
BASIC BOILERS

NAME :- _____

DATE :- _____

This examination was conducted under conditions that allowed a fair and honest test of the candidate's knowledge and ability.

Exam supervisor _____

1 What is Steam?

Steam is an invisible gas that's generated by heating water to a temperature that brings it to the boiling point. When this happens, water changes its physical state and vaporizes, turning from a liquid into a gas.

2 Explain the following terms: -

- Latent heat - The heat energy required to turn water into a vapor.
- Saturated steam - Steam at the same temperature as the water from which it was formed. Contains water vapor.
- Dry saturated steam - Has no water in suspension. ie. All water has been evaporated into steam at saturation pressure and temperature.
- Superheated steam - Dry steam at a higher temperature.
- Pressure will rise if volume remains constant
- or Volume will rise if pressure remains constant.
-

3 Explain these water treatment terms: -

- PH - Used as a measure of acidity of a solution;
A pH below 7 indicates acidity, and one above 7 alkalinity.
- T.D.S. - Total Dissolved Solids comprising inorganic salts and small amount of organic matter that are dissolved in water
- Scale - Mineral deposits that reduce heat transfer and flow rate
- ppm - Measurement of parts per million.
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4 The boiler blow down is used for as number of purposes list three.

- To lower boiler water level
 - To empty boiler
 - To remove scale and mud
 - To lower TDS levels
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5 List the information that is on an MSDS (MATERIAL SAFETY DATA SHEET)

- a hazardous substances product name
- the chemical and generic name of certain ingredients
- the chemical and physical properties of the hazardous substance
- health hazard information
- precautions for safe use and handling
- the manufacturer's or importer's name, Australian address and telephone number.

6 Which valve is best suited for throttling?

a **Globe valve - Used for throttling**

b *Parallel slide valve - A steam engine inlet and exhaust valve shaped like a rectangular lid. It is reciprocated inside the steam chest, over a face in which steam ports are cut, so as alternatively to admit steam to cylinder and connect the ports to exhaust through the valve cavity.*

7 What indicates that a gland stuffing box that is working correctly?

Should have a slight smear of oil on the rod.

Excessive pressure to the glands will cause rods to become dry and hot and could change to blue color.

8 a What is a conductor? Give two examples.

A conductor is a material or an object that conducts heat, electricity, light, or sound

Thermal Conductor - A material that transfers heat. Eg. Copper and steel

Electrical conductor - A material that conducts electricity. Eg copper and steel

b What is an insulator? Give two examples.

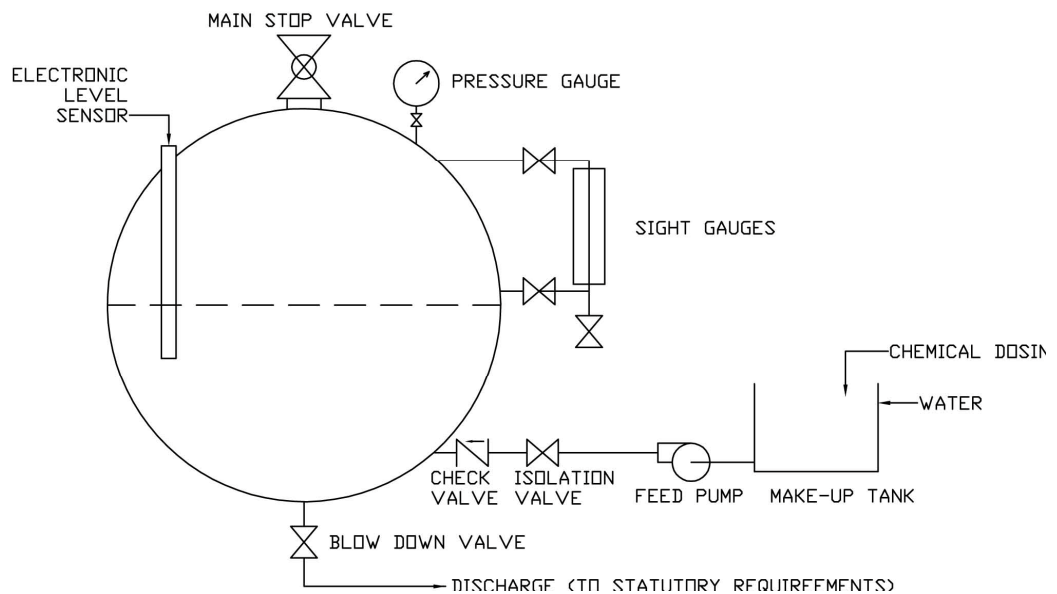
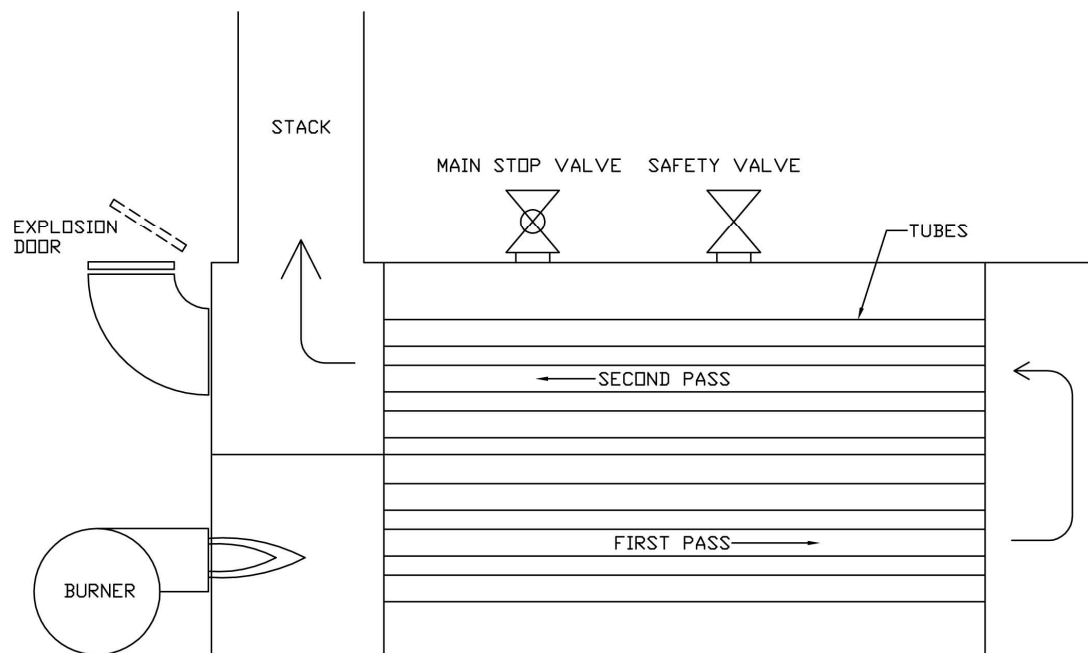
A material or an object that does not easily allow heat, electricity, light, or sound to pass through it

