
ADDENDUM No. 2

PROJECT: New Boiler Plant Project
OWNER: State of Delaware, Delaware Army National Guard
OWNER PROJ No: 05-2016
ENGINEER: Concord Engineering
CE PROJ No: 1C15580.00
ISSUE DATE: September 2, 2016

All Bidders:

The below information is to notify all bidders furnishing labor and/or materials for the above-referenced project of items of revision or clarification for this contract.

GENERAL COMMENTS

Please remember to utilize the revised bid form which was provided as an attachment to Addendum #1.

SUBSTITUTION REQUESTS

1. Camus Advantus AVNH-2000

Response: The substitution has been approved by the EOR. Please see the attached documentation for the boiler.

QUESTIONS

1. No summary of work was provided within the project specifications.

Response: Please see the attached specification, 011000 Project Summary, to be added to the project specifications.

ATTACHMENTS

011000 Project Summary
Camus Boiler Product Information

Bidders shall acknowledge receipt of this addendum in accordance with the requirements of the Specifications. This Addendum is respectfully submitted by:

DEARNG New Boiler Plant Project
Addendum No. 2
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CONCORD ENGINEERING



Chris Sylvia, MBA, CMVP
Project Manager, Building Solutions Department

cc: M. Orndorff, DEARNG
W. Davis, DEARNG
Project File

SECTION 011000 – PROJECT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. Building Permits, Temporary Certificates of Occupancy, Certificates of Occupancy.
- 4. Phased construction.
- 5. Work under separate contracts.
- 6. Access to site.
- 7. Coordination with occupants.
- 8. Work restrictions.
- 9. Specification and drawing conventions.
- 10. Miscellaneous provisions.

- B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: District Equipment Replacement Project.

- 1. Project Location
 - a. 250 Airport Road, New Castle, DE

- B. Owner: Delaware Army National Guard

- 1. Owner's Representative: William Davis & Marc Orndorff

- C. Engineer: Concord Engineering, 520 S. Burnt Mill Road, Voorhees, NJ 08043.

- 1. Engineer's Representative: Mr. Chris Sylvia, MBA, Project Manager.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
1. **Boiler Installation:** Work includes the installation of two condensing boilers to augment the heating system capacity during extreme cold weather. The boilers will be located in the vehicle maintenance bay located directly next to the existing mechanical room. The contractors are required to provide all work required for execution including but not limited to; mechanical, electrical, plumbing, concrete, roofing, insulation, etc. The boiler system also includes two pumps as well as accessories. In addition to the boiler work, the contractor is required to replace the circulation pumps for the water to water heat pumps as indicated on the project drawings.

1.5 BUILDING PERMITS, TEMPORARY CERTIFICATES OF OCCUPANCY, CERTIFICATES OF OCCUPANCY

- A. The Contractor shall be responsible for preparing, submitting and obtaining building permits, Temporary Certificates of Occupancy/Conformance and Certificates of Occupancy/Conformance for the Work. All permit applications with all required attachments shall be submitted to the Building Code Official in one fully coordinated package.

1.6 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits: Confine construction operations to the immediate work areas.
 2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the during entire construction period, with the exception of limited areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

Client Name: Delaware Army National Guard
Project Name: DE JAFRC Boiler Plant Installation
Concord No.: 1C15580.00

Revision: 0
Date: 09/02/2016

1. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving the ship occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Provide schedule to Engineer for review indicating all utility interruptions by facility four weeks prior to the anticipated interruption and update schedule weekly or as otherwise required for term of contract.
 2. Provide confirmation to Engineer and Owner not less than one week in advance of proposed utility interruptions.
 3. Obtain Engineer and Owner's written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Engineer and Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Engineer and Owner's written permission before proceeding with disruptive operations.
- D. Nonsmoking: Smoking is not permitted on the project site.
- E. Controlled Substances: Use of tobacco products and other controlled substances on the project site is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

Client Name: Delaware Army National Guard
Project Name: DE JAFRC Boiler Plant Installation
Concord No.: 1C15580.00

