

Industrial Guide

High Pressure Steam Plant Guide

Steam Plant Design Guide for Discussion Purposes

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Job Name: _____ Date: _____

Location: _____

Boiler Qty (___) Type ___ Scotch Firetube 3 pass ___ Scotch Firetube 4 pass

___ Vertical Tubeless ___ Vertical Fire Tube ___ Flex Tube Water Tube

BTUH Input _____ mbh Output _____ mbh BHP _____

Pressures:

Design _____ psi Max. Operating _____ psi Relief Valve _____ psi

Codes: ___ ASME CSD-1 ___ F.M. ___ NFPA-85 (≥ 300 HP) ___ Other?

Insurance Requirements: ___ F.M. ___ I.R.I. ___ Other?

Burner Selections

___ Charge for mounting burner Supplied by B.G. Peterson Co.

Electric Service _____ volts, _____ phase

Ignition: Spark Ignited Pilot. Control circuit to be 115/60/1

___ Is a single point power connection required

Fuel sources: ___ Natural gas 7 to 14" w.c., Other _____ "w.c./psi

___ L.P. gas (11" w.c.), ___ LP vaporized, ___ LP/NG blended, Oil # _____ grade

___ Combination fuels as circled above, Oil ___ Pressure or ___ Air Atomizing

Burner Oil Options

___ Oil pump base mounted, ___ Oil pump burner mounted

___ Remote mounted pump set, factory boiler skid mounted, piped & wired.

___ Remote transfer oil pumps or individually piped from tank

___ Oil filter types: ___ Filter, ___ Strainer, ___ Simplex, ___ Duplex

___ Mounted air compressor, factory boiler skid mounted, piped, and wired.

Burner Control: on/off, ___ low/hi/off, ___ hi/low/off, ___ low/hi/low, ___ modulation

Modulation: ___ Standard, ___ Characterized, ___ Linkageless,

Type: ___ Honeywell, ___ Fireye, ___ Siemens, ___ Auto Flame

Burner turndown: ___ 4:1, ___ 6:1, ___ 8:1, ___ 10:1, ___ 12:1

___ Flue gas recirculation

___ Variable speed drives on blower motor ship loose

___ Optional mount and wire blower VFD supplied by factory.

___ O2 trim system

___ Outside air combustion air damper relay in burner panel

___ Optional fan silencer

___ Optional gas pressure gauge: gas train and manifold

___ Optional high and low gas pressure switches.

___ Optional back up LP gas standby pilot

___ Burner panel: (a.) Size (b.) Mounting and location....

1. Boiler base extended forward under the burner and beyond
for base mounting of the burner control panel

2. Options: alarms, lights, monitoring

___ Control cabinet burner mounted standard

___ Optional Cabinet factory wired and mounted to the boiler (location)

___ Optional communication interfaces, control-monitoring-alarm

___ MODBUS ___ BAC NET ___ LON WORKS ___ 1-10 vdc ___ 4-20 ma

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Boiler Feed Options

- Feed Pump Control: ___ on/off feed pump ___ modulating feed pumps
(___ modulating feed water we recommend an optional high water alarm)
- ___ Optional feed water 3-valve bypass - provide with boiler (shipped lose)
- ___ Feed valves, globe, and check, (provide factory mounted with boilers)
- ___ Blow down valves (provide factory mounted with boiler)

Standard Boiler Options

- ___ Burner mounting plate.
- ___ Surface blowdown (provide factory mounted with the boiler)
Manual or automatic continuous (type?) (By chemical treatment people?)
- ___ Steam supply reducing spool (provide with the boiler)
(___ Straight or ___ Angle) Factory tested (*) - Shipped lose.
- ___ Non return check valve (straight or angle) (location) - provide with the boiler - Factory tested (*) - Shipped lose.
___ Hand wheel or chain pulley?
___ Tapping for leak test?
- ___ Optional OS&Y Shut off supply valve - provide with the boiler
Factory tested (*) - Shipped lose.
___ Hand wheel or chain pulley?
___ Tapping for leak test?
- ___ Optional (*) ASME hydro-test at factory for state of NE & IA code
requires these items to be factory supplied, mounted and second ASME tested - Factory provided – shipped lose.

