

COMBUSTION ADDITIVE-ARC-1060 DOLOMITE LIME BASED FORMULATION SOFTWARE

In our country, Conventional boiler mostly use Coal or HFO as the fuel for production of steam during industrial applications, including Electric power generation. To avoid high temperature combustion problems like NOx creation above 1000 deg.Cent(from O2 and N2 of air), **Fluidised bed boilers** appeared.

- [1] They operate at <900 deg.Cent., while generating steam.
- [2] they are designed to use cheap fuels like straw, wood, bark, dry grass, peat etc.
- [3] based upon the fuel types, their combustion problems are different, which get related, with high K>0.5%, Cl>0.1%, Ca>1% or Na>0.5% in Fuel ash. As a result acidic KCl/K2SO4 are deposited in both the paths creating corrosion.
- [4] with softness of ash and low particle velocity (of the order of 1m/sec.), thus, low excess air is required i.e. 20 to 25%.
- [5] high turbulence on the bed facilitates quick start up and shut down.
- [6], Volatilization of Alkali components does not take place and the Ash is not sticky. This means that there is no slagging or shoot blowing.
- [7] SO2 formation can be greatly minimized by addition of Marble stone, Lime Stone/Dolomite for high S coals. 3% lime stone is required for 1% S. in the coal feed.

Conventional boilers on the other hand face fouling in first path by deposits and corrosion in the the second path of combustion zones. The over look during operation sometimes lead to un timing boiler tube failures. So, the subject has been globally studied to find out alternative practical counter treatments with new base chemicals.

In sort presence of Sulphur >3% , Vanadium, NOx , and Na>0.5% in ash may lead to formation of low melting oxides inside combustion zone.

SLAG FORMATION ASH

<u>Compounds.....</u>	<u>Melting Point/</u>	<u>Corrosive deposits</u>
MgSO4.....	1124 deg.C.	Vanadium.. V2O5-3Na2OV2O5.
Na2SO4.....	888 “	Nickel.....3NiO.V2O5.
NiSO4.....	840 “	Ni(CO)4C
V2O5.....	690 “	Sodium-..Na2SO4,NaCl,
Na2O.V2O5.....	630 “	Na2S2O7,Sodium Meta.vanadate
2Na2O.V2O5.....	635 “	Silicon..Silicate..SiO2,MSiO3,
3Na2O.V2O5.....	866 “	CaSilicate.....slag.
3NiO.V2O5.....	899 “	Sulphur....S...SO2...SO3+FeO-FeSO4
Na2O.V2O4.5V2O5.....	624. “	Potassium..K2S2O7attackingFe2O3
		Where as un burnt Carbon led to CO gas formation and Fe3O4
		NOx.....N2..CHNO>>NH3..(NH4)2SO4

ADDITIVES

MgO.....	2800 deg.C.	Phosphoros.....P2O5...4HPO3
Al2O3.....	2030 “	MgO reverses it
CaO.....	2568 “	
MnO2.....	1649. “	Carbon.....(POM).....CO2

ARC-1060 is a combination of Oxides of Ca,Mg,and Mn in support and is taken from their natural ores. It is sold both in Powder and Liquid form, as the case may be.

[A] Inside the combustion zone, Oxides of Sulphur and Vanadium which are acidic and fouling by nature, are neutralized and get converted into respective Metallic Sulphates which then get detached from the (second path) convective zone of super heater and follow out going flue gas path to chimney.

Side by side, they also avoid deposition in the radiant zone.

[B] Un burnt Carbon gets fully oxydised to CO₂ gas instead of CO which is corrosive and toxic by nature.

[C] In S.H. Corrosion /deposition by Sulphation Ratio S/Cl .i.e. >6.7 is brought down to <0.5 by Ca. addition. thereby keeping the Super Heaters free from corrosive deposits.

[D] S. Dew Point is raised >120 deg. Cent. so that back end temp is maintained low and boiler efficiency regained.

While treating Combustion issue of coal,

(a) the powder product can be mixed with fine coal particles and then allowed to enter through burners into the boiler combustion first zone.

(b) The partly soluble product can be prepared by dissolving in water and slurry sprayed on to the fouled areas of the second path to dislodge and avoid formation of hard deposits.

(c) the powder product is also available in solution form using suitable organic solvent like Naphtha to make the treatment program easier.

Now, when facing similar Combustion issue with Fuel Oil,

(A) it is very convenient to take the solution form and add it to the fuel oil tank under operation.

(B) As the situation may be it can also be directly sprayed on to the super heater tubes as dispersant which are facing fouling problems. The exercise shall raise the Melting Point of deposits and thus counter slagging, fouling, acid corrosion against H₂SO₄ and HCl acids. The Manganese Constituent in the formulation shall improve over improper Carbon combustion even up to the Air pre heater zone of the second path thus keep the boiler system clean in general.

sincerely,