

SUPERIOR **BOILER** *BUILT TO **OUTPERFORM***



DENALI D-TYPE



PACKAGE BOILER SPECIFICATIONS

This specification covers the requirements for a D-type package water tube boiler with all the accessories and components that will meet the following project requirements:

Number of unit's	One
Model Number	00-D-000
Boiler capacity	00,000 PPH
Operating steam pressure	000 PSIG
Steam temperature	Sat ° F
Design pressure	000 PSIG
Plant elevation	<1,000' ASL
Ambient temperature	70° F
Feedwater temperature	228° F
Electric power available	460-3-60 (V/PH/HZ)
Fuel	Natural Gas/ #2 Fuel Oil
NOX emissions	- PPM*
CO emissions	- PPM*

*Emissions guaranteed to 4:1 turndown

The unit shall have the following minimum heating surfaces and furnace volume as shown below:

ASME Total Heating Surface 0,000 Sq. Ft.
ASME Radiant Heating Surface 0,000 Sq. Ft.
ASME Convection Heating Surface 0,000 Sq. Ft.
Furnace Volume 0,000 Cu. Ft.
Volumetric Heat Release Rate < 85,000 BTU / Cu. Ft. * Hr.

- a. Radiant Heating surfaces shall be calculated on a flat projected basis.
- b. Furnace volume shall be determined with the furnace limit being considered as not extending beyond the first row of water screen tubes. Furnace volume shall not extend beyond the center line of the lower drums.

BOILER

The boiler shall be a completely assembled D-type package water tube boiler that will be designed and constructed in strict accordance with the ASME Boiler and Pressure Vessel Code, Section I and registered with the National Board of Boiler and Pressure Vessel Inspectors.

The boiler will be assembled on a structural steel base frame that will be designed for expansion of the boiler in all directions without creating any stresses of the pressure parts.

Shop assembled D-type package boiler consisting of a steam drum and a lower or mud drum connected by boiler tubes properly bent to fit the designed configuration. The furnace, division wall, and convection outside wall tubes shall be welded membrane construction. All membrane materials shall be a minimum of ¼" thick and no wider than 1". Membrane shall be attached to the boiler tubes by solid continuous seal welds on both sides of the tube.

The furnace and division wall tubes shall be a minimum of 2" OD (SA178A) with a wall thickness of no less than 0.120" MW. Variable tube diameters with swaged 2" OD tube ends will not be acceptable. These tubes shall be arranged on 4-1/8" centers with 1" steel bar membranes on each tube.

The furnace front and rear walls will be water cooled with minimum of 10" thick pyro block insulation attached to 3/8" thick plate. Designs offering a ring header on the front wall will not be accepted.

Boilers that have a refractory front wall design are not acceptable.

All convection tubes shall be a minimum of 2" OD (SA178A) with a wall thickness of no less than 0.105" MW.

The boiler steam and mud drums shall have manhole openings at each end, sized at 12" x 16" each designed for the working steam pressure and stamped with the ASME symbol of manufacturer.

The boiler drums shall be constructed from a flat steel plate (SA516-70) rolled to the correct diameter. The heads and all connections will be welded using an automatic welding process. All welds on the drums shall be radio-graphed (X-Rayed) per ASME requirements. Steam drum diameter shall not be less than 00" ID and 0.00" minimum thickness.

The steam drum will have an internal feedwater distribution pipe and an internal continuous blowdown pipe installed.

The steam drum shall be fitted with steam separation equipment to provide clean saturated steam leaving the steam drum with 99.5% steam quality when using boiler water that is in

accordance with that set by the ASME code and those of the ABMA for the specified operating steam pressure.

The steam drum must have the following connection for accessories as a minimum:

- Main steam outlet
- Continuous blowdown
- Safety relief valve or valves
- Vent valve connection
- Feedwater connection
- Water column
- Secondary low water cutoff
- Chemical feed
- Drum level transmitter connections

Mud drum diameter shall not be less than 00" ID and 0.00" minimum thickness. The lower of mud drum shall have an internal channel arrangement installed on the inside of the mud drum with notches cut in the channel to allow for an even sweep when blowing down the boiler to keep the mud drum clean from any accumulations from building up inside the drum. The mud drum will be fitted with connections for blowdown valve attachments. Two 1" connections shall be provided in the mud drum head for future addition of a mud drum heating coil.

The following is a list of boiler trim that is to be supplied and mounted on the boiler as much as possible or shipped loose for field mounting due to shipping constraints.

- Non-return steam valve
- Main steam stop valve
- Steam spool piece ASME stamped
- Safety relief valves
- Tandem blow-off valves
- Continuous blowdown valves flow control and manual
- Feedwater control valve and three (3) valve bypass piping assembly
- Steam drum vent valve
- Water column, gauge glass-shutoff cocks, primary low water probes
- Secondary low water cutoff probe type
- Feedwater transmitter shutoff valves
- Feedwater stop valve
- Feedwater check valve
- Steam drum pressure gauge 8" dial, shutoff valve and syphon

The boiler will be assembled in a complete gas tight enclosure. Refractory use will be minimized.

The boiler side walls, floor, and roof will be fully insulated with a minimum of 3" of mineral wool or fiberglass insulation.



The outside casing shall be 26 gauge box rib galvanized sheets.

There shall be a continuous gas tight seal between tube membranes of the upper and lower drums. This seal shall be designed to allow for proper expansion of the pressure parts without creating any cracking or distortions.

There shall be one (1) access door 15" x 18", minimum size, to be located on the rear wall of the boiler this door shall be a bolted style with insulation on the inside and arranged for a gas tight seal. There shall be two (2) flame observation ports located in the rear wall of the furnace area. These observation ports shall be 2" diameter and clear high temperature glass. These observation ports shall be arranged for a seal air connection to receive plant with piping to keep the glass cool and clean.

The boiler pressure parts shall be subject to a hydrostatic pressure test equal to 1½ times the design work steam pressure and in full accordance with the ASME Boiler and Pressure Vessel code. This test must be witnessed by a qualified inspector registered with the National Board of Boiler and Pressure Vessel Inspection. This inspector shall sign all the boiler manufactured code documents certifying that the pressure test has met all the stated code requirements.

Economizer

Economizer will be designed and constructed in strict accordance with the ASME Boiler and Pressure Vessel Code, Section I and registered with the National Board of Boiler and Pressure Vessel Inspectors.

Design Conditions:

Design Temperature 700°F
Design Pressure 490 PSIG
Hydrostatic Test Pressure 735 PSIG

Coil Data:

4" schedule 80 inlet and outlet headers
1.25" OD Tubes (SA178A) with a wall thickness of 0.120" MW
Fins must be carbon steel ½" high x 0.06" thick with a fin density of 4 fins per inch.
Serrated fins not acceptable.

All tube 180° bends must be outside of the normal gas path and be accessible for inspection through removable access doors on both ends of the economizer. Economizer must also be equipped with a removable access door for tube inspection. The outside casing shall be 26-gauge box rib galvanized sheets.