas inlet connections (side/rear).
- Standardized and interchangeable burner components.
- Strong and stable structure with < 2mm deflection under test load.
- LED markings and labeling (manufacturer, usage, thermal efficiency).
- Built for Indian cooking conditions and safety norms, ensures user safety, gas efficiency, and durability, Easy to maintain and service, Complies with BIS standards for better consumer trust. ≥ 68 % thermal efficiency.
- Minimum required thermal efficiency: 68 %.

Applications: Primarily for household cooking, can also be extended to small-scale commercial kitchens that use domestic-grade appliances, aligns with other appliances under IS 5116 series (like ovens, cooking ranges).

[6.] BIOGAS STOVE AS PER IS 8749:2024

Scope: This standard specifies the construction, performance, safety, and testing requirements for biogas stoves used in domestic and commercial settings. It ensures the stove is safe, efficient, durable, and suitable for biogas fuel.

Usage: Designed for cooking applications where biogas is available:
• Domestic kitchens (especially rural areas with biogas digesters)
• Commercial kitchens.
• Educational, community, and eco-infrastructure projects.

Safety: • Operates safely at 747 N/m² (7.62 gf/cm²) biogas pressure.
• Gas-tight and leak-proof under pressure.
• Flame does not extinguish, blow off, or cause flashback.
• No carbon monoxide > 500 ppm.
• Surface temperatures within safe limits: ≤ 120 °C for most, ≤ 60 °C for handles.
• Secure tap positions (OFF/ON/SIMMER).

Key Features: • High-quality construction with corrosion-resistant materials.
• Durable burners with high melting point components (≥ 510 °C).
• Easy-to-clean design with user-friendly maintenance.
• Fixed, calibrated injector jets.
• Stable support for various pan sizes (≥ 125 mm).
• Safe and clean cooking using renewable biogas.
• High durability with low maintenance.
• Thermal Efficiency ≥ 55 %.
• Optimized for methane-rich biogas.
• Low heat loss; high fuel-to-heat conversion.

Applications: • Rural households with biogas units.
• Government/NGO clean energy initiatives.
• Educational institutions, health centers, and remote facilities.
• Suitable for sustainable and off-grid living.

[7.] DOMESTIC METHANOL COOKSTOVE — CANISTER TYPE (IS 17907:2022)

Scope: This standard defines the construction, performance, safety, and operational requirements for canister-based methanol cookstoves intended for domestic use. It includes methanol characteristics, fuel leakage limits, and safety protocols for operation and storage.

Usage & Applications: • ***Primary Use:*** Clean cooking solution for households.
• ***Target Areas:*** Rural, urban, and semi-urban homes lacking LPG access.
• ***Programs:*** Supports clean energy initiatives such as the Methanol Cooking Fuel Program.

Safety: Operates at atmospheric pressure using methanol fuel.
• Methanol vapour leakage limits: < 200 ppm.
• Surface temperature: < 60 °C for touchable parts.
• CO emissions: < 200 ppm; NOx: < 5 ppm.
• Safety precautions included for usage, handling, and emergency response.

Key Features: • ***Durability:*** Corrosion and wear-resistant parts.

- ***Design:*** Detachable canister, stable flame from 100 % to 15 % fuel level.
- ***Materials:*** Use of IS-compliant stainless steel, rubber seals, mineral wool.
- ***Lever Mechanism:*** Instant flame shutdown, safe OFF/ON indication.
- ***Durability:*** Corrosion and wear-resistant parts.
- ***Fuel Canister:*** 1.8 ± 0.1 L, stainless steel body, leak-proof even when inverted.
- Promotes clean and safe cooking.
- Reduces dependency on LPG and imports.
- Easy maintenance, robust construction.

Thermal Efficiency: ≥ 58 % (declared ≥ 62 % possible).

- ***Fuel Consumption:*** 180–290 g/h.
- Efficient combustion with CO_2/CO ratio < 0.02.
- Reduces fuel wastage via vapor-tight design and controlled flame output.

[8.] DOMESTIC ETHANOL COOKSTOVE (FIXED & REMOVABLE CANISTER TYPE) (IS 18380:2023)

Scope: Specifies construction, operation, safety, and performance requirements for domestic ethanol cookstoves operating at atmospheric pressure with either fixed or removable canisters.

Usage & Applications: • ***Primary use:*** Household cooking.
• ***Target users:*** Homes without LPG access, rural/urban clean energy programs.
• ***Supports:*** Sustainable Development Goal 7 (Clean & Affordable Energy).

