

Heater Supply Scope and Responsibilities

1. Purpose

Clarify the responsibilities from Petrobras, VENDOR and ERECTOR based on the Standard Material requisition for Fired Heaters.

2. Licensor responsibilities

Heater Types	<p>a- Atmospheric Fired Heater for Atmospheric Distillation Unit;</p> <p>b- Vacuum Fired Heater for Vacuum Distillation Unit;</p> <p>c- Fired Heater for Hydrodesulfurization Unit;</p> <p>d- Fired Heater for Hydrotreatment Unit;</p> <p>e- Fired Heater for Hydrocracking Unit;</p> <p>f- Fired Heater for Fluidized Catalyst Cracking Unit;</p> <p>g- Naphtha Vaporization Heater for Hydrogen Generation Unit;</p> <p>h- Fired Heater for Natural Gas Plant.</p>	<p>i- Hydrogen Reformer Heater for Hydrogen Generation Unit;</p> <p>j- Coker Fired Heater for Delayed Coking Unit.</p>
Basic design documents for Hydraulic, Process and Thermal design	<p>1- Process description;</p> <p>2- Technical specification for mechanical design, construction and erection;</p> <p>3- API STD 560 Fired Heater data sheet with Hydraulic, Process and Thermal design; Combustion design, Draft design;</p> <p>4- P&ID for Fired Heater, Auxiliary Equipments and Systems, showing battery limits: <i>Fuel oil e fuel gas system;</i> <i>Coalescer filter data sheet;</i> <i>Steam air decoking and spalling system;</i> <i>Blow down drum data sheet;</i></p>	<p>1- Process description;</p> <p>2- Technical specification for mechanical design, construction and erection;</p> <p>3- API STD 560 Fired Heater data sheet with Hydraulic, Process and Thermal design; Combustion design, Draft design;</p> <p>4- P&ID for Fired Heater, Auxiliary Equipments and Systems, showing battery limits: <i>Fuel oil e fuel gas system;</i> <i>Coalescer filter data sheet;</i> <i>Steam air decoking and spalling system;</i> <i>Blow down drum data sheet;</i> <i>Snuffing steam system</i></p>

	<p><i>Snuffing steam system</i></p> <p>5- Burner data sheet with accessories;</p> <p>6- General assembly plan and elevation drawing with: <i>Operation and maintenance platforms;</i> <i>Stairway and ladders;</i> <i>Access doors;</i> <i>Explosion doors;</i> <i>Coil inspection ports;</i></p> <p>7- Skin point installation detail;</p> <p>8- Technical specifications for coil manufacturing;</p> <p>9- Soot blower data sheet;</p> <p>10- Instrument process data sheets;</p> <p>11- O₂, CO, SO_x and NO_x analyzer data sheets;</p> <p>12- Process Control descriptions and Safety Interlocking System: <i>P&ID;</i> <i>Technical specifications;</i> <i>Instrument process data sheets;</i> <i>Trouble shooting table;</i></p> <p>13- Air combustion pre-heating system: <i>P&ID;</i> <i>Pre-heater data-sheets;</i> <i>Centrifugal Fan data sheets;</i> <i>General arrangement of air and gas ductwork system;</i></p> <p>14- Continuous emission monitoring system specification (CEMS).</p>	<p>5- Burner data sheet with accessories;</p> <p>6- General assembly plan and elevation drawing with: <i>Operation and maintenance platforms;</i> <i>Stairway and ladders;</i> <i>Access doors;</i> <i>Explosion doors;</i> <i>Coil inspection ports;</i></p> <p>7- Skin point installation detail;</p> <p>8- Technical specifications for coil manufacturing;</p> <p>9- Soot blower data sheet;</p> <p>10- Instrument process data sheets;</p> <p>11- O₂, CO, SO_x and NO_x analyzer data sheets;</p> <p>12- Process Control descriptions and Safety Interlocking System: <i>P&ID;</i> <i>Technical specifications;</i> <i>Instrument process data sheets;</i> <i>Trouble shooting table;</i></p> <p>13- Air combustion pre-heating system: <i>P&ID;</i> <i>Pre-heater data-sheets;</i> <i>Centrifugal Fan data sheets;</i> <i>General arrangement of air and gas ductwork system;</i></p> <p>14- Continuous emission monitoring system specification (CEMS);</p> <p>15- Reformer Fired Heater specific informations related to Mechanical Design: <i>Coil material supplementary ASTM specifications;</i> <i>Casted support material supplementary ASTM specifications;</i> <i>Radiant coils arrangement drawing with dimensions and detailing supports;</i> <i>Convection coil arrangement drawing with dimensions and detailing supports;</i> <i>Radiant feed entrance system mechanical and arrangement drawing;</i> <i>Radiant outlet system mechanical and arrangement drawing;</i> <i>Transfer piping between the heater and steam generation boiler mechanical and arrangement drawing;</i></p>
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Testing	Smoke test; Performance test.	Smoke test; Performance test.
Guarantees	Performance; Efficiency; Thermal capacity.	Performance; Efficiency; Thermal capacity.
Training	Fired Heater operation.	Fired Heater operation.

