

SELLERS IMMERSION FIRED
LOW PRESSURE STEAM BOILER
SUGGESTED SPECIFICATION

PART 1. – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.02 SUMMARY

- A. This Section includes packaged, factory-assembled and tested, fuel-fired, fire-tube boilers and accessories used for low-pressure steam systems.
- B. Related Sections include the following:
 - 1. Division 15 Section “Breechings, Chimneys and Stacks” for connections to breechings, chimneys and stacks.
 - 2. Division 15 Section “Automatic Temperature Controls” for control wiring for automatic temperature control system.

1.03 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed and operating weights, specialties furnished, and accessories for each model indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, size and location of each field connection.
 - 1. Wiring Diagram: Detail wiring for power, signal and control systems. Differentiate between factory installed and field installed wiring.
- C. Factory Fire Test Report: Include motor data, amperages, setting pressures, diagram of sensing locations, combustion analysis and flue gas temperatures obtained under simulated field conditions.
- D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- E. Maintenance Data: Include in the owners manuals complete maintenance instructions, parts list, troubleshooting instructions and wiring diagrams for each boiler.

1.04 QUALITY ASSURANCE

- A. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
 - 1. The Terms “Listed” and “Labeled”: As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” as defined in OSHA Regulation 1910.7.

- B. ASME Compliance: Fabricate and label boilers in compliance with the ASME Boiler and Pressure Vessel Code; Section IV, "Heating Boilers".
- C. National Board Registration: Unit shall be hydrostatically tested and registered with the "National Board of Boiler and Pressure Vessel Inspectors." Two (2) copies of the "Manufacturers' Data Report" shall be furnished
- D. UL Compliance: The boiler and all components shall be approved as a package by Underwriters Laboratories.
- E. FM Compliance: Control Devices and control sequences in accordance with the requirements of FM.
or
IRI Compliance: Control Devices and control sequences in accordance with the requirements of IRI.
- F. Comply with NFPA 70 for electrical components and installation.

1.05 COORDINATION

- A. Coordinate size and location of concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete".

1.06 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: The manufacturer shall assume undivided responsibility for the boiler and burner.
 - 1 The pressure vessel shall carry a 5 year warranty against thermal shock damage. Warranty shall cover 100 % of labor and material required to repair damage such as loosened tubes, cracked ligaments or welds.
 - 2 All burner components, except electrical components, gas pressure regulators or blower impellers, shall carry a 5 year warranty against defects.
 - 3 The manufacturer shall warrant all parts furnished for eighteen (18) months from date of boiler shipment.
 - 4 Any refractories used in the construction of the boiler shall be warranted for ten (10) years from the date of startup.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

Sellers Engineering Co.

- B. Substitutions: Alternate but equal equipment may be offered provided written approval is obtained a minimum of ten (10) days prior to bid opening.

2.02 PACKAGED BOILERS

- A. Boiler shall have an Output of ___ LB/hour of dry saturated steam from and at 212°F at the nozzle when fired with natural gas with a minimum pressure of ___ inwc (PSI).
- B. Electrical power available will be ___ Volts, ___ Hertz, ___ Phase
- C. Boiler overall dimensions shall not exceed ___ wide X ___ long X ___ high.
- D. Boilers shall be factory assembled and wired to require only supply, fuel, makeup, blowdown, vent and electrical connections.
- E. The boiler shall be of the single pass immersion fired design. Ligaments between the tubes shall not be less than 1". Stainless steel ENERGY X-TRACTORS shall be installed in each tube for high efficiency operation
- F. Front and rear tube sheets and all flues shall be fully accessible for inspection or cleaning when doors are swung open.
- G. Provide on the boiler an unobstructed hinged relief door with an area of 14 square inches for each cubic foot of internal flue gas volume.
- H. Front and rear doors shall be designed to be opened or closed without the use of special tools, including, but not limited to, jacks or overhead lifting devices.
- I. Observation ports shall be installed through the front door to inspect the flame.
- J. Exhaust Gas Vent shall be on top centerline, near the rear of the boiler, complete with flue gas thermometer.
- K. Handholes shall be furnished for cleaning and inspection. Number of handholes shall be in accordance with ASME requirements. A manhole shall be provided on boilers 400 HP and larger.
- L. The boiler shall be insulated with 2" of fiberglass and covered with a steel jacket. A precast hardtop walkway shall be furnished to allow personnel to walk on top of boiler without denting steel jacket.
- M. Lifting eyes shall be welded on the top of the boiler.

