

The background features a technical drawing aesthetic with various circular gauges and scales. A prominent scale on the left side is marked with numbers from 140 to 260 in increments of 10. Other smaller gauges and partial scales are scattered across the frame, some with arrows indicating direction. The overall color palette is a gradient from light green at the top to dark blue at the bottom, with a fine, starry texture.

DESIGN AND FABRICATION OF PRESSING STEAM BOILER

INTRODUCTION:

- A boiler is an enclosed vessel that provides a means for combustion and transfers heat to water until it becomes hot water or steam. The hot water or steam under pressure is then usable for transferring the heat to a process. Water is useful and cheap medium for transferring heat to a process. When water is boiled into steam its volume increases about 1,600 times, producing a force that is almost as explosive as gunpowder. This causes the boiler to be extremely dangerous equipment and should be treated carefully. Liquid when heated up to the gaseous state this process.
- The heating surface is any part of the boiler; hot gases of combustion are on one side and water on the other. Any part of the boiler metal that actually contributes to making steam is heating surface. The amount of heating surface of a boiler is expressed in square meters. The larger the heating surface a boiler has, the more efficient it becomes.

TYPES OF PRESSING

1. Under Pressing: Pressing from the wrong side of the garment.
2. Top Pressing: Pressing from the face side of the garment In-Process Pressing, Pressing during the garment manufacturing process
3. Finish Pressing: Adds the final shape to seams and garments
4. Buck Presses: Used by manufacturers of slacks, skirts, and jackets and most of the dry cleaning plants A lower buck and a complementary moveable head with a linkage system, buck padding, steam and vacuum systems, frame and table, gauges and manual/automatic controls for steams, vacuum, heat and pressure May be used for in-process pressing and finish pressing.

- 5. Iron Pressing:

Manual molding operation with pressure and heat application with a flat contact surface Consists of an iron, power line, bed buck, and an iron support system Irons vary in weight and plate dimensions and characteristics depending on the type of pressing operation, fabric, area to be pressed and quality specifications of the operation Mostly used for under-pressing and are more versatile and mobile and are most common in our daily life.

- 6. Block or Die Pressing:

To establish a product's conformance to a form May change the surface characteristics and dimensions of a product An operator positions the component over a die and engages the machine, and folding blades fold and hold the edges to the underside for creases to be set May also be used to mould collars, collar stands and cuffs.

- 7. Form Pressing:

Used for final pressing or for renovating garments in dry cleaning plants Formed in approximate shapes as the finished garment Designed to reduce the positioning and repositioning time Just smooth garment fabric but does not set creases.

BOILER CLASSIFICATION:

1. Tube content: (i) Fire tube boiler and (ii) water tube boiler
2. Axis of shell: (i) Horizontal, (ii) vertical, (iii) inclined
3. Location of furnace: (i) Externally fired, (ii) internally fired
4. Method of circulation: (i) Natural, (ii) forced
5. Mobility: (i) Stationary, (ii) portable
6. Usage: (i) Packaged, (ii) unpackaged
7. Pressure: (i) High, (ii) low
8. Tubes: (i) Single-tube, (ii) Multi-tube

METHODOLOGY

- Direct method:

Direct method of boiler efficiency test is more usable or more common boiler efficiency $= \frac{Q(H_g - H_f)}{q \cdot \text{GCV}} \times 100$ Q = Total steam flow, H_g = Enthalpy of saturated steam in kcal/kg, H_f = Enthalpy of feed water in kcal/kg, q = quantity of fuel use in kg/hr, GCV = gross calorific value in Kcal/kg, like pet coke (8200 Kcal/kg).

- Indirect method:

To measure the boiler efficiency in indirect method we need a following parameter like 1) Ultimate analysis of fuel (H_2 , S_2 , S, C moisture constraint, ash constraint) 2) Percentage of O_2 or CO_2 at flue gas 3) Flue gas temperature at outlet 4) Ambient temperature in deg c and humidity of air in kg/kg 5) GCV of flue in Kcal/kg 6) Ash percentage in combustible fuel 7) GCV of ash in Kcal/kg

- **TANK CONNECTIONS**

The heater is supplied with separate cold water and hot water connections. A connection is provided for mounting a combination safety temperature and pressure relief valve. An overflow line should be utilized from the relief valve outlet to a floor drain. See drawing for locations and sizes.