Other Boiler Options

- ___ Optional sample cooler – factory mounted
- ___ Optional catwalk supports (catwalk by others)
- ___ Discuss optional steam trap for idle boiler steam chest draining
- ___ 5" Flue gas thermometer optional
- ___ 8.5" Steam pressure gauge optional
- ___ Optional low fire hold aquastat - provide with the boiler
- ___ Optional pre-heat switch to keep boiler at preset temperature
- ___ Optional weld hot pass on scotch marine - yes or no
- ___ Optional drip pan elbows
- ___ Venting Considerations: ___ motorized draft control flue damper,
___ Chimney induced draft fan, ___ Locking manual quadrant flue damper.
- ___ Fresh combustion air fan system.
- ___ Packaged Systems – skid packaging accessories
- ___ Economizers - Condensing or Non Condensing Heat Exchanger

Boiler Plant Equipment

1. **Alternating twin water softener** - yes or no
Provide information:
 - a. Water hardness in parts per million _____
 - b. Percent make-up water _____

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2. **Optional chemical treatment** - specify for each type of treatment:
 - a. System configuration - sketch
 - b. Tank material and size, trim
 - c. Pump size and type
 - d. Electrical controls

3. **Optional surge feed pumps** – (see separate enclosure)
 - a. System configuration - provide sketch of piping
 - b. Provide control logic, **including standby requirements**
 - c. Rate of return
 - d. Are returns gravity, pressurized or both?
 - e. Provide % of each type and temperatures
 - f. Percent make-up water
 - g. Discuss pre-heater
 - h. Voltage _____ Phase _____
 - i. NEMA enclosure rating _____
 - j. Motors - ODP, TEFC, Explosion Proof.
 - k. Atmospheric

4. **Boiler feed pumps** – (see separate enclosure)
 - a. System configuration - provide sketch of piping
 - b. Provide control logic, **including standby requirements**
 - c. Are returns gravity, pressurized or both?
Provide % of each type and temperatures
 - d. Percent make-up water
 - e. Discuss pre-heater
 - f. Voltage _____ Phase _____
 - g. NEMA enclosure rating _____
 - h. Motors - ODP, TEFC, Explosion Proof.
 - i. Surge tank required - yes or no
 - k. Atmospheric or pressurized

5. **Deaeration** – (see separate enclosure)
 - a. System configuration - sketch
 - b. Provide control logic
 - c. Percent make-up _____
 - d. Pressurized
 - e. Voltage _____ phase _____
 - f. City water pressure psi _____
 - g. Maximum number of boilers that run at one time _____
 - h. NEMA enclosure rating _____
 - i. Motors -ODP, TEFC, Explosion Proof
 - j. Surge tank is required

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6. Other requirements

- a. Blowdown separator required - yes or no
- b. Blowdown heat recovery required - yes or no
- c. Discuss steam supply header configuration and sizing - provide sketch
- d. Discuss steam load characteristics and rates of change
- e. Discuss control types: self-contained, electric, pneumatic
- f. Discuss pop safety valve venting, drip pan elbows
- g. Discuss steam system return logic
 1. High pressure returns
 2. Low pressure returns
 3. Flash protection (steam trap failures)
- h. Discuss need to flash high pressure condensate before return to Non-pressurized boiler feed tanks.
- i. Discuss drain valve for blowdown separator
- j. Discuss access and clearances
- k. Modulating feed water discusses high water alarm in boiler

Surge Tank model

Total weight _____ lbs shipped as one packaged component

Horizontal or Vertical _____ Stainless Steel Vessel

____" dia x ____" long 304 L stainless steel 3/16" thick

48" high support stand, removable square box tubing

Dial thermometer

Lifting eyes

Vent to atmosphere

High water float switch

Red line gauge glass assembly

Dial thermometer

Inlet cascade baffle

Lifting eyes

4" inlet basket strainer (shipped loose installed by contractor in field)

Standard float operated 3/4" make up water level controller with 3" three valve bypass schedule 40 pipe with strainer

Direct Injection Steam Heating Assembly:

Stainless steel dispersion tube extended through the whole tank, and bolted at both ends

Temperature regulating valve, ____" main valve with temperature pilot to raise ____ gpm from 50°F to 200°F with 5 psi steam at the temperature regulator (shipped loose, field installed by contractor).