2.02 LOW PRESSURE STEAM BOILER TRIM

- A. Boiler trim shall include the following components:
 - 1. Combination water column and feedwater pump control with trycocks, redline gauge glass set with valves, and low water cutoff
 - 2. Second low water cutoff with manual reset
 - 3. Steam pressure gauge
 - 4. Operating steam pressure controls
 - 5. High limit steam pressure control with manual reset
 - 6. Pop safety valve(s) sized in accordance with the ASME Code

2.03 BURNER

- A. Burner and burner components shall be mounted on one easily opened hinged door. The one burner door shall also provide clear access to all fireside burner parts including tube sheets and tubes. The burner assembly shall include the following:
- a. Forced draft combustion air blower.
 - b. Air gas mixer.
 - c. One burner nozzle for each fire tube.
 - d. Pilot burner assembly.
 - e. Control panel including:
 1. Honeywell RM7800 flame safeguard with digital readout
 2. Motor starter
 3. On-Off switch and Manual-Automatic Switch
 4. Transformer
 5. Six (6) indicating lights.
 6. Air louver initiation and proving circuit in pre-ignition interlocks
 7. Remote alarm contacts for all alarm conditions
 8. Remote enabling circuit
 - f. Main and pilot gas valves and regulators.
 - g. Ignition transformer with electrode.
 - h. Flame monitoring flame rod.
 - i. Air proving switch.
 - j. High and low gas pressure switches
 - k. Flame observation ports.
 - l. The burner and controls shall conform to the requirements of IRI and CSD-1.

2.04 EMISSIONS

- A. The boiler manufacturer shall certify that at the time of start-up, the boiler shall not emit more than 30 PPM NO_x at 100% firing rate when referenced at 3% oxygen.

PART 3 – ACCESSORIES

3.01 BOILER BLOW-DOWN SEPARATOR

- A. Model No. A34B-2-5-5 with a 2" Inlet 5" Drain and 5" Vent
- B. The separator shall be constructed of welded carbon steel and designed for 250 PSIG @ 450° F. Separator vessel shall bear the ASME "UM" stamp and the National Board "U" Stamp.
- C. Connections shall be flanged type.
- D. Separator shall include a tangential inlet with stainless steel striking plate at point of impingement, a centrally located steam vent for clean quiet release of steam to atmosphere, and bottom drain fitted with a stainless steel spiral baffle.
- E. The following accessories shall be included with the separator:
- 1 Three angle legs for floor mounting.
 - 2 Automatic Aftercooler Fitting Model 18DF-5 with a 1-1/4" cooling water inlet, a temperature regulator valve, strainer, and 2" dial bimetal thermometer.

3.02 PACKAGED CHEMICAL FEED SYSTEM

- A. Model SE3000-E1-50-1 packaged chemical feed set including simplex diaphragm pump, motor driven mixer and chemical mixing and storage tank, all mounted on a structural steel stand.
- B. Pump shall be equipped with micrometer adjustable capacity, ball check valves on both suction and discharge side of pump and direct coupled drive motor.
- C. Chemical mixing and storage tank shall be constructed of polyethylene and shall be equipped with removable cover and a drain valve.
- D. Mixer shall be clamp mounted so that shaft position can be adjusted. Mixer shaft and propellor shall be Type 316 stainless steel.
- E. Chemical feed set shall be factory prepiped. Suction piping shall include PVC isolation valve and iron strainer.
- F. Furnish a ¾" corporation stop and injection quill installed in feedwater piping between feedwater pump and boiler.
- G. Furnish a Model SE-316 sample cooler. Sample soler shall be constructed of type 316 stainless steel and rated for maximum working pressure of 3500 PSI at 750°F.