- **OUTER SHELL, INSULATION, AND SUPPORTS**

The tank is encapsulated in 2-inches of high-density fiberglass insulation. The protective shell is constructed of galvanized steel and is coated with a durable silver hammer tone finish. The entire vessel is supported on heavy-duty integrally welded steel supports for sturdy floor mounting.

- HEATING COIL

The water heater is supplied with a high quality factory installed 2, 4, or 6-pass U-tube heating coil constructed from 20-gauge $\frac{3}{4}$ -inch O.D. single wall copper tubing designed for a maximum working pressure of 150 psi. The tubing is installed in a heavy-duty fabricated steel head with threaded NPT connections. Each assembly is fastened to a corresponding tank flange using a gasket and hex head steel bolts and nuts. Specialized heating coil construction may be included. These options include, Double wall tubing with a leak detection port, or special materials (stainless steel, 90/10 copper-nickel, other) for the tubes and/or head. See drawing for complete details.

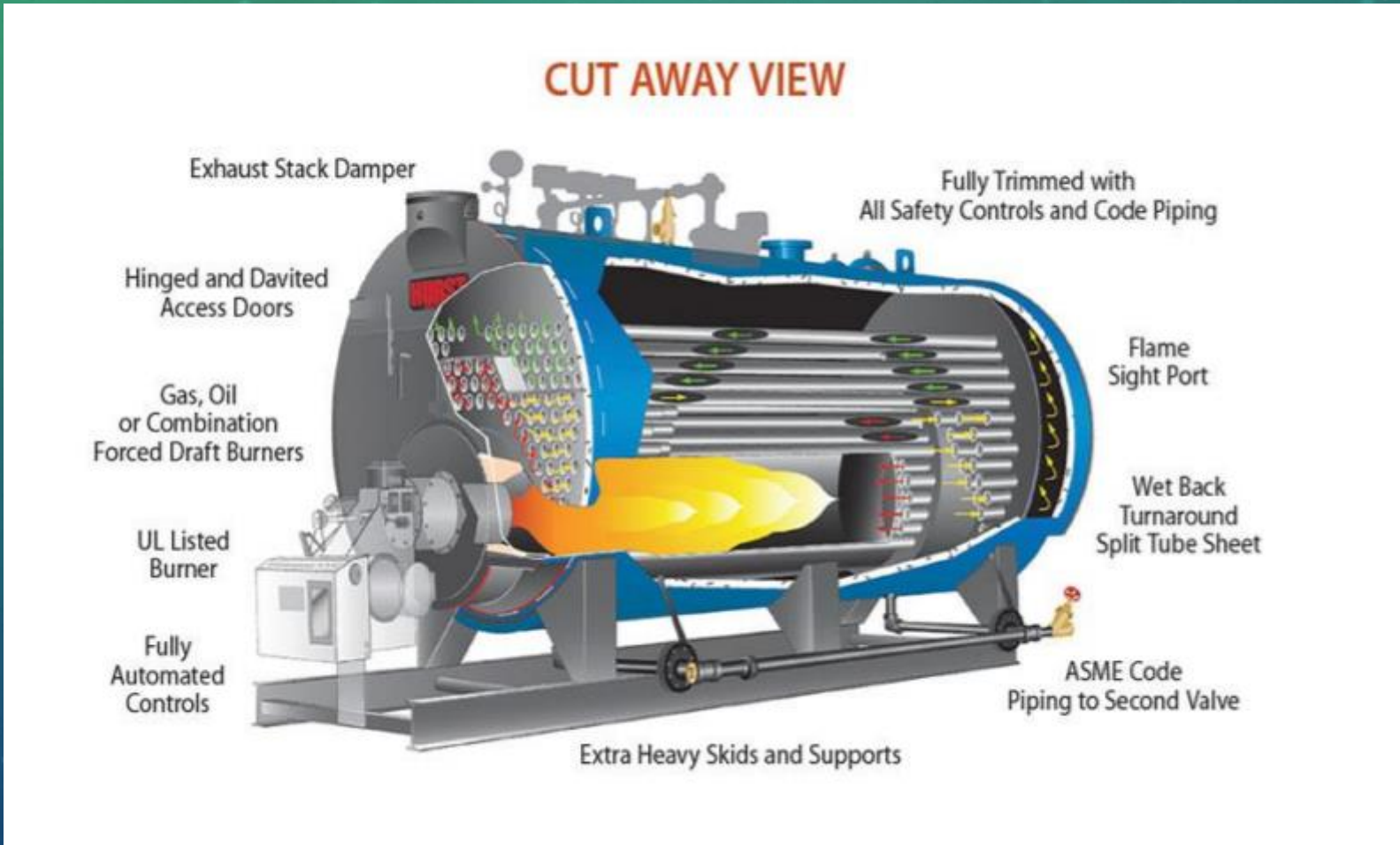
- **CONTROL VALVE**

A fully modulating temperature regulator (also referred to as a control valve) should be installed to regulate the flow of boiler water through the heating coil. No quick opening or snapacting valve should be used as these can cause surges in pressure or thermal shock to the coil. If the unit is furnished with a pilot operated or self contained control valve, no external source of power is required for the valve. The operating controls are factory selected sized, piped, and tested to ensure reliable operation, but can be shipped loose for in the field installation by others up on request. The following is an overview of the various boiler water control systems available.



CUT SECTION OF SHELL

WORKING PRINCIPLE



- EVAPORATION METHOD:

The percentage of total heat exported by outlet steam in the total heat supplied by the fuel (coal) is called steam boiler efficiency.

$$\text{Steam Boiler Efficiency}(\%) = \frac{\text{Heat exported by outlet steam}}{\text{Heat supplied by the fuel}} \times 100$$

It includes with thermal efficiency, combustion efficiency & fuel to steam efficiency. Steam boiler efficiency depends upon the size of boiler used. A typical efficiency of steam boiler is 80% to 88%. Actually there are some losses occur like incomplete combustion, radiating loss occurs from steam boiler surrounding wall, defective combustion gas etc. Hence, efficiency of steam boiler gives this result.

