2.0 SCOPE OF SUPPLY OF WHRB

The scope of supply includes design, engineering, and procurement of materials, manufacture, packing & forwarding supply of **SIX Nos. of Waste Heat Recovery Boilers consisting** of the following equipment.

Item No.		Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
					BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection;VD- Vendor Design/Detailing													
1	**MEMBRANE WATER WALL SECTION**												
	1.1	Front wall & Headers	1 set		O	O	O					O	
	1.2	Side walls & Headers	2 sets		O	O	O					O	
	1.3	Rear wall & Headers	1 set		O	O	O					O	
	1.4	Hoppers (fabrication)	2 sets		O	O					O	O	
	1.5	Screen section	1 lot		O	O	O					O	
	1.6	Buckstays	1 lot		O	O					O	O	
2	**SUPERHEATER – I & II**												
	2.1	Loose coils	1 lot		O	O	O					O	
	2.2	Headers with stubs	2 Lot		O	O	O					O	
	2.3	Casing + refractory	1 lot		O	O					O	O	
3	**ATTEMPERATOR**												
	3.1	Attemperator assembly	1 set		O	O	O					O	

Notes:

1.1. All the above membrane walls will be sent pre-fabricated in panel form with top and bottom headers, as the case may be and access and other openings as required. The membrane walls will be installed and welded to each other as well as with support tubes and screen tubes at site by erection contractor to form gas tight chambers.

1.2. The screen tubes and support tubes with tube support cleats will be pre-fabricated at shop and final installation and erection contractor will do welding at site.

Notes:

2.1. The coils shall be pre-fabricated and supplied loose. The header with stubs welded to the headers (to match with coils), nozzles for steam connection and end covers duly pre-fabricated shall be supplied loose.

2.2.

Notes:

3.1 The attemperator with necessary nozzles & internals shall be sent as a complete assembly. Erection contractor at site shall do spray water connection and steam connection to the attemperator.

Item No.	Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
				BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing												
4	CONVECTION BANK											
4.1	Loose heat transfer tubes	1 lot		O	O	O					O	
4.2	Top and Bottom drums duly drilled	1 lot		O	O	O					O	
4.3	Casing + Refractory			O	O					O	O	
Notes: 4.1. The evaporator bank tubes and drums along with RDC stubs welded to drums will be supplied loose. The tubes have to be expanded by expander in drums by erection contractor.												
5	STEAM DRUM											
5.1	Shell	1 no.		O	O	O					O	
5.2	Dished ends	2 nos.		O	O	O					O	
5.3	Demister pads	1 lot		O	O	O					O	
5.4	Saddles	2 nos.		O	O	O					O	
5.5	Manholes	1 nos.		O	O	O					O	
5.6	Nozzles for various connection	1 lot		O	O	O					O	
Note: 5.1 The complete steam drum assembly shall be duly shop fabricated, stress relieves, hydro-tested in shop in the presence of IBR inspector and is provided with necessary nozzle connections. 5.2 Alignment, installation of steam drum, fitting / welding of connections to nozzles shall be done at site by Erection contractor. (However, the demister pad shall be sent to site in loose condition, and it has to fitted in position after Alkali boilout by erection contractor.)												
6	ECONOMISER											
6.1	Coils	1 lot		O	O	O					O	
6.2	Headers	1 lot		O	O	O					O	
6.3	Casing + Connecting Duct	1 lot		O	O					O	O	

Item No.	Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
				BD	DD	SP	ER	BD	VD	SP	ER	

BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing

Note:
6.1 The Economizer shall be sent to site in loose form and will be fitted & position welded by Erection contractor at site.

- An economizer module shall consist of loose coils the casing will have necessary opening for access / soot blowers. *The casing material / manufacture shall be in other's scope.*
- The coils shall be provided with necessary connections / headers

7	**RISERS & DOWNCOMERS**													
	7.1	Pipes	1 lot		O	O	O					O		
	7.2	Bends & fittings	1 lot		O	O	O					O		

Notes:
7.1 The Risers & Down comer pipes shall be sent to site in loose form.
7.2 Pre-fabrication of the same at ground and assembly and welding in position shall be carried out by Site Erection Contractor.

