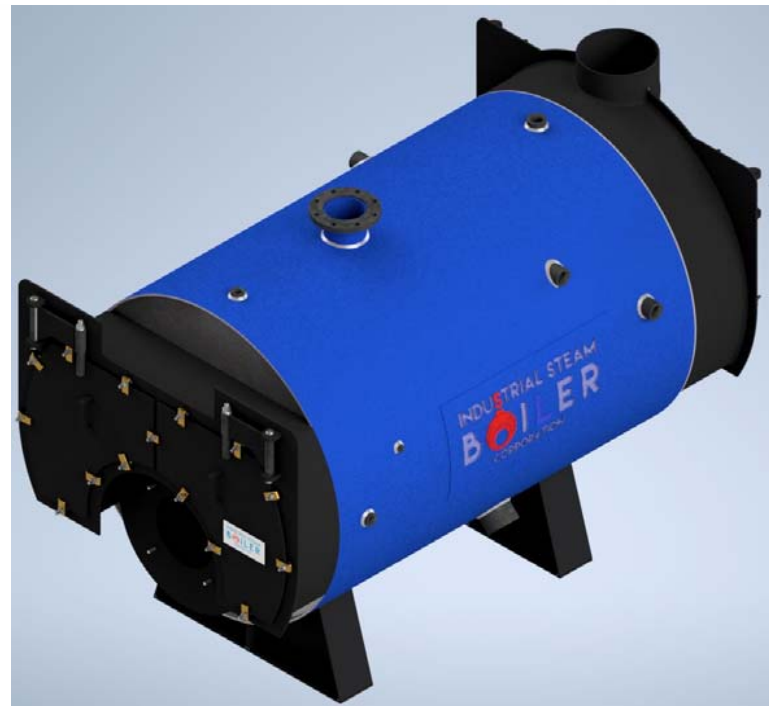


# INDUSTRIAL STEAM BOILER CORPORATION



**SERIES ISB3**

**Sample Specifications  
Factory Packaged Firetube Boilers**

### **Sample specifications Factory Packaged Firetube Boilers**

The following sample specifications are provided by Industrial Steam Boiler to assist you in meeting your customers specific Boiler needs and application.

The sample specifications are typically utilized as the base template for the complete boiler specification. Contact your local Industrial Steam Boiler authorized representative for information on special insurance requirements, special code requirements, optional equipment, or general assistance in completing the specification.

#### **Industrial Steam Boiler Series ISB3 Steam Boiler (100-600 HP, Steam 15 psig)**

1. Boiler Characteristics (steam)
2. General Boiler Design
3. Steam boiler trim
4. Burner and Controls
5. Efficiency guarantee
6. Warranty
7. Execution

#### **Industrial Steam Boiler Series ISB3 Hot Water Boiler (100-600 HP, Hot Water 30-160 psig)**

1. Boiler Characteristics (Water)
2. General Boiler Design
3. Water boiler trim
4. Burner and Controls
5. Efficiency guarantee
6. Warranty
7. Execution

#### **Industrial Steam Boiler Series ISB3 Steam Boiler (100-600 HP, Steam 15 psig)**

##### **1.0 Boiler characteristics (Steam)**

1.1 The steam boiler shall be Industrial Steam Boiler ISB, \_\_\_\_\_ Series, \_\_\_\_\_ HP designed for \_\_\_\_\_ psig (15, psig steam). The maximum operating pressure shall be \_\_\_\_\_ psig and the minimum operating pressure shall be \_\_\_\_\_ psig.

1.2 The boiler shall have maximum output \_\_\_\_\_ Btu/hr, or \_\_\_\_\_ horsepower when fired with \_\_\_\_\_ oil and/or natural gas. Electrical power available shall be \_\_\_\_\_ Volt \_\_\_\_\_ Phase \_\_\_\_\_ Cycle.