3. Vendor responsibilities

MD Mechanical and Structural Design; Piping plan and detailed (isometrics) drawings, Piping stress analysis and supportation;

DE Engineering for Fabrication and Erection: technical specifications, data-sheets, flow sheets, assembly and detailing drawings, material requisitions, refractory and thermal insulation drawings;

MS Material Procurement and Supply;

MF Modules fabrication and Transportation to the Site;

S Supervision of erection, conditioning and commissioning works.

4 Erector responsibilities

E Material supply for field works, Heater and equipments foundations and civil bases design and execution, modules hook-up, erection works, inspection, testing, site cleaning, conditioning and commissioning

5 Responsibility matrix

	MD	DE	MS	MF	S	E
HEATER AND AUXILIARY EQUIPMENTS AND SYSTEMS BASIC DESIGN						
Process and Thermal design according previous item 2	Licensor contracted by Proprietary					
CFD modeling (when required)		X				
RADIATION AND CONVECTION FABRICATION MODULES						
Structural Framework, Casing, Heater floor, Plenum Stairways, Ladders and Platforms	X	X	X	X	X	X
Corrosion protection coating		X	X	X		
Radiation and Convection section refractory lining		X	X	X		
Fire proofing for Heater Structural Framework	X	X	X	X		
Shelters and Stack or Chimney, including flue gas sample nozzles and platform and ladder for accessing	X	X	X	X		X
Radiation Convection Coils: tubes and forged bends with skin points	X	X	X	X		
Convection Coils: tubes and forged bends	X	X	X	X		
Radiation coil casted supports	X	X	X	X		
Convection coil casted tubesheets	X	X	X	X		
Heater platforms, stairways and ladders	X	X			X	
Cross over piping	X	X	X	X	X	X
FUEL OIL AND GAS SYSTEMS						
Burners		X	X		X	X
Flame detectors for each pilot		X	X		X	X
Flame electrical igniter for each pilot		X	X		X	X
XV valves		X	X		X	X
Air and fuel gas and oil for burners piping system		X			X	X
Oil Atomization steam piping system		X			X	X
Flame supervision local panel		X	X		X	X
Combustion control local panel;		X	X		X	X
Metallic reinforced hoses to connect pipe to burners		X	X		X	X
Blow down drum	X	X	X		X	X
Coalescer strainer drum	X	X	X		X	X
Fuel static mixers	X	X	X		X	X
O2 and CO analyzers and transmitters		X	X		X	X
Continuous emission monitoring system (CEMS)		X	X		X	X
Fuel oil and Gas piping system	X	X			X	X
Ball block valves with "fire tested" certification		X	X		X	X

Steam tracing of oil piping	X	X			X	X
Fireproofing for Vessel supports	X	X			X	X
NOISE SUPPRESSOR						
Steam silencers		X	X		X	X
Piping	X	X			X	X
FIRE SNUFFING SYSTEM						
Steam sprays		X			X	X
Piping	X	X			X	X
SOOT BLOWER SYSTEM						
Retractile Soot blowers		X	X		X	X
Steam piping system		X			X	X
Control panel		X	X		X	X
COMBUSTION AIR PRE HEATING SYSTEM						
Combustion Air Pre-heating ductwork system	X	X	X		X	X
Flue gas ductwork t system	X	X	X		X	X
Expansion joints for Flue Gas and Air Intake piping systems	X	X	X		X	X
Combustion Air duct refractory lining	X	X	X		X	X
Flue Gas ductwork refractory lining	X	X	X		X	X
Forced draft fan with driver and gear		X	X		X	X
Induced draft fan with driver and gear		X	X		X	X
Fan electrical motor		X	X		X	X
Steam turbine actuator for fan		X	X		X	X
Fan steam turbine		X	X		X	X
Variable-frequency drive) for fan electrical motor speed control		X	X		X	X
Pressure and temperature instruments for Combustion Flue Gases		X	X		X	X
Pressure and temperature instruments for Combustion Air		X	X		X	X
Flow meters for Combustion Flue Gas		X	X		X	X
Flow meters for Combustion Air		X	X		X	X
Fan local control panel		X	X		X	X
Balancing of air and fuel gas fans		X	X		X	X
Clutches to energize the fan motors		X	X		X	X
Damper including drive and positioners	X	X	X		X	X
Static air pre heater		X	X		X	X
Recuperative type air plate pre-heater		X	X		X	X
Steam type air pre-heater		X	X		X	X
Fireproofing for Vessel and Structure supports	X	X			X	X
DECOKING SYSTEM						
Decoking piping system	X	X			X	X
Spalling on line piping system	X	X			X	X
Knock-out decoking drum	X	X	X		X	X
Fireproofing for Vessel supports	X	X			X	X
FIRE SNUFFING SYSTEM						
Snuffing sprays		X	X		X	X
Snuffing piping system	X	X			X	X
PROCESS PIPIG SYSTEMS						
Process piping system	X	X			X	X
Transfer line	X	X			X	X