Safety: • Ethanol vapour leakage: < 2 g/h.
• CO emissions: < 400 ppm, CO_2: >15,000 ppm, NOx: < 5 ppm.
• Flame stability in air flow (2 m/s).
• Safe tilt up to 15° without spilling.
• Surface temperature (touchable areas): < 60 °C.
• Comprehensive first-aid and storage instructions.

Key Features: • ***Canister Capacity:*** < 2 L; no leakage when tilted 180°
• ***Material:*** Anti-corrosive stainless steel (IS 6911), mineral wool insulation.
• ***Flame Control:*** Lever-operated with instant shutoff.
• ***Maintenance:*** Easy-to-clean, modular design, interchangeable parts.
• ***Marking & Instructions:*** Clear ON/OFF indicators, safety SOPs in multiple languages.
• Cleaner alternative to kerosene, biomass, and partially accessible LPG.
• Safe, efficient, and low maintenance.

Thermal Efficiency:
- **Fixed Canister:** ≥ 56 % (declared ≥ 62 %).
- **Removable Canister:** ≥ 56 % (declared ≥ 65 %).

• ***Fuel Consumption:*** 200–400 g/h.
• ***CO/CO_2 Ratio:*** < 0.02 (high combustion efficiency).

[9.] OIL PRESSURE STOVES (IS 1342:2019)

Scope: This standard specifies the requirements and tests for oil pressure stoves designed for domestic and commercial use, operating on pressurized kerosene at 100–200 kN/m² (1–2 kgf/cm²).

Usage & Applications: • ***Primary Use:*** Cooking in households and small businesses.
• ***Common Settings***: Urban and rural homes, roadside eateries, and field kitchens.

Safety: • **Withstands:**

- ***Air Pressure:*** 250 kN/m² without leakage.
- ***Hydraulic Pressure:*** Up to 1,000 kN/m² without bursting.

• **Surface Temperature:** Must not exceed 60 °C at user contact points.
• **CO/CO_2 Ratio:** Must not exceed 0.02 (ensures clean combustion).
• Stable flame under 2 m/s wind (draught resistance).

Key Features:

• Durable brass or mild steel construction.
• Pump-operated pressurization.
• Leak-proof filler cap and safety release screw.
• Interchangeable key components (burner, washers, nipples, etc.).
• Delivered with standard accessories (funnel, spanners, washers, prickers).
• Simple maintenance with readily available spares.
• Portable and sturdy design, resistant to tipping.

• **Thermal Efficiency:**

- ≥ 55 % for roarer burners.
- ≥ 58 % for silencer burners.
- May be declared up to 60–62% for high-efficiency models.

• Controlled fuel consumption with test-verified limits.

[10.] OIL PRESSURE HEATERS (IS 2787:2006)

Scope: This standard specifies the requirements and tests for oil pressure heaters operating on pressurized kerosene up to 200 kN/m² (2 kgf/cm²), used for domestic and commercial heating applications.

Usage & Applications: • ***Primary Use:*** Heating and large-scale cooking in homes, small industries, canteens, and field kitchens.
• ***Applications:*** Particularly suitable for areas without access to electricity or LPG.

Safety: • **Withstands:**

- ***Air Pressure Test:*** 250 kN/m² without leakage.
- ***Hydraulic Safety Test:*** 600 kN/m².
- ***Bursting Pressure Test:*** 1000 kN/m² without rupture.

• Flame must remain stable under 2 m/s wind.
• Surface/fuel temperatures: Must remain below 60 °C.
• **CO/CO_2 Ratio:** ≤ 0.02 (clean combustion).

Key Features:

• Brass fuel tank and components, seamless tubes.
• Pump with safety valve and leak-proof filler cap.
• Pressure-release screw angled at 45° for safe depressurization.
• Durable construction for long-term use.
• Resilient to pressure and mechanical wear.
• Stable flame and efficient heating output.
• Suitable for low-resource environments.
• Fully assembled and ready-to-use.

• **Thermal Efficiency:**

- ***Roarer burner:*** ≥ 55 %
- ***Silencer burner:*** ≥ 58 % (may declare ≥ 60–62 %).

• **Fuel Consumption:** Within ±15 % of manufacturer's rating.
• High-efficiency combustion conserves fuel and minimizes emissions.

[11.] IS 10109:2018 — OIL PRESSURE STOVES, OFFSET BURNER TYPE

Scope: This standard specifies requirements for offset burner type oil pressure stoves designed to burn pressurized kerosene for domestic and commercial use. These stoves operate within a pressure range of 100 to 200 kN/m² and are made in capacities from 1.5 litres to 10 litres.

Usage and Applications: These stoves are widely used in homes, hostels, canteens, and field kitchens. Their offset design enhances safety by distancing the burner from the fuel tank, reducing the risk of accidents. The robust construction allows for reliable operation in various environments.