##### **2.0 General Boiler Design**

2.1 The boiler shall be a three-pass wet back horizontal firetube type boiler with five (5) square feet of heating surface per rated boiler horsepower. It shall be mounted on a heavy steel frame with integral forced draft burner and burner controls. The complete packaged boiler approved as a unit by Underwriters Laboratories and shall bear the UL label.

2.1.1 The boiler shall be completely preassembled, and fire tested at the factory. The unit shall be ready for immediate mounting on floor or simple foundation and ready for attachment to water, fuel, electrical, vent and blowdown connections.

2.1.2 The boiler shall be built to comply with the following Insurance and codes \_\_\_\_\_ (Factory Mutual Industrial Risk Insurance, ASME CSD-1).

## 2.2 Pressure Vessel Construction

2.2.1 The pressure vessel is built in a strict accordance with ASME code section IV, to the latest year of issue and addendums. Manufacturers quality control Department in conjunction performs all tests of materials and fabrication with a licensed authorized inspector in accordance with the NBIC code. Completed pressure vessel is shop hydrostatically tested to ASME code requirements, issued a National Board Number and a ASME H-2 data report which is furnished to the purchaser at time of final payment.

2.2.2 The boiler shall be furnished with four (4) 3"x4"x4" hand holes optional 3" and or 4" plugged couplings in the boiler shell. 12" by 16" manhole to be provided on boilers over 60" in diameter. Two lifting lugs must be provided located on top of the boiler.

2.2.3 The front and rear doors shall be hinged and davited. doors are to be sealed with heat resistant gaskets and fastened using lugs and brass nuts. Design doors so front and rear tube sheets and all flues are fully accessible for inspection and cleaning when doors are open.

2.2.4 Provide a steam separator in the boiler shell below the main steam outlet flashing to provide for dry steam with no water carryover. Provide a baffle at the feed water inlet to temper the water.

2.2.5 The exhaust Gas vent shall be located at the rear of the boiler and be capable of supporting 2000 pounds. the boiler vent shall include a locking blade damper and stack thermometer.

2.2.6 Provide observation port at rear end of boiler for inspection of flame conditions (Front end observation Port Optional). Provide a plug test port at the rear of the furnace for testing of furnace back pressure.

2.2.7 Unit(s) shall be provided with maximum 3" thick mineral wool insulation. The boiler shall be lagged with a 22-gauge thick carbon steel jacket. The boiler jacket shall feature a bottom side primer of polyurethane resin base coat of .2 mil. dry finish thickness and a final coat of .4 mil. dry finish thickness of Valspar. The topside (exterior) of the jacket shell feature a primer .3 mil. dry finish thickness and the final coat of .8 mil. dry finish thickness of Valspar Polyurethane Resin based paint. The application of the paint is to be automated roller type. The exterior finish of the boiler jacket shall be guaranteed by the manufacturer for three (3) years from the date of manufacture for chalking, fade, peeling, or blistering.

2.2.8 The entire boiler base frame and other components shall be factory painted before shipment, using a hard finish enamel coating.

2.2.9 Low-pressure steam & hot water boilers have a straight furnace. Furnace heat release shall not exceed 160,000 Btu per cubic foot of furnace volume. Provide a refractory plug in rear turn around for inspection access to the furnace.

## 3.0 Steam Boiler Trim

### 3.1 Water Column

A water column shall be located on the right-hand or left -hand side of the boiler complete with dry-cocks, gauge glass set and water column blowdown valves.

#### 3.1.1 Feedwater Pump Control

The boiler feedwater pump control Shall be included as an integral part of the water column and automatically actuate a motor driven feedwater pump to maintain the boiler water level within normal limits. McDonnell & Miller # 157

### 3.1.2 Low Water Cutoff

The low water cutoff shall be included as an integral part of the boiler feed water control wired into the burner control circuit to prevent burner operation if the boiler water level falls below a safe operating level.

### 3.2 Auxiliary Low water Cut-off

Auxiliary low water cut-off shall be included piped to the vessel and wired to the burner control circuit. A manual reset device shall be used on this control.

