



**TYPICAL SPECIFICATIONS FOR: ADVANTUS™
HYDRONIC HEATING BOILERS
MODELS AV(H)0500 – AV(H)4000**

Hydronics Ltd.

The heating boiler shall be a Camus® ADVANTUS™ model _____ having an input rating of _____ Btu (kW)/hr. and _____ Btu (kW)/hr output for hydronic heating.

The hydronic heating boiler shall be design certified by CSA International and shall meet the requirements of ANSI Z21.13, and CSA 4.9. The heating boiler shall be vented as a Category II or IV condensing appliance.

Performance Overview:

- Boiler shall operate with up to 99% thermal efficiency
- Heat exchanger shall be a fully condensing, cylindrical, vertical, two-pass, counter-flow, fire tube design with 304L/316L grade stainless steel construction and all welded design with constant allowable system return temperatures of 40F.
- Fine-tuned combustion premix providing homogeneous air and gas combustion mix to a radial burner incorporating a knitted stainless steel wrap ensuring stable light off and efficient clean combustion.
- Up to 25:1 gas input turn down ratio while maintaining excess air levels and sustaining condensing efficiencies throughout entire modulating range
- Oxides of Nitrogen (NOx) of 9 ppm corrected to 3% oxygen.
- Category II and IV venting options.
- The boiler is fully factory fire tested to obtain optimum combustion characteristics and to establish certified gas input rates.
- System safety and operating devices and controls are fully configured, calibrated and factory tested.
- Models consist of an input range of 450 MBTUH to 4000 MBTUH
- The boiler shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard.

Heat Exchanger:

The heat exchanger shall be designed, inspected, and tested to A.S.M.E. Section IV requirements. The A.S.M.E. Section IV seal of approval will not be provided as standard for jurisdictions not requiring the A.S.M.E Section IV seal of approval. The heat exchanger shall be of fully welded construction and have a maximum working pressure of 160 psig (1100 kPa). Configuration shall be a cylindrical, vertical, two-pass, counter-flow, fire tube design and consist of an integral combustion chamber with an inner tube bundle for primary heat transfer and an outer tube bundle for extracting latent heat from flue gases. The combustion chamber, fire tubes, and tube sheets shall be constructed of 316L stainless steel. The remainder of the heat exchanger shall be constructed of 304L stainless steel. The fire tubes shall be of an oval design with a minimum wall thickness of 0.061". The upper and lower tube sheets shall have a thickness of no less than 0.25". The heat exchanger design shall be capable of 40°F constant system return temperatures and be fully condensing complete with condensate trap and drains. A pressure relief valve of _____ lb/hr shall be furnished with the heater.

Combustion Chamber:

The combustion chamber shall be an all welded stainless steel construction and an integral part of the heat exchanger. The combustion chamber shall incorporate an easily removable radial fired knitted fiber stainless steel burner to access the internal combustion chamber for inspection, service, and cleaning. A window view port shall be provided for visual inspection of the boiler combustion during firing.

Gas Train:

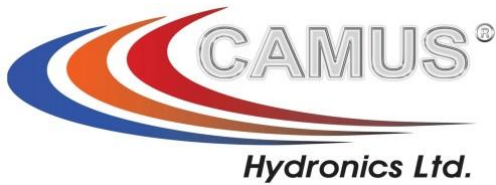
The gas train shall consist of a pressure regulating electro-hydraulic proportional air/gas main gas actuator providing a slow opening, fast closing shutoff valve and proportional 1:1 air/gas ratio control, a fast closing safety shutoff gas pressure regulator with 1/2 PSI allowable static pressure, a low gas pressure switch, and a high gas pressure switch (Models AV3000 – AV4000). Optional high gas pressure switch is available for Models AV0500 - AV2500. A factory pre-set combination metering valve and orifice shall be provided for setting combustion parameters.