Safety: The stove undergoes multiple pressure tests including air pressure, safety pressure, and burst pressure to ensure no leakage or deformation under extreme conditions. A pressure release screw, leak-proof filler cap, and tilt stability up to 15° improve operational safety.

Key Features:

- Interchangeable components (burner, pump, filler cap, etc.), Heat-resistant construction with durable materials, Stable base and efficient fuel feed design, Visual and tactile controls for ease of use, Comes with essential accessories for maintenance and use.
- Affordable and durable, Safer than traditional direct-tank burners, Easy maintenance with replaceable parts, High structural integrity.
- The stove achieves thermal efficiency of at least 55 % (roarer) or 58 % (silencer), with potential to exceed 60–62 %. It is tested for optimal fuel consumption and minimal CO/CO_2 emissions, making it efficient and environmentally compliant.

[12.] IS 18616:2024 — PIEZOELECTRIC SPARK LIGHTERS FOR GAS BURNING APPLIANCES

Scope: This standard defines requirements and testing methods for impact-type piezoelectric spark lighters used with gas-burning appliances.

Usage: Primarily used to ignite domestic and commercial gas appliances, ensuring safe and reliable ignition without external power sources.

Safety: Includes insulation resistance, moisture proofing, high-voltage output (>10 kV), shock resistance, drop and heat resistance, and child safety labeling like “Keep out of reach of children”.

Key Features: • Manual actuation (≥15 N), piezoelectric ceramic cartridge, corrosion-resistant materials, durable spring (IS 4454 SS wire), and 15,000-cycle endurance rating.

- Energy-free ignition, high durability, resistant to humidity and temperature, easy to use, long service life, and safe with no external flame or battery required.
- Does not consume external power, making it inherently energy efficient. Spark is generated via mechanical impact on piezoelectric material.

Applications:

Suited for household gas stoves, commercial kitchen appliances, and gas burners where safe and instant ignition is required.

[13.] IS/ISO 22702:2018 – UTILITY LIGHTERS – SAFETY SPECIFICATION

Scope: This standard applies to all flame-producing consumer products known as utility lighters (e.g., grill lighters, fireplace lighters, gas matches) used to ignite stoves, lanterns, appliances, etc. It does not cover cigarette or cigar lighters.

Usage: Used to safely ignite items like candles, grills, camp stoves, pilot lights, and other fuel-fired appliances by manually generating a flame via built-in ignition systems.

Safety: Includes drop resistance, no sustained self-ignition, overheat and leakage resistance, internal pressure endurance, spitting/flaring prevention, and mandatory safety warnings like “Keep out of reach of children”.

Key Features:

- Manual ignition requiring ≥ 15 N force.
- Flame height controls and limits.
- Fuel compatibility and leak resistance.
- Durable construction with smooth edges.
- Safe to use under varied temperatures and positions.
- Withstands multiple ignition cycles and burns.
- Long-lasting, reusable in case of refillable types.
- Compliant with international safety benchmarks.
- Lighters use pressurized butane/propane gases for instant flame generation. No external energy source is needed, ensuring energy-free ignition and fuel-efficient flame control.

Applications: Suitable for domestic and commercial use, including ignition of gas burners, charcoal grills, fireplaces, pilot lights, and camping equipment.

[14.] LIGHTERS — SAFETY SPECIFICATION (IS/ISO 9994:2018)

Scope: The standard defines safety requirements for flame-producing lighters intended for lighting cigarettes, cigars, and pipes. It ensures a reasonable degree of safety under normal use and foreseeable misuse.

Usage & Applications: ***Primarily used for:***

- Lighting cigarettes, cigars, and pipes.
- May also be used to light candles, paper, or small flames.
- Not intended for use as: Extended flame devices like torches or flashlights.

Safety: Requires deliberate user action to ignite and maintain flame

- Flame height is limited by type:
  - Max: 120 mm (fluid), 100 mm (gas)
- Withstands drops, pressure, and heat without causing leaks or ignition
- No spitting, flaring, or sustained afterburning
- Leak resistance (≤ 15 mg/min)
- Fuel fill limits: ≤ 85% capacity; ≤ 10g mass

Key Features:

- Flame control mechanism (adjustable or fixed).
- Safety design resists accidental ignition.
- Designed to withstand:
- Drop tests.
- Elevated temperature.
- Burn tests (continuous & cyclic).
- Flame extinguishes quickly (< 2–5 seconds).

Advantages:

- Enhanced user safety through mechanical and material testing.
- Reliable performance under various environmental conditions.
- Standardized performance metrics for manufacturers.
- Prevention of fuel overfill, leakage, and sustained flame risks.

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