

ST49 Technical Specification

ST49 Steam Boiler

Composite Three Pass Wet Back



ST49 Package Steam Boiler

The COCHRAN ST49 COMPOSITE PACKAGE STEAM BOILER is of horizontal three pass wet back design (fired side) and is built to BS EN12953 with independent inspection by British Engineering Services (BES) and UKCA or UKNI marked as appropriate (see footnote).

Combining the benefits of a conventionally fired boiler and supplemented by a waste heat recovery section, the ST49 has been developed for higher operational efficiency and lower emissions to meet the latest European environmental legislation, the Medium Combustion Plant Directive (MCPD).

It complies with the requirements of the Factories Act (1961) and Guidance on Safe Operation of Boilers Ref: BG01 developed by the Safety Assessment Federation (SAFED) and the Combustion Engineering Association (CEA), the latter being the acceptance criteria for compliance with HSE and UK Inspection Authority requirements. In addition, it meets the requirements of:

- Pressure Equipment Directive
- Low Voltage Directive
- Electro-Magnetic Compliance Directive
- Machinery Safety Directive

Throughout the manufacturing process, in addition to the inspection carried out by BES, COCHRAN apply their own quality procedures that comply with the requirements of ISO 9001.

The following schedules detail the specification of the Boiler proposed in our tender.

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Note: Boilers destined for markets within the EU will be CE marked as appropriate.

Schedule 1: Boiler Pressure Parts

General

All plate used in the construction of the boiler is cut and profiled by computer controlled equipment. The shell, furnace and reversal chamber plates are then rolled, assembled, machine welded and subjected to NDT (either radiographic or ultrasonic) to ensure compliance with the latest construction standard requirements.

Tube plates are drilled by computer controlled equipment to ensure the correct ligament is maintained and a satisfactory tube hole finish is achieved.

Boiler Shell

Furnace and Reversal Chamber: The furnace tube incorporates a 'bowling hoop' design to provide sufficient stiffness to allow for adequate expansion. It is located between the boiler front and reversal chamber tube plates with a totally submerged, wet back reversal chamber.

Convection Tubes, Fired Section: Two separate passes of convection tubes are fitted. One pass between the boiler front tube plate and the reversal chamber tube plate with another pass between the boiler front and rear tubeplates.

All plain tubes are expanded into position with the inlet to the first pass tubes in the reversal chamber being expanded and welded. Stay tubes and stay bars are fitted to ensure that stressing of tube plates and tube nests are within construction code limits.

Convection Tubes, Heat Recovery Section: Single or multi-passes of convection tubes are fitted. All plain tubes are expanded into position with the inlet of the first pass being expanded and welded.

Access and Inspection: For inspection purposes, openings are provided to gain access to the steam/water side of the boiler. One 420x320mm elliptical manway opening is provided on the top of the boiler. Two 320x220mm elliptical headhole openings are provided in the lower quadrants toward the rear of the boiler, one provided on each side. One 125x90mm elliptical handhole opening is provided in the rear tubeplate.

To permit observation and access into boiler furnace tube, a rear access door complete with a flame viewing sight port is provided.

Seatings

Mountings and controls are fitted to pads, standpipes and bosses welded to boiler shell.

Materials, Specification, Shell and Shell Attachments:

Shell, Furnace, Reversal Chamber and Tube Plates:

BS EN 10025-2 P265 GH

Furnace Access Tube:

ASTM A106 GR

Stay Bars:

BS EN 10273 P235 GH

Plain and Stay Tubes:

BS EN 10216-1-TR2

BS EN 10216-2

BS EN 10217-1-TR2

BS EN 10217-2

Mandoor Head Holes Muddoor Lifting Lug:

BS EN 10025-2 P265 GH

Pads (Valves):

BS EN 10025-2 P265 GH

Standpipes:

ASTM A106 GR B

Schedule 2: Boiler-Mounted Fabrications

Casings, Insulation and Supports

Front and Rear Casings

Fired Section: Boiler front and rear casings are fabricated from mild steel plate fully welded to the Boiler tubeplates and shell.