Burner/Combustion:

The combustion air fan(s) draws gas under negative pressure and mixes it with air to generate a fine tuned air gas mixture which is delivered under positive pressure to the radial knitted stainless steel burner. Combustion modulation is established by either a pulse width modulation signal on models (AV0500 – AV0600) or by a variable frequency drive on models (AV0800 – AV4000). The burner shall be a 100% stainless steel vertical mounted radial fired type with stainless knitted metal fiber construction. The burner shall combust a precise amount of premixed combustion air and gas to provide equal distribution of heat for heat transfer throughout the entire heat exchanger. Combustion products are exhausted under minimum back pressure. Combustion operates with a minimum 10:1 turn down ratio on models AV0500 – AV0600, a minimum of 22:1 turn down ratio on models AV0800 – AV1800 and a minimum 25:1 turn down ratio on models AV2000 – AV4000 while sustaining combustion characteristics throughout the entire modulating range. Operation of up to 99% thermal efficiency and shall be certified for Oxides of Nitrogen (NOx) of 9 ppm corrected to 3% oxygen.

Firing Mode:

The burner combustion shall operate as proportional modulating with a minimum 10:1 turndown ratio with a minimum 10% firing rate on models AV0500 – AV0600. The burner combustion shall operate as proportional modulating with a minimum 22:1 turndown ratio with a minimum 4.5% firing rate on models AV0800 – AV1800 and a minimum 25:1 turndown ratio with a minimum 4.0% firing rate on models AV2000 – AV4000. Multiple boiler "Cascade" firing algorithms are proportional modulation. Light off shall be at no more than 50% input to assure rumble free soft start. Combustion shall be optionally suitable for natural gas, propane and dual fuel operation.



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Controls:

Standard controls include a SOLA electronic proportional integrated combination ignition limit/operator control accurate to 1°F (0.5°C) having a 4-20 mA output signal suitable for control of a variable frequency motor drive or a pulse width modulation signal output for modulating fan speeds. Controls are lead lag "Cascade" ready for control of up to eight boilers c/w indoor outdoor reset and lead lag control. Control shall be equipped and ready with 4-20 mA or 0-10Vdc input for remote set point or modulating control. Control is BMS Modbus RTU protocol ready and capable of other alternate protocol conversions with additional optional gateway protocol converter. Control shall be supplied with a 7" mounted touchscreen display which shall also provide for control system configuration and set up, readouts of boiler target, differential and inlet/outlet temperatures as well as accumulated runtime, enunciator diagnostics, and firing rates. The complete control package shall be mounted on the front panel with a hinged door for easy access to all control modules. The boiler safety control string shall be furnished with controls for low gas pressure, optional high gas pressure, fan air proving, blocked flue, water pressure, high limit, stack limit and flow switch. A flow switch and relief valve shall be provided for each unit. Additional control safeties shall include flue gas stack temperature, flame rectification, fan speed, and auto recycling high limit.

Ignition Module:

The ignition module shall employ a direct igniter with 3 tries for ignition followed by lockout for AV0500 – AV2500. A proven pilot is used on AV3000 – AV4000. Trial for ignition shall proceed with 15 seconds between retries. Ignition control shall include times for pre-purge, pre-ignition, ignition, and post purge.

Venting Options

The following venting options shall be utilized:

- Category II Venting – single or combined vent*
- Category IV Outside Air (Horizontal & Vertical)
- Category IV Direct Venting (Horizontal & Vertical)
- Outdoor Venting
- Category II & IV Direct Venting

* Category II combined vent shall only employ an engineered designed vent system prepared by a certified vent manufacturer

The following category II and IV optional vent materials shall be utilized

UL/ULC Listed

- Stainless or AL29-4C for all system applications
- PPE or polypropylene for all system applications
- CPVC for domestic hot water systems and select low temperature heating systems – consult factory

External Jacket and Fasteners:

The external jacket shall be of 430 stainless steel mirror finish panels and a powder paint coated access top cover assembled utilizing interference fit locks and minimal non-strip self-tap screws for ease of removal and access to the heat exchanger and combustion air / gas control.