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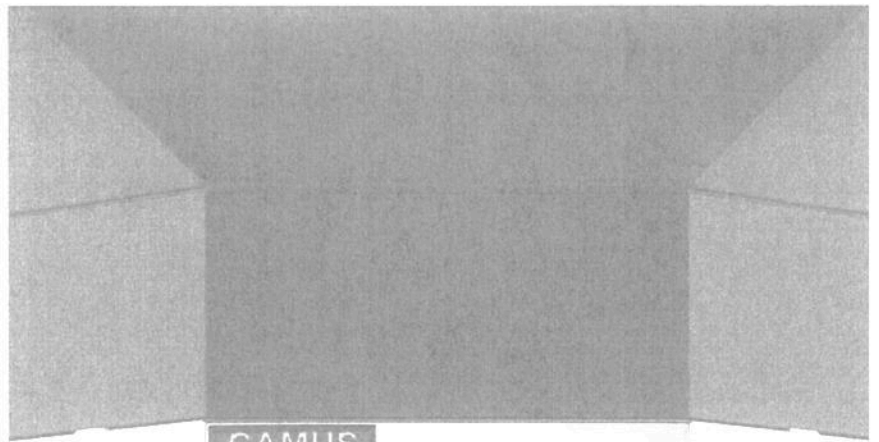
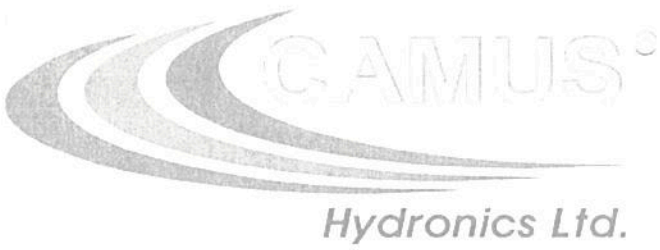
1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000



CAMUS
Hydronics Ltd.

UP TO **25:1**
TURNDOWN
RATIO!

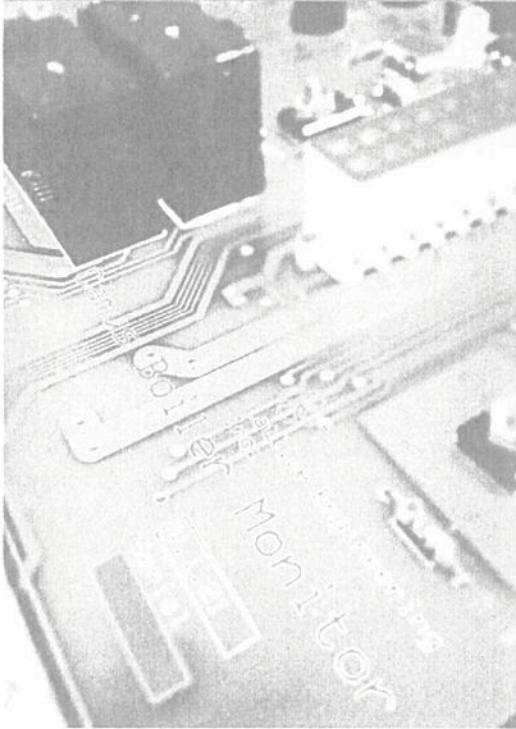


ADVANTUS

two-pass counter flow fire tube commercial boilers

for hydronic heating
and hot water supply

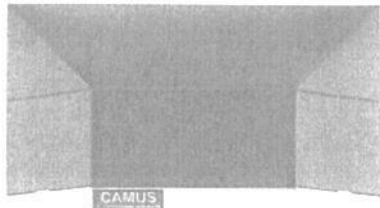
FEATURES & CONTROLS



Fieldserver
Protonode

In a world where we are becoming more connected, the Advantus™ is ready to enter this revolutionary phase in building automation. All Advantus™ are equipped with standard Modbus RTU communication protocol to allow for BMS access to view boiler operation. The remote monitoring of a boiler plant allows for complete overview of various boiler-related temperatures, boiler status, pump activation, boiler error codes and more. This is not just limited to read-only parameters, as a BMS is permitted to write setpoint temperatures, enable/disable and remotely send and receive firing rate requests.

To further evolve and adapt to the changing marketplace, the Advantus™ is available with BacnetIP, BacnetMSTP, MetasysN2 and LonWorks protocol support. All the features available in the Modbus RTU realm are carried into these protocols with the use of a highly advanced yet user friendly Fieldserver Protonode. The Fieldserver Protonode is equipped with Ethernet or RS485 connectivity and is BTL (BACnet Testing Laboratory) Certified. This approval assures that we carry only the highest quality products with optimum performance and utmost ease of connectivity.



The Advantus™ is controlled by an integrated Honeywell SOLA controller. The 7 color touch screen provides remote operation through the 4-20mA or 0-10Vdc for set point or fire rate control. Paired with the ability to control multiple pump operation along with daisy chain set up for up to 8 boilers, this user friendly control also provides you with a USB output for screenshot capture, as well as password access for service personnel. Up to 8 SOLA devices may be monitored and controlled with one single display.



Standard Features

- Single point input adjustment for control of air and gas
- 1 to 1 air/gas ratio control for perfect combustion across entire modulation range
- Return water temperatures down to 40°F
- Extremely low NOx emissions (less than 9 ppm)
- Water pressure switch
- Local/Remote switch for building management, remote modulation and set-point control
- Direct ignition up to 2.5 million BTU/hr.
- Proven pilot ignition for 3 to 4 million BTU/hr.
- High gas pressure switch (models 2500-4000)
- Minimum gas pressure requirements of 4.0 w.c.
- Main burner test firing valve
- For operation with natural gas or propane
- Flame failure alarm contacts
- Up to 25:1 turndown for seamless operation
- Boiler modulates to shut down on flue gas high temperature detection
- UV flame detection
- Staging relay to govern operation of low end or high end gas valve (models 800-4000)
- Electronic air proving switch
- Extremely low noise level

Flow switch, pressure relief valve, low gas pressure switch and flame failure contacts are standard on every Advantus™

HEAT EXCHANGER & BURNER

**THERMAL EFFICIENCIES OF UP TO
99%**

Inside the signifying mineral panels is the heat exchanger that separates Camus from the rest.

