



Good Grade of Coal

-P Combrink.

Helpful guidelines

Comprehensive Proximate Analyses

- Inherent Moisture MAX 8 % but preferably 4.5 %
- Ash content 18 % Max, preferably 15.5 %max, larger %, will cause ash loading, and reduce combustion capacity of Boiler
- % Volatiles 23-24 ideal, < 23 delayed ignition > 25 Pulsation too much fuel, for air (positive furnace pressure)
- % Fixed carbon, closer to 60 % better energy yield but good from 54 up (Good value pointer of Coal)



GCV Calorific value, should maintain good steam to coal ratio (Gross calorific value 27.5 Mj/kg min for supposed A grade) The higher the better. Contributes to improved steam to coal ratio.

- Coal Hardness: Hardgove index 30 - 100, the higher the easier coal grinds to fines average SA coals approx. 50
- AFTs all above spec should not clinker – AFT min 1280 deg preferably > 1400 deg (Ash fusion temperature) determines clinker formation if > 1500 deg cels clinkers don't form.
- % Phos Max .1 , preferably as low as possible (extremely important, causes hard fouling >0.1) that would need mechanical grinding to remove
Crucible swelling number, Coal kernels potentially draw moisture, max 1,0 indicates moisture drawing during combustion, hence swelling terminology (certain profiles of deformation typifies an according swelling number index) Swelling number may affect expansion and alter combustion conditions



Coal sizing (Peas Coal)

- Usable (ideal 90 + %, cumulative of -25+15 and -15 + 6.3)
- Over size (cumulative -31 upwards preferably 5 % max)
- Under size (fines) (cumulative -6.3 downwards pref 5 % max, red flag at 10 %)

Ash

Composite: optimum on 15 % therefore deduct 15 % of actual quenched sample result, the closer to 15 % the better, the benchmark is as result of VSD and Spiral tube efficiency as supposed to conventional 20 % losses, as a good new industry standard, please bear in mind that any figure for Water tube Boilers 20-25 % still very good as the efficiency is lower than firetube.

Steam to Coal ratios

- , Conventional Fire – Tube: 1: 8.3 ideal conditions
- Spiral- Tube (Fire -Tube) 1: 10
- Water- Tube 1- 7.5 Max



Trace elements:

- Determines what possible fouling elements might be problematic to deposition or combustion issues. Highlighted are the typical ones seen in SA coals
- Aluminium oxide approx. 30 %, has very high melting point > 2000 deg cels, can cause clinker formation as it interacts with Sulphur in combustion
- Silica approx. 50 % can cause hard fouling, glassy deposits and clinkering - Silica (approx. 50 commonplace SA coals)
- Calcium oxide 5- 10 % (incombustible)
- Sulphur Trioxide, iron a Titanium Dioxide (usually less than 5 %) Iron in itself preferably < 8 % to prevent slagging
- The trace elements also serve as a record of Alkali metal make-up composition, if fireside deposit needs to be analysed, can be valuable pointer, and incredibly accurate, trace elements also necessary in determination of other values, and cannot be omitted from a comprehensive analysis
- If all else in check, and poor combustion, analyse for Chlorine content on its own, separate test by UIS, reacts same as low Volatiles or High Ash cont.