Air, cloth and rubber are good electrical insulators;

Dry light wood and wool make good thermal insulators. (asbestos was used)

9 Sketch a fire tube two pass package boiler and indicate the following features: -

- Main steam stop valve
- Gauge glasses
- Chemical dosing point
- Boiler Feed pump
- Blow down line and valves
- Explosion door
- Water level control mechanism
- Pressure gauge
- Safety valves
- Stack



10 Describe the checks that need to be carried out in a boiler house and around boiler after an outage for maintenance work, before firing of the boiler can commence.

- Check workplace lighting and free access to work area.
- Check for and remove any foreign combustible material
- Electrical supply systems and isolation points
- Emergency equipment is available
 - Fire extinguishers
 - Check test dates
 - Condition of each item
 - What each item can be used for
- First Aid materials
- Test communication system

11 Prior to accepting an on line boiler, what checks must you do?

Talk to previous operators.

Read log for problems or any special instructions

Walk around and inspect engine to detect any defects:-

- Safety tags are in place
- Equipment is serviceable
- Valves are in correct setting
- Air vent open
- Dampers are operational
- Check boiler drum water level

Question engine driver about any matter that is not clear concerning operational condition and requirements of the engine or driven machinery.

Accept responsibility for taking charge of the engine according to workplace requirements.

Carry out engine checks as required by the owner:-

- Check engine speed
- Check supply, engine and exhaust conditions
- Check lubrication systems
- Check engine for smoothness and freedom of motion

Carry out driven machinery checks as required by the owner.

12 What are the classifications of boiler storage?

Dry open storage - Drain while warm, open all door, ensure all water removed, fit vermin doors, isolate systems, blank flu, keep dry, monitor. regularly.

Dry closed storage - (same as closed) add drying chemicals, monitor regularly.

Wet storage - Fill with treated water, expel all air, blank flue, not used if freezing a problem, Monitor and maintain chemicals.

13 Safety Red or Signal Red can be used to identify which plant services pipe work?

Fire fighting. Steam lines are sometimes painted red.

14 What is hydrostatic testing?

High pressure water test to predetermine pressures as required by specifications.

15 What is tested by a “Quick test” and by an “Independent test”?

A Quick test is a simple way of testing the gauge glass by opening and closing the blow thru cock. Water should return smartly to its correct level.

An independent test is used to test each cock and passage by:

Opening blow thru cock and closing steam way cock. Water should blow out.

Opening blow thru cock and closing waterway cock. Steam should blow out.

16 List some of the typical information that would be contained in an Operators Log Book.

Operators name/date/time

Record engine operating conditions as required by the owner

Record the driven end machinery operating conditions data as required by owner

Engine operating hours

Operational problems or unusual engine events

Incidents and accidents

Equipment failures

Equipment deficiencies

Instructions for the next driver

Advice for maintenance personnel

Record separate information for any additional engines if applicable.

17 What is the function of a Post Purge?

A method of scavenging the furnace passes to remove all combustible gases before ignition of the main burner.

18 For a cold start the air cocks are opened, why?

To expel any gasses inside of the boiler.

(should be left open after blow down to prevent damage from vacuum)

19 List the three of the four functions of a blow down.

To empty boiler

To remove scale and mud

To lower TDS levels

20 What is a boiler bank?

2 or more boilers connected together to a common feed.