Cochrane Engineering

Cochrane Engineering (Pvt) Ltd

HV ELECTRIC BOILER

A TECHNICAL OVERVEIW OF THE HIGH VOLTAGE ELECTRODE BOILER

THE BOILER IS FULLY AUTOMATIC, AND REQUIRES MINIMAL OPERATOR INPUT.

OVERVEIW & BENEFITS

The High Voltage (HV) boilers are constructed to cater for voltages up to 15KV and for a power output ranging from 6 to 50 MW, (that is approximately 9 to 75 ton/hour of steam). Standard operating pressures are 15 and 25 bar, though designs up to 32 bar gauge are possible. The boilers are constructed with a high resistance neutral point as the inner vessel is insulated from the pressure vessel.

The construction and main features of the boiler are illustrated in fig. 1. Inside the pressure vessel (item 1) there is an open tank (item 2) mounted on top of insulators. The Electrodes extend down into this tank and it is there that steam is generated. The Electrodes are fixed and the steam output is regulated by the changing water level.

The bottom dished end of the pressure vessel acts as a water storage container. This water in continually pumped up into the inner vessel by the circulation pump (item 4). Water which is not evaporated runs back into the outer vessel through a control valve (item 5). The level in the inner tank is regulated with this valve.

BENEFITS

- **The boiler itself is small in size**, allowing it to fit into a building with the plan area of your garage rater than a multi-story building.
- **Operating the boiler is simple and clean**, the floor will not be damaged and the most noise in the boiler room will come from the circulating and boiler feed water pumps. There is no coal handling, and associated dust, as well as no emissions of the green house gasses, grits and acid gasses.
- **The boiler can be started quickly.** From a cold boiler you can have a full head of 10 bar steam in 90 mins.
- **Inspection requirements are greatly simplified, and maintenance straightforward**, so that the availability of this steam boiler plant is high.
- **The boiler is up to 99% efficient**, the only losses being by heat conduction from the boiler pressure vessel shell.
- **The steam is of high quality.**
- **The boiler has an excellent response to load**. the plant can decrease the load by 30% per minute, and the boiler will regualate accurately maintaining pressure. The boiler will automatically increase load at the rate of 10% per minute.
- **The turndown ratio is particularly attractive**, as the boiler can be turned down as standard to 5% of the rated capacity and still maintain its high efficiency.
- **Safety.** The boiler pressure is inherently safe, unlike most other boiler types. If there is no water in the boiler, no current is passed through the electrodes, and there is no steam produced. There is no possibilty of overheating taking place.
  The boiler is earth protected, and the high voltage cable connections are within a locked cage. This can be further isolated.
  The voltage supply is usually 11 Kv.
  There are two pressure switches that trip the main breaker if the pressure rises above the control limits, as well as two safety valves along with regulation codes.