PART 4 – EXECUTION

4.01 EXAMINATION

- A. Examine area to receive boiler for compliance with requirements for installation tolerances and other conditions affecting boiler performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

4.02 INSTALLATION

- A. Install boiler level and plumb, according to manufacturer's written instructions and referenced standards.
- B. Install gas-fired boilers in accordance with NFPA 54.
- C. Support boilers on 4-inch thick concrete base, 6 inches larger on all sides than base of unit. Dowel base to floor on 18" centers along perimeter of base. Cast anchor bolt inserts through the base into floor.
- D. Assemble boiler trim according to manufacturer's written instructions.
- E. Install electrical devices furnished with boiler, but not specified as factory mounted.

4.03 CONNECTIONS

- A. Connect gas piping full size to boiler gas-train inlet with union.
- B. Connect steam supply piping to boiler outlet with dual shutoff valves and flange at each connection
- C. Connect feedwater piping with shutoff valve and non-slam check valve from boiler feed pumps to boiler feedwater inlet tapping.
- D. Install piping from safety relief valves to exit building in accordance with local code.

- E. Connect breeching to boiler exhaust outlet, full size of outlet or as indicated on plans.
- F. Electrical: Comply with applicable requirements of Division 16 Sections.

4.04 FIELD QUALITY CONTROL

- A. Manufacturer's field service: Engage a factory authorized service representative to perform startup and test of boilers. Provide a written report of the startup and testing results to include the following:
 - 1. Hydrostatically test boiler and piping systems in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code and all local codes.
 - 2. Verify that the boiler is installed correctly and that all connections are in accordance with manufacturer's instructions.
 - 3. Adjust combustion in accordance with manufacturer's factory fire test data.
 - 4. Perform and record the results of boiler flue gas analysis.
 - 5. Check limits, operating controls and safeties to assure proper operation.

4.05 CLEANING

- A. Prior to placing the boilers in service, clean and flush the boilers in accordance with manufacturer's written instructions.
- B. After completing installation and prior to final acceptance, inspect exposed finish and remove burrs, dirt and construction debris. Repair damaged finishes, including chips, scratches and abrasions with manufacturer's touchup paint.

SELLERS IMMERSION FIRED
HIGH PRESSURE STEAM BOILER
SUGGESTED SPECIFICATION

PART 1. – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.07 SUMMARY

- C. This Section includes packaged, factory-assembled and tested, fuel-fired, fire-tube boilers and accessories used for high-pressure steam systems.
- D. Related Sections include the following:
 - 3. Division 15 Section “Breechings, Chimneys and Stacks” for connections to breechings, chimneys and stacks.
 - 4. Division 15 Section “Automatic Temperature Controls” for control wiring for automatic temperature control system.

1.08 SUBMITTALS

- F. Product Data: Include rated capacities; shipping, installed and operating weights, specialties furnished, and accessories for each model indicated.
- G. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, size and location of each field connection.
 - 3. Wiring Diagram: Detail wiring for power, signal and control systems. Differentiate between factory installed and field installed wiring.
- H. Factory Fire Test Report: Include motor data, amperages, setting pressures, diagram of sensing locations, combustion analysis and flue gas temperatures obtained under simulated field conditions.
- I. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- J. Maintenance Data: Include in the owners manuals complete maintenance instructions, parts list, troubleshooting instructions and wiring diagrams for each boiler.

1.09 QUALITY ASSURANCE

- G. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
 - 1. The Terms “Listed” and “Labeled”: As defined in NFPA 70, Article 100.
 - 4. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” as defined in OSHA Regulation 1910.7.

- H. ASME Compliance: Fabricate and label boilers in compliance with the ASME Boiler and Pressure Vessel Code; Section I, "Power Boilers".
- I. National Board Registration: Unit shall be hydrostatically tested and registered with the "National Board of Boiler and Pressure Vessel Inspectors." Two (2) copies of the "Manufacturers' Data Report" shall be furnished
- J. UL Compliance: Underwriters Laboratories shall approve the boiler and all components as a package.
- K. FM Compliance: Control Devices and control sequences in accordance with the requirements of FM.

Or

IRI Compliance: Control Devices and control sequences in accordance with the requirements of IRI.
- L. Comply with NFPA 70 for electrical components and installation.

1.10 COORDINATION

- B. Coordinate size and location of concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete".