Water Content

Model	Water Content (Gal)
0500	17.5
0600	17.5
0800	34.4
1000	34.4
1200	67.5
1400	67.5
1600	55.0
1800	55.0
2000	72.5
2500	72.5
3000	105.0
3500	105.0
4000	105.0

Input & Output

Model	Maximum Input [MBTU/hr]	Maximum Output [MBTU/hr]
0500	450	425
0600	600	567
0800	800	749
1000	1000	936
1200	1200	1123
1400	1400	1310
1600	1600	1498
1800	1800	1685
2000	2000	1900
2500	2500	2375
3000	3000	2850
3500	3500	3325
4000	4000	3800

Voltage Requirement

Model	Voltage Requirement
500 - 2000	115VAC, 1, 60Hz
800 – 2000 ^Δ	208/230VAC, 60Hz, 1 Phase*
2500-3500	208/230VAC, 60Hz, 1 Phase*
800-3500 ^Δ	208/230VAC, 60Hz, 3 Phase**
4000	208/230VAC, 60Hz, 3 Phase**
800 - 4000 ^Δ	460VAC, 60Hz, 3 Phase

*This is a 4-wire power supply requiring two (2) lives, a neutral and a ground

**This is a 5-wire power supply requiring three (3) lives, a neutral and a ground

^Δ Optional power supply available upon request



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Heat Exchanger Head Loss & Flow

Model	10°F Rise		20°F Rise		40°F Rise		60°F Rise	
	(Minimum Input)		(Maximum Input)		(Maximum Input)		(Maximum Input)	
	US GPM	ΔP-Ft.	US GPM	ΔP-Ft.	US GPM	ΔP-Ft.	US GPM	ΔP-Ft.
500	N/A	N/A	47.2	1.8	23.6	0.5	15.7	0.2
600	N/A	N/A	56.6	2.6	28.3	0.6	18.9	0.3
800	6.6	0.03	74.8	4.5	37.4	1.1	24.9	0.5
1000	8.2	0.05	93.4	7.0	46.7	1.8	31.2	0.8
1200	9.9	0.02	112.2	2.0	56.1	0.5	37.4	0.2
1400	11.5	0.02	130.8	2.7	65.4	0.7	43.6	0.3
1600	13.2	0.03	149.6	3.9	74.8	0.8	49.9	0.4
1800	14.8	0.04	168.2	4.4	84.1	1.2	56.1	0.5
2000	16.5	0.05	189.8	5.6	94.9	1.4	63.2	0.6
2500	20.6	0.07	237.2	8.8	118.6	2.2	79.1	1.0
3000	24.7	0.01	284.6	1.6	142.3	0.4	95.0	0.2
3500	28.9	0.02	332.0	2.2	166.0	0.6	110.7	0.3
4000	33.0	0.02	379.4	2.9	189.7	0.7	126.5	0.3

Vent Sizes

Model	Air Inlet Filter Ø "L" – As Shipped [in.]	Air Inlet Ø up to 100 ft. Equiv. Length	Ø Dim. "V" [in.] Vent - As Shipped	Req'd Vent Ø Dim. CAT IV up to 100ft Equiv. Length [in.]	Req'd Vent Ø Dim. "V" [in.] Vent CAT. II
500	6	5	5	5	6
600	6	5	5	5	6
800	8	6	6	6	6
1000	8	6	6	6	7
1200	10	6	7	7	8
1400	10	6	7	7	8
1600	10	8	8	7	9
1800	10	8	8	8	10
2000	12	8	9	8	10
2500	12	8	9	9	10
3000	12	10	10	9	10
3500	12	10	10	10	12
4000 (Natural Gas)	12	10	10	10	12
4000 (Propane)	12	10	10	10	14