### 3.3 Steam Pressure Gauge

The steam pressure gauge shall be located at the front of the boiler and include cock and test connection.

### 3.4 Safety Valves

Safety Valves of a type and size to comply with ASME Code requirements shall be shipped loose.

### 3.5 Steam Pressure Controls

The steam pressure control to regulate burner operation shall be mounted near the water column. Controls shall be in a high limit (manual reset), operating limit (auto reset) and firing rate control.

## 4.0 Burner General

A combination burner shall be of the forced draft annular port flame retention type suitable for burning natural or manufactured gas and air atomizing for burning No.2 oil. The burner shall burn the specified quantity of fuel without objectionable vibrations, noise, or pulsation with no CO in the products of combustion. The burner shall meet <\_\_\_ppm Nox while firing on natural gas utilizing flue gas recirculation technology. The burner shall be factory installed and wired, shall bear the listing mark of Underwriters Laboratories, Inc. evidencing compliance with requirements of UL-796 for gas burners and UL 296 for oil burners. The entire boiler and burner unit shall be factory fire tested prior to shipment with a copy of the fire test being supplied to the owner.

### 4.1 Firing Sequence

The burner operation shall be full modulation with low fire start.

#### 4.1.1 Burner Design

A burner fan shall furnish all combustion air, which shall be an integral part of the burner. The burner fan and motor shall be mounted below the horizontal centerline of the boiler for ease of maintenance and inspection. The burner air control louver shall be of the low-pressure drop, Inlet pipe to allow visual checking of the louver settings, and ease of cleaning or adjustment. The burner shall have an air flow safety switch to prove combustion flow. The burner shall have an interrupted gas-electric ignition system with an electrical transformer. An observation port shall be provided in the burner to provide observation of both the pilot and main flame.

#### 4.1.2 Gas Pilot

The gas pilot shall be the premix type with automatic electric ignition, complete with electric flame scanner to monitor the pilot so the primary fuel valve cannot open until pilot flame has been established. The gas pilot train is to consist of shut-off cock, pressure regulator, and automatic gas valve.

#### 4.1.3 Gas Train

The lone gas train shall be mounted on the boiler and shall include the following: A manually operated gas cock at the inlet to the train, a gas pressure reducing regulator, a motorized automatic gas valve, a second automatic gas valve, and a manually operated leak test cock located downstream from the automatic gas valve. The gas train shall include high and low gas pressure switches to monitor the gas pressure. Customer can modify the design in writing if they want a different gas train configuration..

## 4.2 Fuel Oil System

### 4.2.1 Oil Pump

The oil pump set shall consist of an oil pump with a capacity of twice the firing rate of the boiler and motor mounted on a base. Oil pump assembly shall ship loose for field installation.

### 4.2.2 Oil Piping

The oil burner piping shall include automatic oil safety valve, oil metering valve, fuel filter, and all necessary piping, end linkages for full modulation operation, all mounted and piped on the unit. pressure gauge shall be provided to indicate oil pressure and air atomizing pressure. The unit shall have a low air pressure switch interlocked to prevent burner operation in the event of air pressure failure.

## 4.3 Control Panel

The Factory pre-wired control panel should be mounted on the burner proper or on the side of the boiler to allow for ease of maintenance and troubleshooting. The control panel shall contain the following items electronic flame safeguard control circuit transformer motor starter control circuit fuse numbered terminal strips and indicating lamps for major functions. The control panel shall include A manual-automatic selector switch and a damper motor positioning switch to permit Automatic firing in accordance with load demand or manual control of the firing rate at any desired point between low fire and maximum rate. Changeover from one fuel to the other shall be accomplished by flipping a switch. No burner adjustment or link exchange shall be necessary when going from one fuel to the alternate fuel.

The electronic flame safeguard shall be complete with all necessary accessories devices to control ignition and starting and stopping of the burner, to provide pre-combustion purge and post -combustion purge, and to shut down the burner on failure of ignition, pilot, or main flame by the electric scanner.