Pressure regulating valve, ____" main valve with pressure pilot located up stream of the temperature regulating valve to reduce steam pressure from ____ psi down to 5 psi. (shipped loose and installed by contractor in field)

Factory Supplied: Insulation and Jacket

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Surge Tank - Continuous modulating feed water to DA

Suction piping:

sized for ≤ 2.5 fps

___" dresser coupling

___" gate valve for isolation

(QTY) Model ___ Pumps ___" discharge ___ gpm @ 35 psi
___ hp ODP 3,500 rpm ___/60/3
Low net positive suction head, Carbide/viton seals

Discharge Schedule 80 piping with factory installed:

Pressure gauge,

Griswold automatic flow valve

Check valve

Gate valve for isolation

Pump combination bleed/bypass piping with valve

Pressure switch pump failure alarm, time delay automatic

standby **shipped loose field mounted & wiring by contractor**

Control Panel:

U.L. Nema 1 Mounted and wired (**desired location to discuss**)

Single point power connection

Main panel disconnect

Liquid tight conduit

Magnetic starter per pump

Fused disconnect switch per pump

Hour Meter per pump

Pilot run light per pump

Fused control circuit transformer with disconnect per pump

Alarm bell with silencing switch:

High and low water alarm

Pump failure

Low water pump cutoff

Transfer: "Continuous-Off-Standby" selector switch with test buttons

Repeat cycle timer to equalize pump operating hours

Remote Monitoring:

Alarm circuit with relay for monitoring

Pump starters have auxiliary contacts for pump on-off monitoring

High water alarm relay for remote monitoring

Pump failure with relay for remote monitoring

High temperature limit circuit with relay for remote monitoring

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Deaerator model

Horizontal or Vertical Vessel: Total weight _____ lbs
_____ lbs/hr, _____" dia x _____" long, _____ gallons of storage,
Pressurized, carbon steel or 304 Stainless steel 3/16" thick
48" high support stand, removable square box tubing
12" x 16" stainless steel manhole
Dial thermometer
Magnesium anode
Lifting eyes
External overflow, **is to be piped by the contractor in the field**
Automatic Vent Valve
Safety relief valve _____" x _____" (drip pan elbow)
Sentinel relief valve
Liquid filled pressure gauge with snubber
Compound gauge
High and low water switches
Low water pump cut off
Sampling valve
Stainless steel chemical feed quill,
Stainless steel sample cooler, shipped loose, **piped by contractor in field**
Red line gauge glass assembly
Shell and tube Vent condenser, **piped by contractor in field**
_____ " inlet basket strainer, **piped by contractor in field**

Deaerator Compartment:

304L stainless steel Horizontal Spray Manifold
304L stainless steel spray nozzles
304L stainless steel spray box

Direct Injection Steam Heating Assembly:

Stainless steel dispersion tube extended through the whole tank,
and bolted at both ends

Pressure regulating valve _____" main valve with pressure
pilot to raise _____ gpm from 50°F to 227°F with 5 psi steam at the
regulator, with three valve bypass. **Shipped loose field installed.**

Electric Modulating Transfer Assembly

Feed water control: Electric modulating transfer assembly,
Siemens _____" electric valve with NOVA type level controller with
three valve bypass and strainer. Sized to pass _____ gpm at a 10 psi
pressure drop.

Pumps for Continuous Operation, Modulating Feed Water

Suction piping: each pump to be individually piped sized for ≤ 2.5 fps
_____ " dresser coupling
_____ " vortex breakers
_____ " gate valve for isolation

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(QTY) Model _____ Pumps _____" discharge
Low net positive suction head, Vertical direct coupled
____ hp ODP frame 3,500 rpm _____/60/3
Carbide/viton seals rated for 300°F
____ gpm @ _____ psi auto valve set at _____ gpm
Based upon boiler with _____ psi safety relief valve

Pump VFD (shipped loose, to be installed by contractor in field) with
pressure transducer to be field installed by the contractor in boiler
header piping for future _____ psi operation to automatically ramp the
pumps down to the _____ psi operating pressure.

Discharge per pump includes:

Pressure gauge
Pump combination bleed/bypass piping with ball valve.

Control Panel:

U.L. Nema 12 Mounted and wired (desired location to discuss)
Main power disconnect
Single point power connection
Liquid tight conduit
Nema magnetic starter per pump
Fused disconnect switches breaker per pump
Fused control transformer per pump
Fused circuit disconnect per pump
Hour Meter per pump
Pilot run light per pump
Auto-off selector switch with test buttons per pump
Alarm bell with silencing switch:
High and low water alarm, Pump failure
Low water pump cutoff

Includes Run timer to equalize the hours of operation between two pumps

REMOTE MONITORING:

Alarm circuit with relay for monitoring
Pump starters have auxiliary contacts for pump on-off monitoring
High and low water alarm relays for remote monitoring
Pump failure alarm with relay for remote monitoring
Temperature transducers with dry contacts for remote monitoring

Factory supplied: Insulation and Jacket