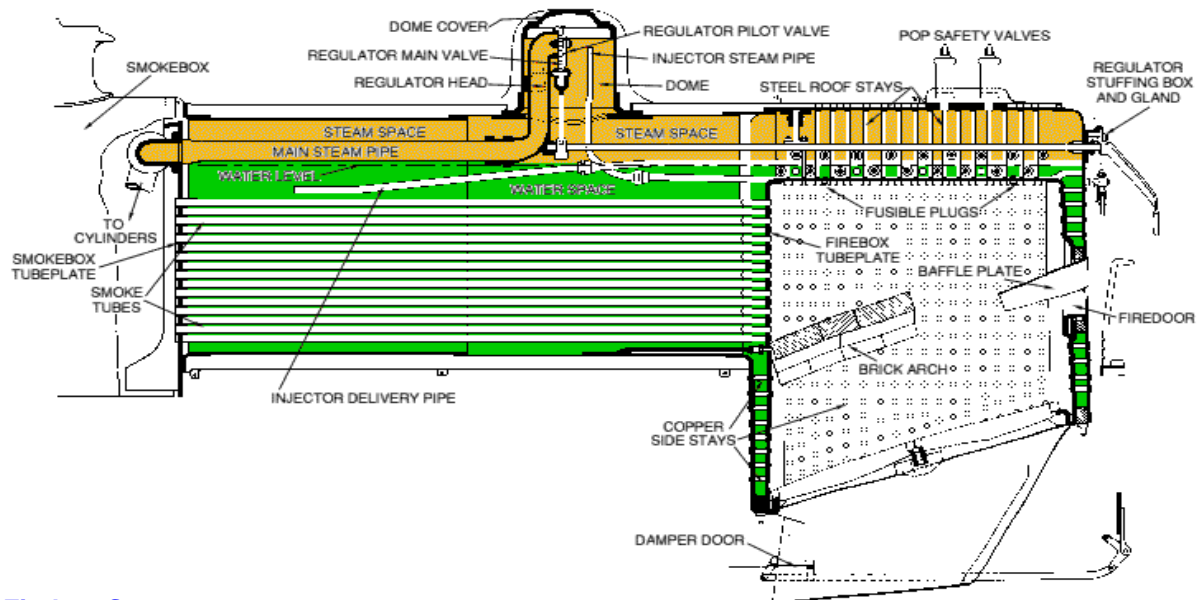


Boiler Components Basics

Boiler

The boiler consists of a steel shell, which includes the boiler barrel, the outer firebox wrapper plate, the inner firebox, boiler back plate, smokebox tubeplate and throat plate.



Firebox Stays

The inner firebox is supported from the outer firebox by the foundation ring at the bottom, crown stays at the top and palm stays between the firebox tubeplate and the boiler barrel. In addition, copper or steel stays run between the firebox and the outer firebox wrapper plate, the boiler back plate and throat plate.

Tubes

The tubes run between the Firebox Tubeplate and the Smokebox Tubeplate. In superheated boilers, large tubes contain the Superheater Elements.

Dome

The dome is positioned at the highest part of the boiler barrel where it forms a collector for steam above the surface of the water.

Main Steam Pipe

Steam collected in the dome is fed into the main steam pipe via the regulator valve to the header in the Smokebox.

Smokebox

The smokebox is an extension of the front end of the boiler barrel. Exhaust steam from the cylinders passes through the blast pipe into the chimney and creates a partial vacuum. This causes hot gases to be drawn through the tubes which, in turn, draws air into the firebox through the grate and firehole door. The smokebox also contains the main steam pipes to the steam chests, blower, superheater header, tubes and exhaust for the Vacuum Ejector where fitted.

Brick Arch

The brick arch serves several purposes. It protects the firebox tubeplate from the direct flame of the fire, radiates heat to prevent rapid fluctuation of the tubeplate temperature, and ensures thorough combustion of volatiles by lengthening their path from the fire to the tubeplate.

Firedoor

Firehole doors vary from locomotive to locomotive. These give access for firing and can be adjusted to control the flow of secondary air.

Baffle Plate

The baffle plate placed in the firehole is designed to direct the secondary air down towards the firebed in order to mix it thoroughly with the hot gases and flames.

Fusible Plugs

Fusible plugs are screwed into the firebox crown. They are made of brass and have a lead core. If the water level in the boiler drops and uncovers the firebox crown, the lead melts allowing steam to escape into the firebox. This warns the Enginemen and helps to deaden the fire. Both injectors should be put on immediately if this occurs and steps taken to remove or deaden the fire.

Superheater

The superheater consists of a superheater header and superheater elements. Steam from the main steam pipe arrives at the saturated steam chamber of the superheater header and is fed into the superheater elements. Superheated steam arrives back at the superheated steam chamber of the superheater header and is fed into the steam pipe to the cylinders. Superheated steam is more expansive.

Reference:

<http://www.btinternet.com/~ian.rivett/imic/boiler.htm>