Front casing is insulated internally to reduce radiation loss to a minimum and incorporates hinged doors with screen plates which allow access to boiler tubeplates and tubes to facilitate tube cleaning, tube removal and inspection.

Rear casing is provided with flanged outlet for chimney connection. Hinged doors allow access to tubeplate and tube nest and are also fitted with screen plates.

Heat Recovery Section: Casings are fabricated from mild steel plate fully welded to the Boiler tubeplates and shell.

Insulation and Sheeting

The boiler shell is insulated with 100mm thick high density insulation to reduce radiation loss then clad in 0.7mm thick Embossed Aluzinc sheeting. Tubeplates, pads and standpipe penetrations are finished with Aluzinc collars.

To aid access for inspection purposes, inspection doors and valves are not provided with insulation, this is available on request as an added option. Pipework is provided uninsulated as the client may find it easier to insulate on site with other connecting pipework between the package and the system.

Economiser

An Economiser that preheats the feed water by recovering sensible heat from the exhaust gases can be supplied and mounted on the rear smokebox. On the fired side this can provide up to 5% gain in efficiency (giving up to 94.5% Nett overall efficiency to EN12953) and is supplied complete with insulation and cladding, safety valve, temperature gauge, flow and return pipework (insulation and cladding of pipework excluded) and an automatic bleed valve to prevent possible steaming of the feed water within the Economiser during no-flow conditions.

To increase the steam capacity from the heat recovery section, the economiser can be extended to the Heat recovery section.

A manual water bypass system that allows an operator to mechanically isolate the water supply to and from the economiser can be provided.

Supports

The supports are fabricated as an all-welded structure fabricated from suitably sized hollow sections, incorporating outriggers which are welded or bolted as appropriate for the boiler feed pump and control panel. Jacking points are provided on the support structure to assist in offloading, positioning and manoeuvring the boiler.

Schedule 2: Boiler-Mounted Fabrications, continued

Ladders and Platform (OPTIONAL EXTRA)

Access ladder and platform can be fitted to allow access to top of boiler and safety valve. The ladder incorporates safety hoops beginning at a level of 2515 mm from floor level of the Boiler baseframe terminating above the level of the platform safety railing.

The platform is provided on three sides with safety handrailing to a height of 950 mm, the fourth side left open for access to the boiler valves.

Bypass Damper and Ductwork (OPTIONAL EXTRA)

We can supplement our offering with the supply of a bypass damper and associated ductwork all fully insulated and clad and trial fitted prior to despatch from our factory.

Please refer to your covering Tender for details of the full scope of supply offered.

Schedule 3: Steam & Water Mountings

General

As standard, the valves and gauges we offer comply with BS EN 12953 and are fitted to the boiler standpipes with suitable joints and flanges drilled to BS EN 1092. Flange fixing is by metric studs and nuts or bolts. Standard valves and fitting are tabulated below:

Quantity	Description	Material
1	Steam Stop Valve, Angle pattern type	Cast steel
1	Single Spring High Lift Safety Valve sized to provide 100% discharge capacity	SG Iron
1	Feed water isolation, Angle pattern type	Cast steel
1	Feed water, wafer pattern non-return	Stainless steel
1	Multi stage, fixed speed, centrifugal feed pump	Stainless steel
1	Water strainer, Y Type (supplied loose)	Cast Iron
1	Manual Blowdown Valve, ball type	Carbon steel
2	Reflex type water gauge assembly with steam & water cocks fitted to a plate type column	Carbon steel
1	Standard integrity Probe type controls. On-off operation upto and including 7000 kg/hr, Modulating control from 8000 kg/hr and above	-
1	Bourdon type, Direct mounted Pressure Gauge	Aluminium
1	Air vent valve	Bronze
1	DN25 Blanked connection for TDS Control or Chemical injection	-

Drain pipework from the water gauge drain cocks and safety valve drain are extended in suitably sized pipework terminating individually at boiler centre line.