8	**SOOT BLOWERS**													
	8.1	Retractable blowers	2 Nos.		O	O	O					O		
	8.2	Rotary blowers	6 Nos.		O	O	O					O		
	8.3*	Control Panel	1 No.		O					O	O	O		
	8.4	Power cabling from Control Panel to Soot blowers motors	1 lot		O					O	O	O		
	8.5	Soot blower Supports	1 lot		O	O					O	O		

*Notes:
1. For sootblower control panel Thermax will provide logic,customer has to club the same with DCS.

9	**FEED WATER PIPING**													
		FROM	TO											
	9.1	Water treatment Plant	Deaerator	-						O	O	O	O	NONIBR
	9.2	Deaerator	FWP suction	-		O	O	O					O	NONIBR
	9.3	FWP discharge	FW flow control station	-		O	O	O					O	
	9.4	FW flow	Econom	1		O	O	O					O	

Item No.		Description		Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
						BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER Erection,VD- Vendor Design/Detailing														
		control station	izer	lot										
	9.5	Economiser	Steam drum	1 lot		O	O	O					O	
	9.6	FW Piping	Attemp erator	1 lot		O	O	O					O	
	9.6	FW Pump (Spill back)	Deaerat or	1 lot		O	O	O					O	Incl. Leak-off
Notes: 9.1 The Feed water pipes shall be sent to site in loose form. 9.2 Pre-fabrication of the same at ground and assembly and welding in position shall be carried out by Site Erection Contractor.														
10	STEAM PIPING													
		FROM	TO											
	10.1	Steam drum	Superhaeter –1	1 lot		O	O	O					O	
	10.2	Superh eater -1	Attemperato r	1 lot		O	O	O					O	
	10.3	Attemp erator	Superheater - II	1 lot		O	O	O					O	
	10.4	Superh eater - II	Main steam stop valve	1 lot		O	O	O					O	
	10.5	Main steam stop valve	Main steam header	-						O	O	O	O	
	10.6	Main steam line	Soot blowers	1 lot		O	O	O					O	
	10.7	Venting points	Safe height	1 lot		O	O	O					O	Ref note 10.2
	10.8	SH line	Start up vent valve	1 lot		O	O	O					O	
	10.9	Start up vent valve	Silencer	1 lot		O	O					O	O	
	10.10	Superh eater Safety valve	Silencer	1 lot		O	O					O	O	
	10.11	Safety valve of	Atmosphere	1 lot		O	O	O					O	

Item No.	Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
				BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing												
	Drum											

Notes:

10.1 Pre-fabrication of the same at ground and assembly and welding in position shall be carried out by Site Erection Contractor.

10.2 For venting point to safe height upto first isolation valve being IBR in Thermax Scope , after isolation valve all piping is non IBR is in Customers scope.

11	**COOLING WATER PIPING**													
		FROM	TO											
	11.1	Source	Battery limit (As per P&I Diagram)	1lot						O	O	O	O	
	11.2	Battery limit	Individual equipments	1lot		O	O	O					O	

Notes:

12	**DRAIN PIPING**													
		FROM	TO											
	12.1	Steam drum	Blow down tank	1lot		O	O	O					O	
	12.2	Individual drain points	Blow down tank	1lot		O	O	O					O	
	12.3	Blow down tank	Nearest surface trench	1lot		O	O	O					O	

Notes:

13	**HOPPERS**													
	13.1	For Radiation pass		1		O	O					O	O	
	13.2	For Superheaters		1 lot		O	O					O	O	
	13.3	For Evaporator		1		O	O					O	O	
	13.4	For Economiser		1		O	O					O	O	

Notes:

