Hot Commissioning activities of Boiler
(Stoker/AFBC/CFBC/OIL&GAS)

1 **Refractory Dry Out**
   a. Fuel feeding & Backing / Curing Period
   b. Natural Cooling Period
2 **Alkali Boil out**
   a. Atmospheric Boil Out / Acid Cleaning
   b. Pressure Boil Out
   c. Header end stub cutting & Flushing
3 **Steam Blowing**
4 **Safety Valve Setting / Floating**
5 **Steam Test @110% MCR**

Major Inputs required

1 **Fuel**
   a. Primary Fuel (Main Firing) - Biomass / Coal / Oil
   b. Secondary Fuel (Slow Firing) - Charcoal / Wood / Kerosene / LDO / HSD
2 **DM water**
3 **Chemicals**
   a. Acid Cleaning
   b. Alkali Boil out - TSP / DSP / Surfactant / Soda Ash
   c. Oil, Phosphate, Iron testing apparatus
4 **Bed Material**
5 **Target Plate** (MOC - softer than Turbine Blade Material)

General Consideration for Commissioning Input Calculations:-

		Change Values as per your inputs	
1	Consider about 85% boiler efficiency of quoted Efficiency for input calculation e.g. Boiler quoted Efficiency is 78% than for input calculation consider 78*0.85 = 66.3%	85.0	C29
2	Main Fuel Quantity given at MCR & GCV, Bed Material Quantity for given bed height		
3	Charcoal / Wood / Oil as a startup fuel		
4	Boiler water holding capacity, consider nearly 90% of MCR except slop fired boiler	90.0	C32
5	**Duration of each activity for Input calculation**		
	1. Refractory Dry Out		
	a. Backing / Curing Period – Stoker / AFBC / Oil & Gas – 60 Hours	60.0	C36
	b. Backing / Curing Period - CFBC – 140 Hours	140.0	C37
	c. Natural Cooling Period – No fuel required – 48 Hours	48.0	C38
	2. Alkali Boil Out		
	a. ABO Period – Stoker / AFBC / Oil & Gas – 36 Hours	36.0	C40

	b. Acid Cleaning Period - CFBC – 140 Hours	140.0	C41	
	c. PBO Period – Stoker / AFBC / Oil & Gas – 48 Hours	48.0	C42	
	d. Header end stub cutting & Flushing & Re-welding with Hydro test – 120 Hours	120.0	C43	
	3. Steam Blowing			
	a. Steam Blowing & Target Plate Acceptance – 240 Hours	240.0	C45	
	4. Safety Valve Setting / Floating			
	a. Safety valve- Steam Drum , Super Heater – 24 Hours	24.0	C47	
	5. Steam Test @110% MCR			
	a. Safety valve 100% Floating- Steam Drum , Super Heater – 08 Hours	8.0	C49	
6	**Steam Flow MCR% of each activity for Input Calculation**			
	1. Refractory Dry Out			
	i. For < 60 TPH MCR capacity- 7% of MCR	7.0	C53	
	ii. For > 60 TPH MCR capacity- 5% of MCR	5.0	C54	
	2. Alkali Boil out			
	a. Atmospheric Boil Out (ABO)			
	i. For < 60 TPH MCR capacity- 15% of MCR	15.0	C57	
	ii. For > 60 TPH MCR capacity- 10% of MCR	10.0	C58	
	b. Pressure Boil Out (PBO)			
	i. For < 60 TPH MCR capacity- 25% of MCR	25.0	C60	
	ii. For > 60 TPH MCR capacity- 20% of MCR	20.0	C61	
	3. Steam Blowing			
	i. For < 60 TPH MCR capacity- 30% of MCR	30.0	C63	
	ii. For > 60 TPH MCR capacity- 25% of MCR	25.0	C64	
	4. Safety Valve Setting / Floating			
	i. For < 60 TPH MCR capacity- 35% of MCR	35.0	C66	
	ii. For > 60 TPH MCR capacity- 30% of MCR	30.0	C67	
	COMMISSIONING INPUTS CALCULATION			
	Reference Boiler - 1x100 TPH, AFBC, 100% Indian Coal with startup LDO burner	100.0	C70	
	Main Fuel Quantity given at MCR in TPH	20.0	C71	
	Boiler Water Holding Capacity in M3	90.0	C72	C70*C32/100
	Boiler Quoted efficiency 78%	78.0	C73	
	Boiler efficiency for Input Calculation	66.3	C74	C73*C29/100
1	Bed material in MT for Initial filling / First light up: No. of Compartment 04, Total Bed Area 80 m2, Bed Height - 400 mm, Bed Material Density 1.125 Ton/m3,	36.0	C76	80*400/1000*1.125
	Bed material Quantity in MT for additional 03 light up as stock	108.0	C77	C76*3
2	Charcoal / Wood in MT for First light up @ 15% of Bed Material for 02 compartment	2.7	C79	C76*15/100*2/4
	Charcoal / Wood in MT for additional 02 light up as stock	5.4	C80	C79*2