## 4.4 Codes and Standards

A boiler shall be inspected by an authorized inspector and be registered with the National Board of Boiler and Pressure Vessel Inspectors. The package boiler shall carry an Underwriters Laboratory label "B", The boiler-burner unit shall meet the requirements of \_\_\_\_\_VL or FM or I.R.I.)

## 5.0 Efficiency Guarantee

The efficiency guarantee will be included with the formal submittal.

## 6.0 Warranty

6.1 All equipment is to be guaranteed against defects materials and/or workmanship for a period of 12 months from date of shipment

## 7.0 Execution

### 7.1 Shop Tests

7.1.1 The packaged boiler must receive factory tests to check the construction, controls, end operation of the unit. the purchaser if desired may witness all tests.

### 7.2 Start-up service

7.2.1 After boiler installation is completed; the manufacturer shall provide the services a field representative for starting the unit and training the operator at a cost to be specified by manufacturer.

7.2.1.1 A factory approved, and authorized start-up report shall be submitted to the customer user at the time of start-up.

**SCHEDULES:**

In lieu of showing Scotch Marine Boiler ratings and characteristics on the drawing in the form of "NOTES" it is recommended that a schedule be prepared of Scotch Marine Boiler performance requirements. This schedule can be included on the drawings (usually on a separate schedule sheet) or as the last page of this section. A sample schedule is included in these evaluations.

**SAMPLE SCHEDULES:****SCOTCH MARINE BOILER SCHEDULE**

Plan No.	B-1	B-2	B-3
Working Medium	STEAM	WATER	WATER
Pressure-PSI	15	30	80
Fuel	#2 OIL	NATURAL GAS	NATURAL GAS/#2OIL
Gross Output			
BHP	200	80	150
Steam/Water-MBH	6,695	2,678	5,021
Steam-LB/HR	6,900	2,760	5,175
Heating Surface – Sq Ft.	1,000	400	750
Firing Rates			
Natural Gas-CFH	8,369	3,348	6,277
#2 Oil-GPH	58	23	44
Power requirements			
Blower Motor	240/60/3	240/60/3	240/60/3
Controls	115/60/1	115/60/1	115/60/1

**\*NOTE TO SPECIFICATION WRITER: SEE ISB SERIES ISB3 PRODUCT DATA SHEET FOR INFORMATION REQUESTED.**

**ESTIMATED FUEL TO STEAM EFFICIENCIES  
3-PASS ISB3 SERIES  
NATURAL GAS & #2 OIL-15 PSIG. DESIGN**

<b>BOILER HP</b>	<b>NATURAL GAS</b>	<b>#2 OIL</b>
50	79.57%	82.97%
60	81.98%	84.31%
70	80.07%	83.17%
80	81.76%	84.17%
90	83.03%	84.92%
100	80.20%	83.23%
125	82.78%	84.76%
150	84.38%	85.72%
175	81.40%	83.93%
200	82.86%	84.80%
250	84.78%	85.96%
300	85.78%	86.56%
350	85.88%	86.63%
400	86.31%	86.89%
450	86.55%	87.04%
500	85.77%	86.56%
600	86.37%	86.93%

**EFFICIENCY CALCULATIONS BASED ON FOLLOWING:**

<b>FUEL</b>	<b>NATURAL GAS</b>	<b>FUEL</b>	<b>#2 OIL</b>
<b>FUEL NG</b>	CARBON = 69.98%	<b>FUEL # 2 OIL</b>	CARBON = 85.9%
<b>COMPOSITION % BY</b>	HYDROGEN = 12.70%	<b>COMPOSITION % BY</b>	HYDROGEN = 12.70%
<b>WEIGHT</b>	SULFUR = 0%	<b>WEIGHT</b>	SULFUR = 0.1%
<b>NG HEATING VALUE</b>	21,830 BTU/LB	<b>EXCESS AIR</b>	15%
<b>AMBIENT AIR</b>	80°F	<b>RELATIVE HUMIDITY</b>	30%
<b>TEMPERATURE</b>			