Specifier, please select the desired project-specific product features and equipment options, which are highlighted in red.

SAMPLE SPECIFICATION FOR STAINLESS STEEL GAS CONDENSING BOILERS

ABSOLUTE BOILERS INC, ABSOLUTE **SPIRE** CONDENSING BOILER WITH HONEYWELL CONTROL

PART 1 - GENERAL DESCRIPTION

1.01 QUALITY

A. It is essential that the equipment complies with the requirements of this specification, performs as specified, and is the manufacturer's standard commercial product, unless otherwise specified.

B. Electrically operated components specified are to be “Listed” and/or “Labeled” as defined by NFPA 70, Article 100.

C. The boiler pressure vessel must be constructed in accordance with ASME Section IV Code and bear the "H" stamp and shall be manufactured within an ISO 9001 Certified facility to ensure high quality standards. Electrical connections, and vent connection, designed and constructed to Section IV, ASME Code and UL certification.

D. The boiler must be UL certified to the ANSI Z21.13 / CSA 4.9 standard for Gas Fired Low Pressure Steam and Hot Water Boilers and shall have the UL label affixed.

E. Boiler must be AHRI listed and certified in accordance with the Commercial Boiler program and the BTS-2000 testing standard and is required to undertake a Full Function Factory Fire Test before shipping out.

F. Boiler is required to be registered with the National Board directly from the manufacturing facility.

G. The manufacturer is required to provide, upon request, all quality assurance documentation and the results of the Full Function Factory Fire Test corresponding to the boiler's serial number.

H. Boiler(s) is to be test fired prior to shipping including all safety circuits tested. Combustion parameters and operating sequence to be factory tested requiring only site-specific adjustments and project specified set points.

DRAFT

Specifier, please select the desired project-specific product features and equipment options, which are highlighted in red.

1.02 PERFORMANCE

A. Boiler rated output in BTU indicated on the schedule and the boiler rating plate with efficiency confirmed by AHRI.

B. Achieving ultra-high efficiency shall be possible by optimizing all factors of the condensing process including lower return temperatures, lowering overall system temperature while reducing modulation rate.

C. The thermal efficiency of the boiler shall be no less than (Model SP500 – 96.5%, SP800 – 98.4%, SP1000 – 97.4%, SP1500 – 97.8%, SP2000 – 97.8%, SP3000 – 98.1%, SP4000 – 97.1%, SP5000 – 97.2%, SP6000 – 97.7%, SP8000 – 97.6%).

D. Combustion efficiency will not be accepted as “boiler or thermal efficiency”

E. Flue gas temperature leaving the boiler not to exceed 230 F.

1.03 BOILER DESIGN

A. Basis of design is Absolute “SPIRE” High efficiency condensing fully stainless-steel boiler supplied by “Rep Name”.

B. The boiler shall be an ultra-high efficiency condensing boiler, featuring a pressure vessel constructed from 316L stainless steel and designed with water tubes.

C. The boiler shall be designed for a maximum allowable working pressure of 160 PSIG and a maximum allowable temperature of 210 F.

D. Each space heating boiler shall be model Absolute Spire; fire tested, assembled and shipped as a factory “packaged” unit, complete with boiler jacket, burner and controls mounted & wired into the boiler, gas train manifold and all components and accessories including boiler trim required for an operable boiler.

E. The “packaged” boiler will be hydrostatically tested with headers attached, inspection of the pressure gauge and visually verified no leaks are found.

F. The heat exchanger construction must be of helical, multi-channel manifold tubes technology with large internal tube diameters to allow lowest water pressure drop facilitated by circulation of water.

G. The water connections will be positioned at the top of the boiler, while the flue gas exhaust will be located at the rear. The combustion air intake and incoming gas connection will be situated on the right side of the boiler

DRAFT

H. Additionally, the boiler(s) will be equipped with a factory-supplied, oversized ASME relief valve.

I. The heat exchanger must have no less than the total fireside heating surface area defined below:

	SP500	SP800	SP1000	SP1500
Heating Surface Area, ft^2	39.1	60.9	75.4	98.6

	SP2000	SP3000	SP4000	SP5000
Heating Surface Area, ft^2	153.19	188.54	402.93	402.93

	SP6000	SP8000
Heating Surface Area, ft^2	487.12	487.12

J. Boiler Footprint shall not exceed dimensions listed below.

	SP500	SP800	SP1000	SP1500
Boiler Footprint, ft^2	6.9	8.1	9.3	10.6

	SP2000	SP3000	SP4000	SP5000
Boiler Footprint, ft^2	16.4	18.4	30.2	30.2

	SP6000	SP8000
Boiler Footprint, ft^2	34.3	34.3

K. The boiler must be of a horizontal design with a hinged front door to allow full access to the combustion chamber and the burner for inspection and cleaning. The boiler(s) will consist of one (1) horizontal stainless steel water tube heat exchanger, one (1) combustion blower, one (1) burner assembly and one (1) gas train manifold. No multiple heat exchangers, blowers, burners integral or otherwise are accepted.

