CRONE Fluidized Bed Boiler

For the combustion of various solid fuels such as:

- **Coal**
- **Wood pellets**
- **Wood chips**

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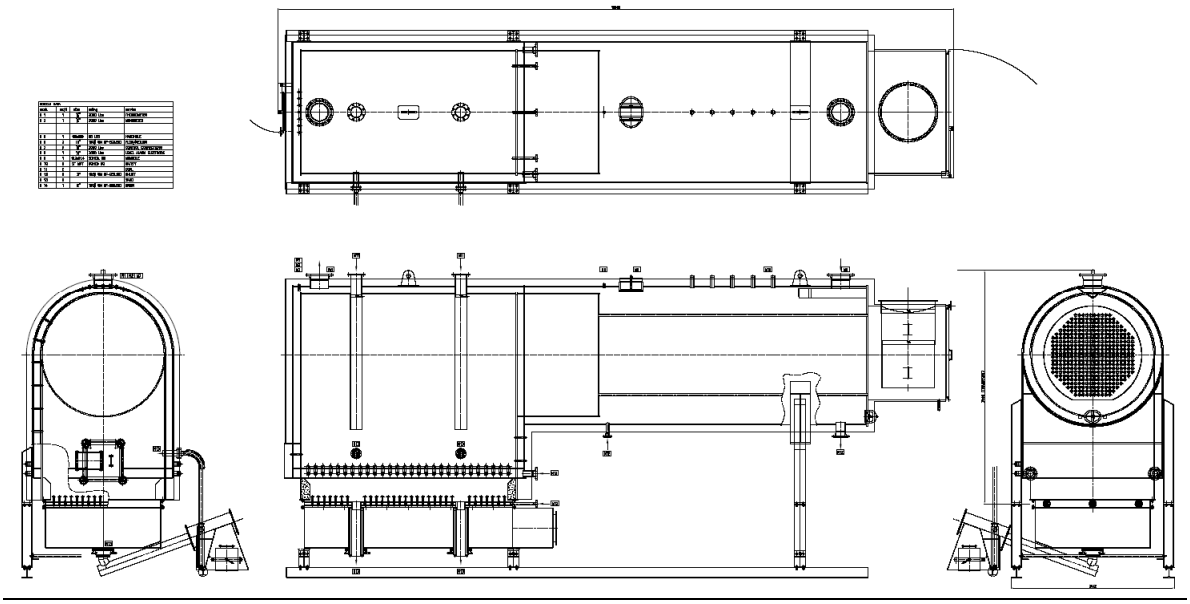
Because of steeply risen energy prices, the interest in burning different fuels increases. Also the use of fossil fuels will reach an end at some point, so one seeks for alternative means of energy sources. Today, fully automatic operation of boiler plants is required with clean, efficient combustion for environmental and economical reasons. We achieve these objectives with the application of the fluidized bed combustion systems.

In the beginning of the 1980's Crone has developed a lot of experience with the fluidized bed principle. During the energy crisis at that point, coal was used as fuel source, and in a later stage (late '90s) various biomass (e.g. wood from forestry and vineyards) sources were burnt.
The fluidized bed principle is a principle that is applied a lot in very large industrial plants. On a smaller scale it is relatively unknown and applied. Several Technical Universities (TU Delft, TU Madrid) and governmental institutions have done research in this field on how it Works and how it can be applied best. All are very enthusiastic about the versatility and the efficiency of this system. Many fuels can be burnt such as: coal, wood chips, wood pellets, palletized paprika (pepper) waste coming from greenhouses, B-quality wood pellets (demolition wood) and olive pits.

Among the biomass combustion technologies, fluidized bed boilers are considered to be one of the best, not only because of their versatility and high efficiency.