- **BOILER**

A boiler is a closed vessel in which water or other fluid is heated. The fluid does not necessarily boil. The heated or vaporized fluid exits the boiler for use in various processes or heating applications including water heating, central heating, boiler-based power generation, cooking, and sanitation.

- **PRESSURE GAUGE**

Many techniques have been developed for the measurement of pressure and vacuum. Instruments used to measure pressure are called pressure gauges or vacuum gauges. A manometer is an instrument that uses a column of liquid to measure pressure, although the term is often used nowadays to mean any pressure measuring instrument. A vacuum gauge is used to measure the pressure in a vacuum which is further divided into two subcategories, high and low vacuum and sometimes ultra-high vacuum. The applicable pressure range of many of the techniques used to measure vacuums has an overlap. Hence, by combining several different types of gauge, it is possible to measure system pressure continuously from 10 m bar down to 10⁻¹¹ mbar.

- SAFETY VALVE

A safety valve is a valve mechanism which automatically releases a substance from a boiler, pressure vessel, or other system, when the pressure or temperature exceeds preset limits. It is one of a set of pressure safety valves (PSV) or pressure relief valves (PRV), which also includes relief valves, safety relief valves, pilot-operated relief valves, low pressure safety valves, and vacuum pressure safety valves. Safety valves were first used on steam boilers during the Industrial Revolution. Early boilers operating without them were prone to accidental explosion. A gate valve also known as a sluice valve, is a valve that opens by lifting a round or rectangular gate wedge out of the path of the fluid. The distinct feature of a gate valve is the sealing surfaces between the gate and seats are planar, so gate valves are often used when a straight-line flow of fluid and minimum restriction is desired. The gate faces can form a wedge shape or they can be parallel.



4 FINAL VIEW OF DESIGN AND FABRICATION OF PRESSING STEAM BOILER

THANK YOU