Notes

- Valve materials are provided for the rating, pressure and temperature requirements.
- For multi-boiler installations an additional steam non-return valve will be required to comply with the requirements of Guidance Notes BG01. Cochran can provide this additional valve on request if not being supplied by your Installation Contractor.
- Please refer to quotation for any additional valves or mountings offered.

Schedule 4: Feed Pumps & Water Level Controls

Water Level Controls - Direct Mounted Probe Type

Water Level Controls are Direct Mounted Probe Type which are located on the top centreline of the boiler shell.

Modulating water level control is provided. Including:

- Pump On/Off Control
- High Water Alarm
- First Low Water Level Alarm and System Lockout
- Second Low Water Level Alarm and System Lockout

Note

As standard the water level control probes do not have self-monitoring capability but this facility can be offered if required.

Feed Water Pump

The feed water pump is multistage type sized to suit the boiler working pressure and rating. The pump is fitted to the boiler on an outrigger fixed to the baseframe and connected to the boiler feed check valve in suitably sized mild steel pipework. The pump is continuously running and provided with an automatic bleed valve to prevent possible steaming of the feed water within the Economiser during no-flow conditions.

A feed water inlet strainer is supplied loose.

Schedule 5: Combustion Equipment/ Control Panel/Wiring & Testing

Combustion Equipment

The Boiler is fitted with either a pressure jet or a rotary cup burner matched to Boiler in accordance with the rating and is suitable for the fuel(s) specified in our tender. The burner is a complete unit pre-wired and includes fuel atomiser system, ignition equipment, windbox and control linkage, etc. In the case of gas fired units a matched gas train is supplied.

Control Panel

A Boiler control panel is fitted to the Boiler supports and includes the necessary control equipment, starters, water level alarms, controls for feed pump and mains isolation. Control pressure switches are attached to the side of the panel.

Electrical Wiring

Heat resistant cabling is used for wiring between water level controls and the control panel, all other wiring is in PVC covered wiring carried in flexible conduit. Colour Coding to BS EN 60204-1:2006.

Functional Testing

An electrical functional test of the boiler safety and control system is carried out and witnessed by the Cochran Q.A. Department Inspectors.

Schedule 6: Painting

Surfaces are degreased prior to painting and one coat of primer, one coat of undercoat and one finishing coat is applied.

Standard Colours are as follows:

Baseframe, ALL Valves, Platform and Ladder (when fitted)	Black
Front and Rear Casings	Silver
Screen Plates	Blue
Sheeting	Embossed Aluzinc Sheeting
Burner	Manufacturer's Standard
Control Panel	Manufacturer's Standard
Feed Pump	Manufacturer's Standard

Schedule 7: Terminal Points

Flanges to BS EN 1092 except where otherwise stated.
Screwed connections BSP except where otherwise stated.

Description:

Stop Valve (Outlet)	Flanged
Safety Valve (Outlet)	Flanged
Blowdown Valve (Outlet)	Flanged
Feed Water (Inlet)	Flanged
Drain Pipework (Outlets)	Screwed
Flue Gas (Outlet) Vertical	Flanged
Oil Flow (Connection)	Screwed
Oil Return (Connection)	Screwed
Gas (Inlet) when applicable	Flanged
Economiser Bleed valve	Screwed
Pilot Gas (Inlet) when applicable	Screwed

Schedule 8: Tools & Documents

Tools Provided

Tube cleaning brushes and rod handle are provided.

Documents Provided

- General Arrangement Drawing and Electrical Wiring Diagrams are provided.
- Certificate of Compliance is provided, certified by independent Inspection Authority.
- Operation and Maintenance Manual is provided.

Important Note:

Cochran reserve the right to amend or alter this Specification during the tender validity period or the manufacturing stage of any subsequent order to comply with any alteration or amendment to applicable Standards, Safety Codes, Guidance Notes or Revisions in Manufacturing Techniques.

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