1.11 WARRANTY

- C. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- D. Special Warranty: The manufacturer shall assume undivided responsibility for the boiler and burner.
 - 5 The pressure vessel shall carry a 5-year warranty against thermal shock damage. Warranty shall cover 100 % of labor and material required to repair damage such as loosened tubes, cracked ligaments or welds.
 - 6 All boiler and burner components shall carry a 5-year warranty against defects.
 - 7 The boiler manufacturer shall furnish a 5-year labor warranty to replace any defective part.
 - 8 Any refractory used in the construction of the boiler shall be warranted for 20-years from date of start up. Warranty shall cover 100% of the cost of repair or replacement.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

Sellers Engineering Co.
- D. Substitutions: Alternate but equal equipment may be offered provided written approval is obtained a minimum of ten (10) days prior to bid opening.

2.04 PACKAGED BOILERS

- N. Boiler shall have an Output of ___ LB/hour of dry saturated steam from and at 212°F at the nozzle when fired with natural gas with a minimum pressure of ___ inwc (PSI).
- O. Boiler shall be built to the requirements of the ASME Boiler and Pressure Vessel Code for a maximum allowable working pressure of ___ PSI.
- P. Electrical power available will be ___ Volts, ___ Hertz, ___ Phase
- Q. Boiler overall dimensions shall not exceed ___ wide X ___ long X ___ high.
- R. Boilers shall be factory assembled and wired to require only supply, fuel, makeup, blowdown, vent and electrical connections.
- S. The boiler shall be of the single pass immersion fired design. Ligaments between the tubes shall not be less than 1". Stainless steel ENERGY X-TRACTORS shall be installed in each tube for high efficiency operation
- T. Front and rear tube sheets and all flues shall be fully accessible for inspection or cleaning when doors are swung open.
- U. Provide on the boiler an unobstructed hinged relief door with an area of 14 square inches for each cubic foot of internal flue gas volume.
- V. Front and rear doors shall be designed to be opened or closed without the use of special tools, including, but not limited to, jacks or overhead lifting devices.
- W. Observation ports shall be installed through the front door to inspect the flame.
- X. Exhaust Gas Vent shall be on top centerline, near the rear of the boiler, complete with flue gas thermometer.
- Y. Handholes shall be furnished for cleaning and inspection. Number of handholes shall be in accordance with ASME requirements. A manhole shall be provided on boilers 400 HP and larger.
- Z. The boiler shall be insulated with 2" of fiberglass and covered with a steel jacket. A precast hardtop walkway shall be furnished to allow personnel to walk on top of boiler without denting steel jacket.
- AA. Lifting eyes shall be welded on the top of the boiler.

2.02 HIGH PRESSURE STEAM BOILER TRIM

- B. Boiler trim shall include the following components:
 - 7. Combination water column and feedwater pump control with trycocks, redline gauge glass set with valves, and low water cutoff
 - 8. Float type second low water cutoff with manual reset
 - 9. Steam pressure gauge
 - 10. Operating steam pressure controls
 - 11. High limit steam pressure control with manual reset
 - 12. Pop safety valve(s) sized in accordance with the ASME Code

2.05 BURNER

- B. Burner and burner components shall be mounted on one easily opened hinged door. The one burner door shall also provide clear access to all fireside burner parts including tube sheets and tubes. The burner assembly shall include the following:
- m. Forced draft combustion air blower.
 - n. Air gas mixer.
 - o. One burner nozzle for each fire tube.
 - p. Pilot burner assembly.
 - q. Control panel including:
 - 9. Honeywell RM7800 flame safeguard with digital readout
 - 10. Motor starter
 - 11. On-Off switch and Manual-Automatic Switch
 - 12. Transformer
 - 13. Six (6) indicating lights.
 - 14. Air louver initiation and proving circuit in pre-ignition interlocks
 - 15. Remote alarm contacts for all alarm conditions
 - 16. Remote enabling circuit
 - r. Main arid pilot gas valves and regulators.
 - s. Ignition transformer with electrode.
 - t. Flame monitoring flame rod.
 - u. Air proving switch.
 - v. High and low gas pressure switches
 - w. Flame observation ports.
 - x. The burner and controls shall conform to the requirements of IRI and CSD-1.

