ST23 Technical Specification

ST23 Steam Boiler

Three Pass Wet Back Boiler

MCPD COMPLIANT

COCHRAN

ST23 Package Steam Boiler

The COCHRAN ST23 PACKAGE STEAM BOILER is of horizontal three pass wet back design and is built to BS EN12953 with independent inspection by British Engineering Services (BES) and UKCA or UKNI marked as appropriate (see footnote).

This boiler model has a steam output range of 1000 to 6000 kg/hr F&A 100°C.

Although it mainly targets International markets, it can also be used in the UK and EU particularly when utilising the alternative ST23e version for compliance with the Medium Combustion Plant Directive (MCPD).

It complies with the requirements of the Factories Act (1961) and Arrangement 1 of 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.

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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.

Design

Boilers rated at 2000 kg/hr F & A 100°C and below are of bent tube wet back design. The furnace tube is designed to allow adequate expansion to take place.

Boilers rated above 2000 kg/hr F & A 100°C are of fully wet-back design. The furnace tube is designed to allow adequate expansion and is located between the front tube plate and the totally submerged reversal chamber. The rear reversal chamber plate is stayed to the Boiler rear tube plate with the required number of stay bars.

Tube plates are drilled by computer controlled equipment to ensure the correct ligaments are maintained and a satisfactory tube hole finish is achieved. Weld preparation for welded tubes and bars are also undertaken by computer controlled equipment to strict tolerances.

Two separate passes of convection tubes are fitted. On boilers rated at 2000 kg/hr F & A 100°C and below, the first pass of tubes are fitted between the boiler front tube plate and curved to enter the rear of the furnace which also allows for adequate expansion. The tubes are spaced around the furnace into which they are expanded and seal welded.

On boilers rated 2500 kg/hr F & A 100°C and above the first pass of tubes are fitted between the Boiler front tube plate and the reversal chamber front tube plate. The first tubes are expanded into both tube plates.

All plain tubes are expanded into position with the inlet to first pass tubes on boilers rated at 2000 kg/hr F & A 100°C and below being prepped, 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.

The required number of stay tubes and stay bars are fitted in all Boilers. All stay tubes are lightly expanded before being welded in the main boiler tube plates and reversal chamber. Stay bars are welded into tube plates.

Access and Inspection

For inspection purposes, openings are provided to gain access to the steam/water side of the boiler. One 420 x 320mm elliptical manway opening is provided on the top of the boiler. Two 125 x 90mm elliptical handhole openings are provided, one in each of the main boiler tubeplates.

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

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Schedule 1: Boiler Pressure Parts, continued

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

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Schedule 2: Boiler-Mounted Fabrications

Casings, Insulation and Supports

Front and Rear Casings

The front casing incorporates a hinged, insulation lined door, which carries the combustion equipment and provides access to the boiler furnace and convection tubes.

Rear casing is insulated externally and provided with a flanged outlet for chimney connection (vertical gas flow), and lift off doors for access to boiler tubeplates and tubes to facilitate tube cleaning and inspection.

The front and rear casings are provided with screen plates on the front and rear to further minimise heat losses.

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.

Supports

The boiler supports are an integral part of the front and rear casings and are provided with outriggers for feed pump and also incorporate jacking points. The front and rear supports are connected together using tie sections to provide rigidity and assist in installation.

Jacking points are provided on the support structure to assist in offloading, positioning and manoeuvring the boiler.

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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.	-
1	Bourdon type, rear entry Pressure Gauge	Aluminium
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.

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Schedule 4:
Feed Pumps & Water Level Controls

Water Level Controls - Direct Mounted Probe Type

Two top mounted probe type water level elements are fitted, one to operate the on/off feed pump, first low water alarm and system lockout, the other to provide a second low water alarm and system lockout as follows:

One Water Level Control will provide the following operational signals:

- Pump On
- Pump Off
- First Low Water Alarm and System Lockout

One Water Level Control will provide the following operational signals:

- Second Low Water Alarm and System Lockout
- High Water Alarm

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 of the multistage type sized to suit the boiler working pressure and rating.

The pump is fitted to the boiler support brackets and connected to the boiler feed valve in suitably sized mild steel pipework.

A feed water inlet strainer is supplied loose.

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

Combustion Equipment

Each boiler is fitted with Cochran combustion equipment. Our Simplex Burner (Modulating control on gas firing; high/low control on oil firing) is fitted on boilers rated upto and including 3000 kg/hr and our Triplex Burner (Modulating control on gas firing; three stage control on oil firing) is fitted on boilers rated from 3500 kg/hr to 5600 kg/hr. The 6000 kg/hr unit is fitted our Equinox burner (Modulating control on gas firing; high/low control on oil firing).

All burners are fully automatic pressure jet type and have been designed specifically for gas and/or oil applications. Primarily designed for use when firing natural gas, our burners can be adapted to suit gases such Towns gas and liquefied petroleum gas. They have also been designed to operate with distillate and residual oils as defined by British Standards Specification BS2869 as Classes 'D', 'E', 'F' or 'G'.

The Simplex and Triplex burners are a composite, gun type configuration comprising of a combustion head assembly, electronically operated air damper, forced draught fan, electric ignition and flame monitoring equipment pre-wired to a junction box. Our Equinox burner has all of the same features but with a side slung windbox arrangement. The burner is controlled by an electronic, linkageless burner management system.

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.

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.

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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	Black
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
Gas (Inlet), Pilot Gas (Inlet)	Screwed

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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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