"Natural Gas"

TT-027-0196

Natural Gas is one of the most commonly used forms of fuel for the middle market boiler systems. It is delivered to the boilers via a transmission pipe system from the gas fields and burns cleaner than any of the other more commonly used fuels. As such, the additives that could be used in this case are very limited.

Natural Gas is primarily methane with some ethane. The other hydrocarbons that are found in natural gas as butane, hexane and octane are removed by the gas supplier in the compressor transmission plants. They are removed because they are worth a great deal more as building blocks in chemical synthesis than they are as a fuel. Based on the market value of ethane for chemical synthesis in industry, the natural gas may be almost pure methane. Methane has a BTU value of 980 BTU/cu. ft. whereas when the natural gas contains some ethane, the BTU value will increase to 1000 BTU/cu. ft. This is why there are some BTU value differences between gas users in each plant.

This natural gas does not by itself have a noticeable odor and can be very corrosive to the transmission lines. The gas suppliers will then add mercaptan to the gas so that it will have that sulfur odor and corrosion inhibitors to the gas to prevent line loss. These two materials can cause the most problem for your boiler.

The corrosion inhibitor is a surface active agent which usually is never a consideration for the boiler. On occasion, it can drop out at the end of a line and slowly accumulate. If this does happen, you will experience a slightly sticky liquid that restricts the burner and will not sustain combustion. Since gas is pure, where this gunk comes from is the usual concern of the boiler operator. You will have to explain that it is a corrosion additive and that it will have to be mechanically removed.

The mercaptan that is added will usually only come into play when;

Boiler has been put on standby
Boiler is switching from oil to gas
Stack temperature is low

When a boiler is put on standby, the plant will usually treat the water side of the boiler to prevent corrosion. They do not however, do anything to the fireside. The fireside has air passing through it as the natural draft pulls outside air through. This air will contain moisture, and if the gas has not been burned properly and soot has been formed, the soot will absorb this moisture. Once absorbed, the sulfur in the mercaptan and react to form sulfuric acid, which will cause localized corrosion of the boiler tube metal. This is more prevalent in water tube boilers than in fire tube boilers, but it can occur in both of them.