Example of a CFB 60 (6 MW or5 Gcal/hr)

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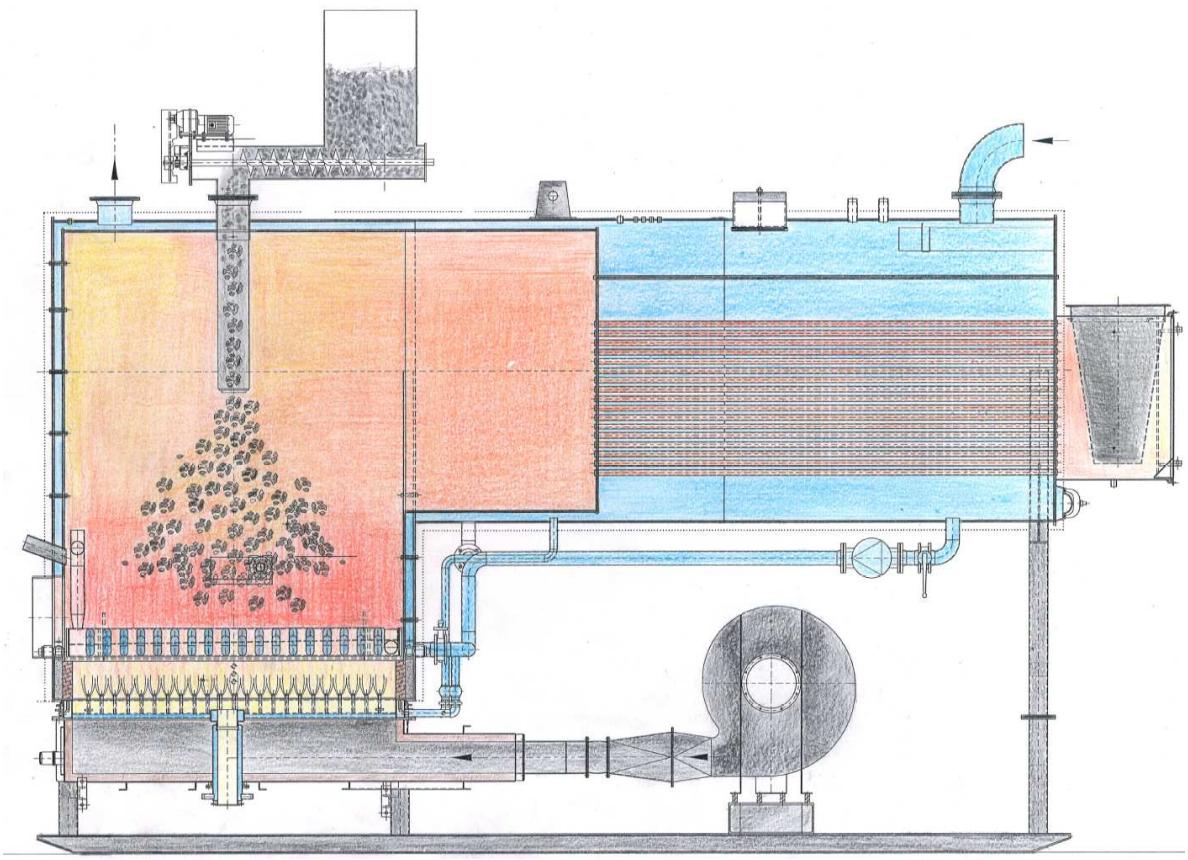
Principle of the fluidized bed boiler

The combustion of the fuel takes place in a tunnel shaped space, the combustion chamber. The fluidized bed burner is mounted on the bottom of this chamber. On the bottom plate numerous vertically placed tubes process the combustion air through tiny holes in the side of each tube. A layer of sand lies on the bottom of the grate. Just above the sand, there are water tubes connected to the boiler internal circulation system that cool the bed and make a more efficient operation of the boiler possible.