Item No.		Description		Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
						BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing														
14	DUCTING:													
		FROM	TO											
	14.1	ABC outlet	Boiler inlet	1		O	O					O	O	
	14.2	Boiler outlet	Econo miser inlet	1		O	O					O	O	
	14.3	Econo miser outlet	ESP inlet	1		O	O					O	O	
	14.4	ESP outlet	ID fan inlet	1		O	O					O	O	
	14.5	ID fan outlet	Stack	1		O	O					O	O	
Notes:														
15	FIELD INSTRUMENTS													
	15.1	As per list		1		O	O	O					O	Ref note
	15.2	Instrument hardware		1		O	O	O					O	Ref note
Notes: Necessary cabling from the instruments to DCS, shall be by NSIL														
16	VALVES & MOUNTINGS													
	16.1	As per P & I Diagram		1		O	O	O					O	
Notes:														
17		PAINTING												
	17.1	Shop primer painting		1		O	O	O					O	
	17.2	Site final painting		–		O	O					O	O	

Note:

17.1 The shop-assembled parts shall be duly cleaned by wire brushing prior to application of primer paint. Two coats of primer painting shall be applied on all external surfaces, in order to prevent rusting during transportation and storage. Internal surfaces shall be not be painted. Heat transfer surfaces shall be suitably coated with Red oxide / linseed oil.

17.2 Supply of final painting and Site surface preparation, primer painting & final painting shall be done by Site erection contractor. Painting scheme will be given by Thermax.

Item No.		Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
					BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing													
18		EXPANSION JOINTS											
	18.1	At inlet of boiler	1 no.		O					O	O	O	
	18.2	At other ducting	-		O					O	O	O	
Notes: 18.1 The expansion joints will be engineered based on Thermax Specification by vendor & to be erected by Site Erection contractor.													
19		STACK											
	19.1	Stack and its components.	1 no. for 2 boiler		O	O					O	O	
Notes: Chimney height calculation tobe provided by Thermax. Detail Engineering will be done Thermax													
20		ELECTRO STATIC PRECIPITATOR											
	20.1	ESP & its components, Designed for 70 mg/Nm3 of dust @ outlet of ESP	1 Per boiler		O					O	O	O	
Notes:													
21		INDUCED DRAFT FAN											
	21.1	ID FAN	1		O					O	O	O	
	21.2	Drive	1		O					O	O	O	
	21.3	Coupling	1		O					O	O	O	
	21.4	Inlet damper	1		O					O	O	O	
Notes:													
22		EARTHING MATERIAL											
	22.1	All earthing material	1						O	O	O	O	
	22.2	Earth pits	1						O	O	O	O	
23		REFRACTORY											
	23.1	On gas inlet duct	1		O	O					O	O	
	23.2	On hoppers	1		O	O					O	O	
	23.3	Refractory anchors	1		O	O					O	O	
Notes: 24.1 Refractory application, curing etc. shall be in scope site erection contractor.													

Item No.		Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
					BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing													
24	DCS												
	24.1	DCS	1						O	O	O	O	
Notes: 24.1 The engineering, supply and erection of the control panel will be carried out by NALWA SPONGE. / Site erection contractor , However boiler related input will be given by Thermax.													
25	SILENCER												
	25.1	Common silencer for Superheater safety valve and start-up vent valve	1 no.		O					O	O	O	
Notes:													
26	INSULATION												
	26.1	On steam drum	1		O	O					O	O	
	26.2	On Boiler	1		O	O					O	O	
	26.3	On Risers & Down comers	1		O	O					O	O	
	26.4	On Piping of	1		O	O					O	O	
	26.5	On Ducting	1		O	O					O	O	
	26.7	On other parts	1		O	O					O	O	
Notes:													
27	SAMPLE COOLERS												
	27.1	On Saturated Steam line	1per boiler		O	O	O					O	
	27.2	On Superheated steam line	1per boiler		O	O	O					O	
	27.3	On Blow-down line	1 per boiler		O	O	O					O	
Notes:													
28	MCC												
	28.1	MCC and its accessories	1						O	O	O	O	
Notes: 28.1 The supplier shall provide with necessary electrical loads and their quantity to NALWA SPONGE. The NALWA SPONGE shall do the engineering, supply and erection of the MCC													
29	CIVIL												
	29.1	Civil load data	1 lot		O					O	O	O	
	29.2	Civil Design	1 lot						O	O	O	O	
Notes: N.A.													