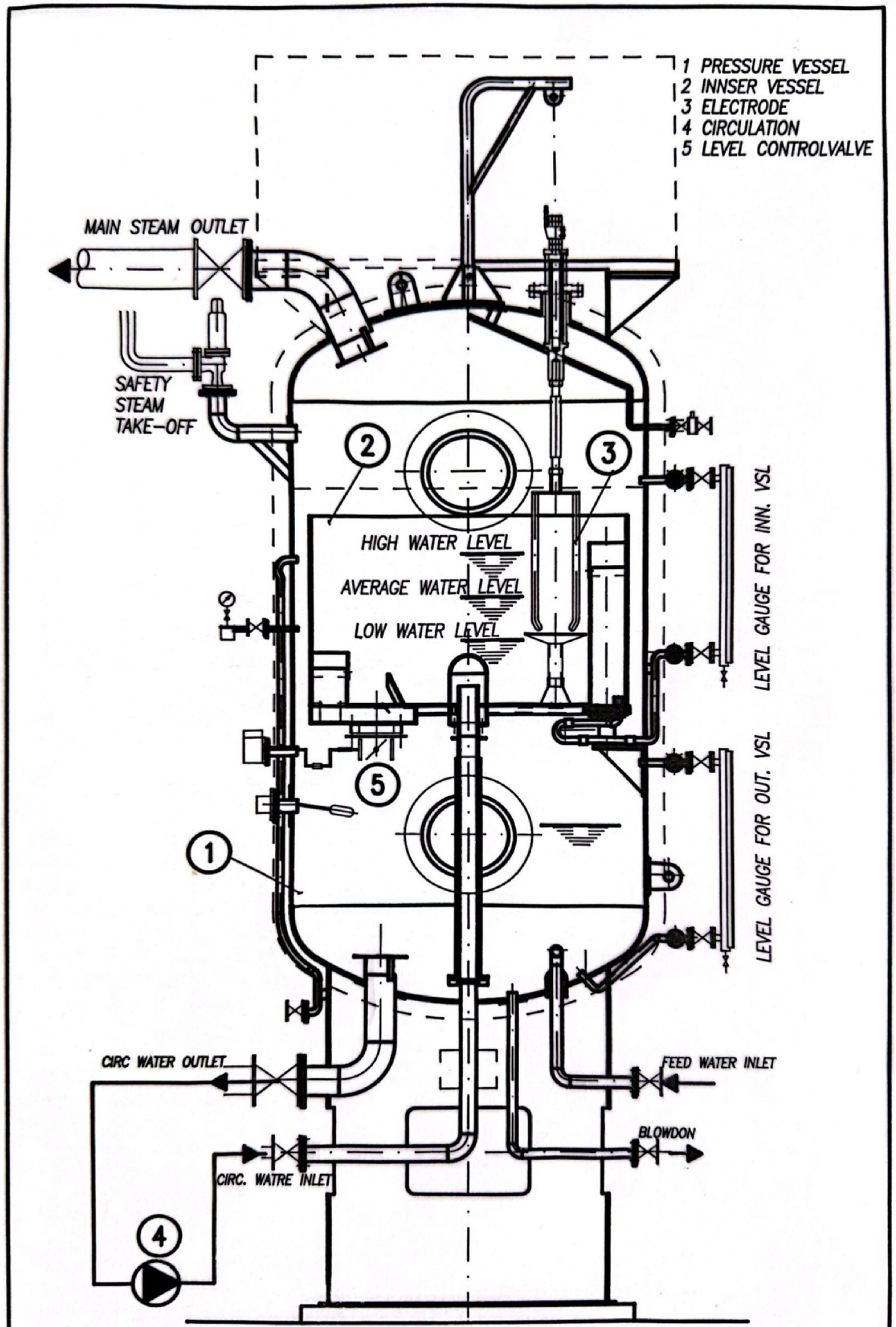

FIG.1 – HIGH VOLTAGE BOILER

CIRCULATING PUMP FOR ELECTRODE BOILER

Main Data

OUTPUT, MW	12	16	20	25	35	42	50	
MAKE								
TYPE	72	96	120	150	210	252	300	
CAPACITY (tonn/hr)	75	100	120	170	200	250	270	
PUMPING HEAD (m)	12	12	12	12	12	12	12	
SYSTEM PRESSURE BAR	15 25	-	-	-	-	-	-	
TEMPERATURE (c,deg)	200 225	-	-	-	-	-	-	
NPSH, m	<1,5	<1,5	<1,5	<1,5	<1,8	<1,8	<2,0	
RPM	1450	1450	1450	1450	1450	1450	1450	
(1) Transport weight (tonnes)	5	6	7	8.5	10	12	15	
Diameter, mm	2300	2400	2500	2800	3000	3300	3600	
(2) Height, mm	6900	7400	7500	7500	7900	8200	8200	

(1) Applies to boilers with design pressure of about 12 bar
(2) Recommended ceiling height. Can be reduced.

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Over

65 years

experience