Initially the start-up burner (on oil or gas etc.) will heat up the sand by blowing the hot air through the tubes in the sand bed. The sand slowly start to move and bubble. At a temperature of approximately 500°C the fuel can be put in the combustion chamber through a feed hole from the top. The fuel will start to ignite and raise the temperature further to the normal operating temperature of 800-850°C (depending on fuel type). When a temperature around 700°C is reached, the start-up burner will automatically switch off. After that only cold air is blown in through the tubes in the bed.
The 820°C operating temperature is maintained through a balance between the developed heat from combustion and the heat transfer through the water tubes in the sand bed.
Switching off the process scan be done by cutting off the fuel supply. After approximately 2 minutes the combustion air fan is stopped and the sand will fall back down on the bed. If the boiler is restarted within 30 minutes, there is no need to use the start-up burner, but just run the fan and add the fuel again. The sand scrapes off the ash layer around the fuel part and only when it is light enough it will exit the combustion chamber and fly out through the one pass heat exchanger. Because of excellent balance of velocity and heating surface, the heat is being transferred and the tubes stay pretty clean.



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Next to running your boiler fully automatic, it is also very important to burn solid fuels as environmentally friendly as possible. This method, which combines both is also the fluidized bed combustion. In this combustion fuel parts are kept "floating" in hot combustion air and sand with a combustion temperature that does not exceed 900°C. One can accomplish the following:

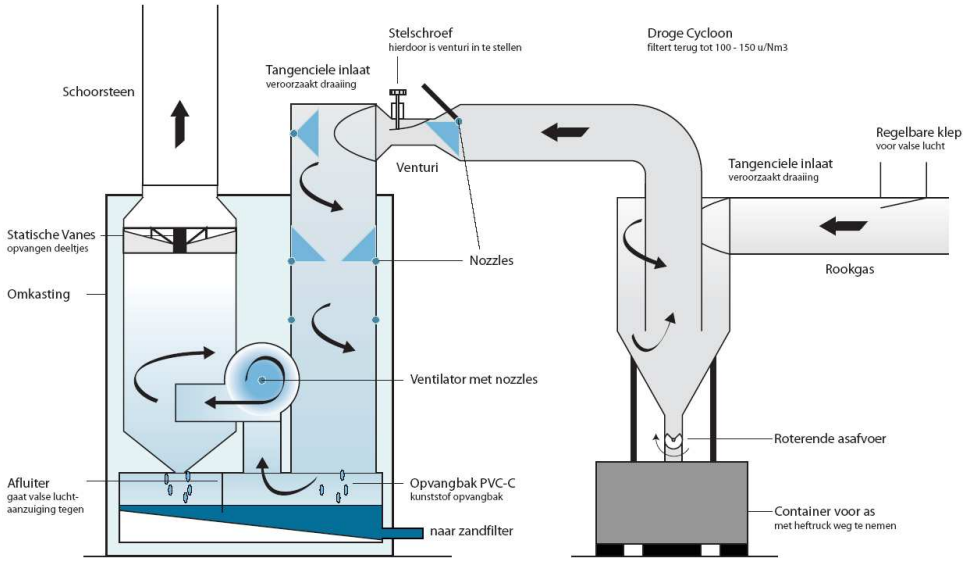
- Full combustion;
- High boiler efficiency;
- Quickly responding automatic high/low and on/off control system allowing to use the boiler also in the summer season;
- Relatively low electricity consumption;
- No or hardly any fouling of boiler tubes;
- No moving parts in the furnace;
- Compact construction;
- Low charge of the boiler material;
- Possibility to burn a wide range of fuels;
- Possibility to have sulphur retention in the bed.

The CFB series can be supplied in the following models:

- As hot water boiler with a capacity range of 1 to 8 MW (100-800 bhp);
- As low/high pressure steam boiler with a capacity range of 1 to 8 MW.

The simple construction with no moving parts in the furnace and the low combustion temperature give these boilers a long economical life time with low maintenance costs.

The fluidized bed boiler can be installed with several systems of fuel storage and transport. The gas cleaning installation depends on the stack emission allowed on the place of installation. This can vary from a nothing to a multi cyclone combined with a wet flue gas cleaning system.



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