2.04 EMISSIONS

- A. The boiler manufacturer shall certify that at the time of start-up, the boiler shall not emit more than 50-PPM NO_x at 100% firing rate when referenced at 3% oxygen.

PART 3 – ACCESSORIES

3.01 BOILER BLOW-DOWN SEPARATOR

- F. Model No. ____ with a ____" Inlet ____" Drain and ____" Vent
- G. The separator shall be constructed of welded carbon steel and designed for 250 PSIG @ 450° F. Separator vessel shall bear the ASME "UM" stamp and the National Board "U" Stamp.
- H. Connections shall be flanged type.
- I. Separator shall include a tangential inlet with stainless steel striking plate at point of impingement, a centrally located steam vent for clean quiet release of steam to atmosphere, and bottom drain fitted with a stainless steel spiral baffle.
- J. The following accessories shall be included with the separator:
- 3 Three angle legs for floor mounting.
 - 4 Automatic Aftercooler Fitting Model 18DF-5 with a 1-1/4" cooling water inlet, a temperature regulator valve, strainer, and 2" dial bimetal thermometer.

3.02 PACKAGED CHEMICAL FEED SYSTEM

- A. Model SE3000-E1-50-1 packaged chemical feed set including simplex diaphragm pump, motor driven mixer and chemical mixing and storage tank, all mounted on a structural steel stand.
- B. Pump shall be equipped with micrometer adjustable capacity, ball check valves on both suction and discharge side of pump and direct coupled drive motor.
- C. Chemical mixing and storage tank shall be constructed of polyethylene and shall be equipped with removable cover and a drain valve.
- D. Mixer shall be clamp mounted so that shaft position can be adjusted. Mixer shaft and propeller shall be Type 316 stainless steel.
- E. Chemical feed set shall be factory prepiped. Suction piping shall include PVC isolation valve and iron strainer.
- F. Furnish a ¾" corporation stop and injection quill installed in feedwater piping between feedwater pump and boiler.
- G. Furnish a Model SE-316 sample cooler. Sample cooler shall be constructed of type 316 stainless steel and rated for maximum working pressure of 3500 PSI at 750°F.

PART 4 – EXECUTION

4.01 EXAMINATION

- B. Examine area to receive boiler for compliance with requirements for installation tolerances and other conditions affecting boiler performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

4.02 INSTALLATION

- F. Install boiler level and plumb, according to manufacturer's written instructions and referenced standards.
- G. Install gas-fired boilers in accordance with NFPA 54.
- H. Support boilers on 4-inch thick concrete base, 6 inches larger on all sides than base of unit. Dowel base to floor on 18" centers along perimeter of base. Cast anchor bolt inserts through the base into floor.
- I. Assemble boiler trim according to manufacturer's written instructions.
- J. Install electrical devices furnished with boiler, but not specified as factory mounted.

4.03 CONNECTIONS

- G. Connect gas piping full size to boiler gas-train inlet with union.
- H. Connect steam supply piping to boiler outlet with dual shutoff valves and flange at each connection

- I. Connect feedwater piping with shutoff valve and non-slam check valve from boiler feed pumps to boiler feedwater inlet tapping.
- J. Install piping from safety relief valves to exit building in accordance with local code.
- K. Connect breeching to boiler exhaust outlet, full size of outlet or as indicated on plans.
- L. Electrical: Comply with applicable requirements of Division 16 Sections.

4.04 FIELD QUALITY CONTROL

- B. Manufacturer's field service: Engage a factory authorized service representative to perform startup and test of boilers. Provide a written report of the startup and testing results to include the following:
 - 6. Hydrostatically test boiler and piping systems in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code and all local codes.
 - 7. Verify that the boiler is installed correctly and that all connections are in accordance with manufacturer's instructions.
 - 8. Adjust combustion in accordance with manufacturer's factory fire test data.
 - 9. Perform and record the results of boiler flue gas analysis.
 - 10. Check limits, operating controls and safeties to assure proper operation.

4.05 CLEANING

- C. Prior to placing the boilers in service, clean and flush the boilers in accordance with manufacturers written instructions.
- D. After completing installation and prior to final acceptance, inspect exposed finish and remove burrs, dirt and construction debris. Repair damaged finishes, including chips, scratches and abrasions with manufacturer's touchup paint.