REFORMER HEATER AND STEAM GENERATION SYSTEM						
Radiation section modules	X	X	X	X	X	X
Catalyst centrifugal casted tubes	X	X	X		X	X
Inlet pigtail	X	X	X		X	X
Outlet pigtail	X	X	X		X	X
Transfer line	X	X	X		X	X
Pigtails and transfer line thermal insulation	X	X			X	X
Catalyst tubes spring hangers	X	X	X		X	X
Convection section modules	X	X	X	X	X	X
Convection coils	X	X	X		X	X
Convection coils casted tubesheets	X	X	X		X	X
Waste Heat Recovery Boiler	X	X	X		X	X
Risers and Down comers: ductworks, accessories and instrumentation	X	X	X		X	X
Risers and Down comers thermal insulation	X	X			X	X
Steam drum	X	X	X		X	X
Intermittent blow down drum	X	X	X		X	X
BFW circulation pump		X	X		X	X
BFW pump electrical motor		X	X		X	X
BFW pump steam turbine		X	X		X	X
Variable-frequency drive) for fan electrical motor speed control		X	X		X	X
Process piping: pipes, accessories and instrumentation	X	X			X	X
Super heater start up silencer	X	X	X		X	X
Catalyst loading and unloading equipment system	X	X			X	X
Fireproofing for equipmen supports and Structures	X	X			X	X
THERMAL INSULATION COATING						
Crossover	X	X			X	X
Transfer line	X	X			X	X
Process piping	X	X			X	X
INSTRUMENTATION AND CONTROL SYSTEM						
Temperature switches		X			X	X
Thermocouples		X			X	X
Pressure Indicators		X			X	X
Control valves		X	X		X	X
NOx and SOx analyzers and transmitters		X	X		X	X
Interconnection with DCS at Control Room		X			X	X
DCS configuration		X			X	X
INTERLOCKING SAFETY SYSTEM - SIS						
Supervisory Instruments		X	X		X	X
Programmable Logic Controller – PLC.		X	X		X	X
Cables and wiring					X	X
ELECTRICAL SYSTEM						
Electrical substation		X			X	X
Grounding grid		X			X	X
CCM panel		X			X	X
Lighting normal and emergency distribution local panel		X			X	X
Cable for electricity distribution		X			X	X
Electrical transformers		X			X	X
Electricity Distribution Local Control Panel		X			X	X
Air craft signalization		X			X	X
Interconnection with Control Room		X			X	X

Special tools for maintenance of electrical components							X
CIVIL WORKS							
Loading diagram for foundation design for heater and auxiliary equipments	X	X					
Foundation and concrete base design for heater and auxiliary equipments						X	X
Execution of foundation and concrete bases for heater and auxiliary equipments						X	X
PACKING AND TRANSPORTATION TO THE SITE							
Modules	VENDOR						
All materials and equipments supplied by VENDOR	VENDOR						
ERECTION AT SITE – Materials and Services							
Erection of Fired Heater and Auxiliary Equipments and Systems						X	X
Field Welding and PWHT						X	X
Welding consumables						X	X
Piping and instrument systems interconnection with CDS						X	X
Fireproofing equipments supports						X	X
Fire proofing for electrical and instrumentation cables and supports						X	X
SITE CLEANING, CONDITIONING AND COMMISSIONING							
						X	X
TESTS – Including all necessary supports and equipments							
Hydraulic tests at shop	VENDOR						
Hydraulic tests at site						X	X
Control loop test						X	X
Auxiliary equipments performance tests at VENDOR shop	VENDOR						
START-UP SUPPORT							
Technical Assistance	VENDOR						
Necessary Materials and Services	ERECTOR						
TRAINING							
Heater operation	Petrobras						
Auxiliary equipments operation and maintenance	VENDOR						
SPARE PARTS FOR COMMISSIONING AND START-UP							
	VENDOR						
GUARANTEES OF THE STRUCTURAL INTEGRITY							
Heater performance	Petrobras						
Services at shop	VENDOR						
Services at site	ERECTOR						
Auxiliary Equipments performance	VENDOR						
SITE PREPARATION							
Radio and self-speakers communication center at jobsite	ERECTOR						
Fire fighting system at jobsite	ERECTOR						
Emergency alarm system at jobsite	ERECTOR						