3	HSD / LDO / Kerosene in Liter for First light up @ 02% of Bed Material Quantity for 02 compartment	360	C82	C76*2/100*2/4*1000
	HSD / LDO / Kerosene in Liter for additional 02 light up as stock	720	C83	C82*2
4	HSD / LDO in Liter for Startup Burner 04 nos.in 01 compartment for 02 hours operation, capacity 24 Liter/Hour for light up	192	C85	4*2*24
	HSD / LDO in Liter for Startup Burner in Liter for additional 03 light up as stock	576	C86	C85*3
5	Refractory Dry Out			
	Fuel for Backing / Curing Period in MT	98.8	C89	C71*C53/100*C73/C74*C36
	DM Water for Backing / Curing Period in M3	510.0	C90	C72+(C70*C53/100*C36)
	DM Water for Flushing & Refilling in Natural Cooling Period in M3	270.0	C91	C72+(C72*2)
6	Alkali Boil out			
	a. Atmospheric Boil Out			
	Fuel in MT	84.7	C95	C71*C58/100*C73/C74*C40
	DM Water for ABO Period in M3	486.0	C96	C72*C57/100*C40
	DM Water for Flushing & Refilling after ABO in M3	270.0	C97	C72+(C72*2)
	b. Pressure Boil Out			
	Fuel in MT	225.9	C99	C71*C61/100*C73/C74*C42
	DM Water for PBO Period in M3	864.0	C100	C72*C61/100*C42
	DM Water for Flushing after PBO in M3	180.0	C101	C72*2
	DM Water for Flushing & Refilling - Header Stub Cutting, Hydro test in M3	270.0	C102	C72*3
7	Steam Blowing			
	Fuel for Blowing Period in MT (each blow gap time 02 hours)	1440.0	C105	C71*C67/100*C45
	DM Water for Blowing Period in M3	6480.0	C106	C72*C67/100*C45
	DM Water for Refilling after Steam Blowing in M3	90.0	C107	C72
8	Safety Valve Setting / Floating			
	Fuel in MT (Boiler Safety Valves)	144.0	C110	C71*C67/100*C47
	DM Water for Floating & Venting Period in M3	216.0	C111	C72*C67/100*C49
	DM Water for Refilling after Safety Valve Floating in M3	90.0	C112	C72
9	Boiler Steam Test @110% MCR			
	Fuel in MT (Steam Test i.e. Simultaneously Floating all Safety Valves @100% Capacity	160.0	C115	C71*C49
	DM Water for Floating & Venting Period in M3	720.0	C116	C72*C49

CHEMICALS - COMMISSIONING INPUTS CALCULATION

01 ppm = 1 gm chemical in 1000 liter water

1 Refractory Dry Out - During Boiler Initial Filling & activity
Corrosion Inhibator like Tri-Sodium Phosphate (TSP)
pH Booster like Morpholine
Oxygen Scavanger

2 Alkali Boil Out - During activity to maintain Loss of Phosphate Level

Tri-Sodium Phosphate (TSP), Quanity will be based on Purity of Chemical
Di-Sodium Phosphate (DSP), Quanity will be based on Purity of Chemical

3 Steam Blowing, Safety Valve FLoating - During activity to maintain Water Parameters
Corrosion Inhibator like Tri-Sodium Phosphate (TSP)
pH Booster like Morpholine
Oxygen Scavanger