Item No.		Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
					BD	DD	SP	ER	BD	VD	SP	ER	
BD- Basic Design; DD - Detailed Design; SP - Supply; ER- Erection,VD- Vendor Design/Detailing													
30	IBR FORMALITIES												
	30.1	Issue of certificates of materials supplied by vendor	1		O	O					O	O	
	30.2	Site IBR activities	1						O	O	O	O	
Notes: 30.1 For materials procured directly from Vendors, Thermax shall arrange necessary IBR certificates directly from them .30.2 Submission of such certificates to local / state / other IBR authority, fixing dates for ground inspection / other inspections, radiography of welded joints, hydraulic testing (both internal and IBR) and all other work related with Indian Boiler Regulation Authority and other Regulatory Authorities / Local Authorities shall be in the scope of Site erection contractor.													
31	STRUCTURE												
	31.1	Boiler supporting structure	1		O	O					O	O	
	31.2	Boiler Operating platform	1		O	O					O	O	
	31.3	Ladders & staircases	1		O	O					O	O	
	31.4	Foundation bolts for structures	1		O	O					O	O	
Notes:													
32	SUPERVISION OF E & C												
	32.1	Supervision of Erection & commissioning	1		O	O	O					O	
Notes: 32.1 Thermax will supervise errection & commissioning of Total boiler.													

SCOPE OF SUPPLY OF WHRB FOR COMMON ITEMS

COMMON ITEMS													
Item No.		Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
					BD	DD	SP	ER	BD	VD	SP	ER	
C1		HIGH PRESSURE DOSING SYSTEM (1 common to 2 boilers)											
	C1.1	Motorized stirrer	1		O					O	O	O	
	C1.2	Dosing pumps	3		O					O	O	O	
	C1.3	Storage tank	1		O					O	O	O	
	C1.4	Carbon steel interconnecting piping	1		O					O	O	O	
Notes:													
C2		BLOW DOWN TANK (1 common for 2 boilers)											
	C2.1	Shell & ends	1 lot		O					O	O	O	
	C2.2	Valves & mountings	1 lot		O					O	O	O	
	C2.3	Foundation bolts	1 lot		O					O	O	O	
	C2.4	Level gauge	1 No.		O					O	O	O	
	C2.5	Nozzles	1 lot		O					O	O	O	
Notes:													
C3		DEAERATOR (1 common for 2 boilers)											
	C3.1	Deaerator	1 no.		O					O	O	O	
	C3.2	Storage tank	1 no.		O					O	O	O	
	C3.3	Valves & mountings	1 lot		O					O	O	O	
	C3.4	Instruments as per P & I Diagram	1lot		O					O	O	O	
	C3.5	Sample cooler	1 No.		O					O	O	O	
Notes: Not applicable													
C4		LOW PRESSURE DOSING SYSTEM (1 for each deaerator)											
	C4.1	Motorized stirrer	1 no.		O					O	O	O	
	C4.2	Dosing pumps	2 nos.		O					O	O	O	
	C4.3	Storage tank	1 no.		O					O	O	O	
	C4.4	Interconnecting piping	1 lot		O					O	O	O	
	C4.5	Instruments	1		O					O	O	O	

COMMON ITEMS													
Item No.		Description	Q'ty	Total weight in tons	THERMAX LTD.				NALWA SPONGE				Rem.
					BD	DD	SP	ER	BD	VD	SP	ER	
Notes: Not applicable													
5	FEED WATER PUMPS (3 nos. for 2 boilers)												
	C5.1	Centrifugal pumps			O					O	O	O	
	C5.2	Electric motors			O					O	O	O	
	C5.3	Cabling from LPBS to MCC							O	O	O	O	
	C5.4	LPBS							O	O	O	O	
	C5.5	Auto Recirculation valves			O	O	O					O	
AUTO RECIRCULATION VALVE IS IN THE SCOPE OF SUPPLY OF THERMAX.													