L. Each boiler shall include an integral stainless-steel condensate pan/collector, condensate drain, removable burner assembly, and boiler trim mentioned in the boiler trim section.

DRAFT

M. Boiler supply/return headers shall be of groove lock style for left side or right-side attachment to system piping.

N. The boiler shall be capable of a 10:1 configuration. The standard 10:1 turndown ratio shall be achieved using the Honeywell Sola commercial boiler controller, EBM fan and Dungs “zero-governor” gas valve. Lower turndown ratios will not be accepted.

O. The boiler shall be using Natural Gas only as its approved fuel.

P. The electrical input to the boiler shall be (Model SP500 – 120V/1PH/60HZ, Models SP800 - SP2000 240V/1PH/60HZ, Models SP3000 - SP8000 – 480V/3PH/60HZ).

Q. The boiler will have fork pockets and longitudinal rails underneath to allow rolling on a level surface, if necessary. Crane lifting lug locations will be affixed to the pressure vessel. Final leveling of the boiler will be achieved by adjusting the supplied leveling feet.

R. The boiler shall be capable of variable primary or primary/secondary piping arrangements.

S. The boiler shall be designed to operate in condensing mode at all firing rates in order to extract the latent heat from the combustion products of natural gas. A PVC condensate trap shall be supplied to allow for attachment to the field supplied condensate neutralization unit(s).

1.04 BOILER TRIM

A. The following ancillary components shall be installed and tested:

i) A probe type, low water cutoff control must include a manual test button, reset and fault indication.

ii) High Limit Aquastat, non-recycling, preset at 210F, adjustable for lower temperature designs.

iii) Two supply thermistors for control of modulation and maximum water temperature in one probe located inside a dry sensor well.

iv) Return temperature thermistor for PID calculations and delta T limit located in a dry sensor well.

v) ASME Rated pressure relief valve (PRV). Relief valve pressure shall be specific psi rating for each system application.

DRAFT

vi) Flow Switch on return header, preset, to lowest allowable flow rate

vii) Automatic air vent shall be opened on the supply header during commissioning to assist air removal. This is not a system air vent and shall be closed at the end of commissioning.

viii) Boiler pressure and temperature gauge (Tridicator) shall be minimum 3" diameter mounted on the supply header

1.05 BURNER

A. The boiler manufacturer must provide a complete fuel burner system with every boiler. This system includes an integral pre-mix style stainless steel mesh gas burner, a combustion blower for mixing air with fuel, main gas valve train, and an ignition system.

B. The burner manufacturer must ensure it works well with the boiler's heat exchanger and the control system to meet the needed power, efficiency, and performance standards. Boilers that do not include an integrated burner will not be accepted.

C. Combustion shall take place inside an enclosed heat exchanger under positive pressure. The air and fuel to be premixed in the EBM Papst fan with fuel metering adjusted by the Karl Dungs gas valve.

D. The 10:1 air fuel ratio system shall achieve combustion within +-1% oxygen through the firing range without the use of O2 trim, air or gas servos. The fan shall have RPM feedback as a safety measure to ensure fan performance is always within specified limits. VFD motor shall be inverter duty rated.

E. Burner tube shall be constructed of stainless-steel fiber mesh for solid body radiation of the burner flame installed horizontally inside the combustion chamber. Combustion shall take place on the surface of the burner mantle, which shall be constructed of a woven SS alloy material creating a 360-degree low temperature radiant flame. Reduction of NOx not exceeding 20 ppm to be achieved by only mesh burner design.

F. A permanent observation port shall be provided in the burner to allow observation of both spark ignition and the main flame. Flame detection for the 10:1 burner shall be an ionization rod.

G. As a minimum, the gas train shall meet the requirements of cULus and ASME CSD-1 and shall be installed and tested gas tight prior to shipping. Retesting required during commissioning.

DRAFT

i) Low Gas Pressure Interlock, manual reset.
ii)High Gas Pressure Interlock, manual reset.
iii) Upstream and downstream manual test ports
iv) Appliance test firing valve and main shut off valve
v) Unibody, motorized double safety gas valve-regulator combination
vi) Union connection to permit burner servicing.

1.06 CONTROLS

A. The Boiler shall include Honeywell Sola Commercial S7999 control including the 7" Honeywell HMI to display the supply temperature, return temperature, and set-point temperature at all times. Utilizing the stock Honeywell Commercial Sola, no added programming or extraneous device shall be required to operate the boiler. Honeywell factory programming shall allow full access to the Modbus registry for local and remote diagnostics.

B. The control shall allow for user input of either temperature or rate of modulation to optimize performance. Combustion fan reaction time shall allow adjustment to tune the boiler's performance to the system.

C. The "all in one" flame safeguard/boiler management control shall meet all UL/CSA and NFPA requirements for fully automatic boiler control with pre-ignition, ignition and running interlocks including self-checks. Boiler wiring to meet UL certification requirements as per ANSI Z21.13 and CSA 4.9

D. Diagnostics to include: Real time data logging of flame signal, boiler modulation and temperatures. The control shall be connected to a color touchscreen display interface that will retrieve lockout history information and allow user and service access to all diagnostic information.