SUBMITTAL DATA SHEET – ADVANTUS™ – HYDRONIC HEATING

Engineer: _____
 Prepared by: _____
 Job Name: _____

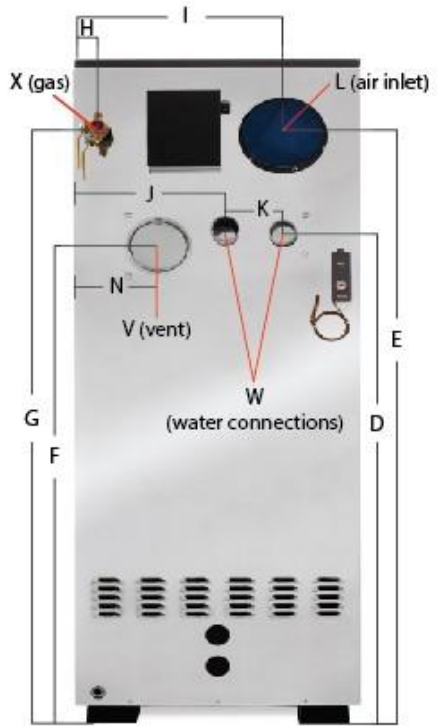
Job Location: _____ Date: _____
 Quote #: _____
 Buyer's Name: _____
 Buyer's Address: _____



FRONT VIEW



SIDE VIEW



BACKVIEW

Model	"A" [in.]	"B" [in.]	"C" [in.]	"D" [in.]	"E" [in.]	"F" [in.]	"G" [in.]	"H" [in.]	"I" [in.]	"J" [in.]	"K" [in.]	"M" [in.]	"N" [in.]	"P" [in.]	"R" [in.]	"W" [Øin.] Water	"X" [Ø in.] Gas	Weight [lbs.]
500	29 ½	34	60	39 ½	54 ½	37 ½	50	9 ½	21 ½	15	6	19 1/8	9 ½	22 ½	37 ½	2	1	830
600	29 ½	34	60	39 ½	54 ½	37 ½	50	9 ½	21 ½	15	6	19 1/8	9 ½	22 ½	37 ½	2	1	860
800	30	34	83	61	74	59 ½	68 ½	4	21 ½	15 ½	6	19	9	22	37 ½	2	1	1000
1000	30	34	83	61	74	59 ½	68 ½	4	21 ½	15 ½	6	19	9	22	37 ½	2	1	1100
1200	30	42	83	59	75	57	67	4	21 ½	15 ½	6	19	7 ½	22	45 ½	2 ½	1	1460
1400	30	42	83	59	75	57	67	4	21 ½	15 ½	6	19	7 ½	22	45 ½	2 ½	1 ¼	1500
1600	30	42	83	54 ½	75	51	63	4	21 ½	16 ½	6	23	7 ½	22	45 ½	3	1 ¼	1640
1800	30	42	83	54 ½	75	51	63	4	21 ½	16 ½	6	23	7 ½	22	45 ½	3	1 ¼	1700
2000	30	42	93	63 ½	80	60	72	4	22	16 ½	6	23	7 ½	22	45 ½	3	1 ¼	1900
2500	30	42	93	63 ½	80	60	72	4	22	16 ½	6	23	7 ½	22	45 ½	3	1 ½	2200
3000	35	47	101	66	90	62	78	5 ½	26	5 ½	24	23	17 ½	27 ½	50	3	1 ½	2500
3500	35	47	101	66	90	62	78	5 ½	26	5 ½	24	23	17 ½	27 ½	50	4	2	2700
4000 (Natural Gas)	35	47	101	66	90	62	78	5 ½	26	5 ½	24	23	17 ½	27 ½	50	4	2 ½	3000
4000 (Propane)	35	47	101	66	90	62	78	5 ½	26	5 ½	24	23	17 ½	27 ½	50	4	2	3000

Model # _____ # Of Units _____ Type of Gas _____

Total Input _____ BTU/hr Flow _____ USGPM @ Allowable Pressure Drop _____ ft.

Total Output _____ BTU/hr

Optional Accessories _____