E. The boiler control shall be fully accessible on a pull-out drawer slide from the front. Wiring to the panel must be completed as per Honeywell Sola Schematics without deviation. All wires terminated from external devices shall be wired directly to the pull-out electrical panel and any junctions clearly labeled.

F. Each boiler must have most common lock-out code chart & cause / check points adhered to the internal boiler casing for simplified serviceability

G. Commissioning setpoints is the responsibility of the installer. The display shall be highlighted in yellow when these settings need to be reconsidered. A yellow highlight will describe the parameter that is not achieved in the time allocated such as temperature, fan RPM or other load-based factors to allow for system tuning.

DRAFT

H. Accessory programming and terminals shall include space heating pump(s), isolation valve, start permissive interlock, boiler primary pump, DHW pump

I. Electrical power shall be provided by a single source to the boiler and disconnect switch. The boiler shall have an internal junction box containing the control transformer when required to provide the 120 VAC for the control circuits and 24 vac for the low voltage devices.

1.07 BUILDING AUTOMATION

A. The boiler control must be able to communicate to a Modbus network cascading up to 8 boilers connected to one Master, seven Slaves, staged, rotated and modulated as a single boiler plant.

B. Boiler control(s) shall monitor outdoor temperature, supply water temperature, return water temperature, and shall communicate between boilers via RS-485 (serial) communication network.

C. The boilers shall be able to communicate to a building management system as either stand-alone boiler(s) or be programmed using a single master to communicate with the cascaded slaves. The boilers shall be able to run autonomously as stand-alone or cascaded to preset or outdoor reset temperature. A local remote switch shall be provided on boilers as an option at time of ordering

D. If BACnet is preferred a conversion module shall be made available from the boiler manufacturer as an option with a minimum preset nodes for either the master or the individual stand-alone boilers.

1.08 DELIVERY, STORAGE, HANDLING AND INSTALLATION

A. Installation of the boilers shall be by the Division 15 Contractor. Field electrical work shall be by Division 16. Control and automation work shall be coordinated by Division 25.

B. The manufacturer’s field service representative shall approve installation and shall be present to supervise start up, commissioning and to instruct operators; all activities will be organized on different dates at owner’s discretion.

C. The boiler pressure vessel shall be warranted against damage for a period of 5 years from the date of shipment, provided the boiler is operated and maintained in accordance with the conditions specified in the Owner’s Operating and Maintenance Manual.

DRAFT

D. Receive equipment and add-ons in the packaging provided by the Factory. Check for any signs of damage. Ensure the boiler is kept in horizontal position from time of delivery to final installation.

E. During storage, all equipment should be shielded from outside factors such as wet or freezing weather conditions, construction work at the job site. Protect the equipment from harm by keeping the packaging intact until it's put into use.

F. Ensure the water meets the manufacturer's specified quality standards by providing the necessary water treatment.

1.09 START UP

A. Manufacturer's representative to provide maintenance and operating instructions to the installing contractor with a detailed start up procedure for review and approval two months prior to start-up.

1.10 COMMISSIONING

A. The commissioning agent will be provided with factory start-up reports and procedures to return to the factory for review. The manufacturer's representative will ensure the warranty is activated and communicate this to the owner with terms and conditions.

1.11 TRAINING

A. The Manufacturer's Representative shall be responsible for providing on-site training to the Owner's representatives for daily inspections, weekly inspections, monthly and annual service.

B. Training available to include full review of all components including but not limited to a full boiler internal inspection, construction details, burner operation, maintenance, flame characteristics, and adjustments, gas train maintenance, boiler normal operation, abnormal events, normal shut-down, emergency shut-down and setting up controls.

DRAFT

1.12 WARRANTY

A. The boiler manufacturer must warrant each boiler, including boiler, trim, boiler control system, and all related components, accessories, to be free of defects in material and workmanship for a period of twelve (12) months from date of shipping invoice date.

B. The boiler manufacturer must warrant the boiler's pre-mix burner head for a period of two (2) years from installation date, or two (2) years plus three (3) months from shipping invoice date.

C. The boiler manufacturer must warrant the boiler's stainless steel heat exchanger to be free of defects in material and workmanship and against failure due to thermal shock for a period of five (5) years from the installation date, or five (5) years plus three (3) months from shipping invoice date.

1.13 ACCEPTANCE

D. The Manufacturer shall demonstrate the full range of controls, operating functions and compliance with performance criteria.

E. The commissioning report shall be approved by the Owner or Owner's representative or Engineer of record prior to the turnover of the hot water boiler(s) to the Owner.

F. Following completion of the boiler(s) commissioning a copy of the documents must be supplied for the Owner's record files, installing contractor and Engineer of record to initiate warranty period.

G. The Owner/Consultant shall accept the requirement if the field and factory run performance test procedures and results are in conformance with ASME and local governing authority standards. If the equipment fails to perform within allowable tolerances, the manufacturer shall be responsible to make the necessary revisions to the equipment and retest as required until conformance is achieved.

-- END OF SPECIFICATION --

DRAFT