Camus® has once again designed an INDUSTRY FIRST!

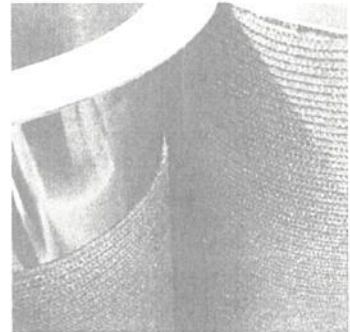
The Advantus™ features a two-pass counter-flow fire-tube heat exchanger with 1.5" diameter oval tubes configured to optimize performance and maximize heat transfer and efficiencies. It has a maximum working pressure of 160 PSIG and a maximum working temperature of 210°F for both heating and domestic hot water applications. Designed with a generous heating surface to sustain efficiencies across complete firing range, the Advantus™ impresses with flow rates ranging from as low as 6.6 GPM* to upwards of 380 GPM**. Constructed using 304L/316L grade stainless steel, this all welded heat exchanger has been designed with a unique counter flow design so that as flue products exit the boiler, they have maximum contact time with incoming water to achieve the highest possible heat transfer and latent heat capture.

The burner is 100% stainless steel vertical mounted radial fired with stainless knitted metal fiber construction. The burner combusts a precise amount of premixed combustion air and gas to provide equal distribution of heat for heat transfer to the entire heat exchanger. Providing a turn down ratio of up to 25:1 all while sustaining combustion characteristics throughout the entire modulating range.

*Advantus™ model 500 at minimum firing rate, 10°F ΔT
**Advantus™ model 4000 at maximum firing rate, 60°F ΔT

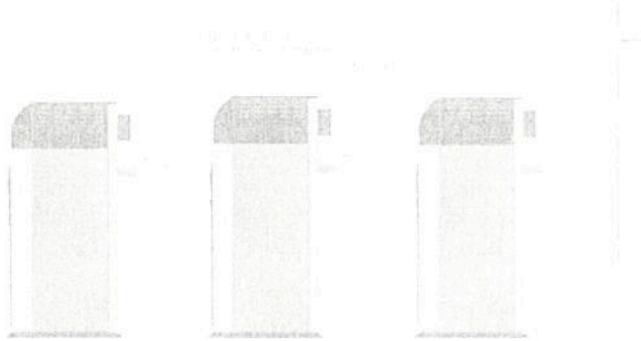


FORWARD THINKING



**TURNDOWN RATIO OF
UP TO
25:1**

VENTING



suitable for category II or category IV

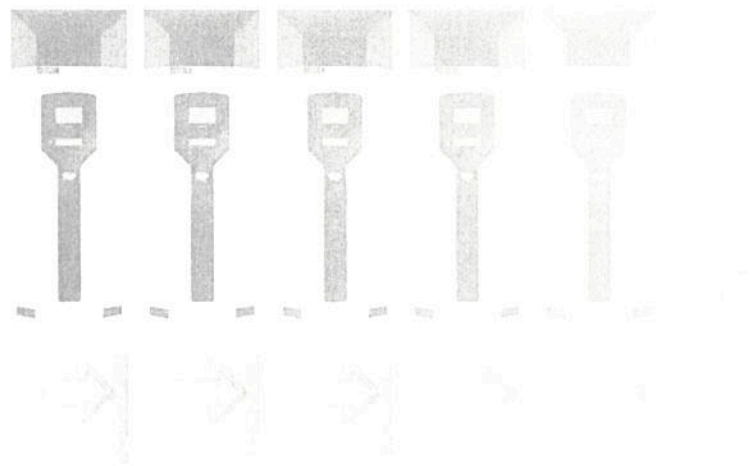
For ease of installation the fully condensing Advantus™ can be vented individually in a Category IV positive pressure venting arrangement or they can be vented in a common chimney designed for a Category II venting system.

With the outstanding efficiency of the Advantus™ it can be vented with corrosion resistant CPVC, Polypropylene, AL29-4C or 316L stainless steel material as stack temperatures are between 10-30°F (5.5 – 16.7°C) above incoming water temperatures. This allows a diverse range of venting materials to suit any installation and for Category II, the Advantus™ is capable of venting up to 100 equivalent feet and up to 100 equivalent feet of combustion air can be brought directly to the boiler for direct vent installations.

The Advantus™ is available with an air inlet damper for cold climates which prevents outdoor air from infiltrating the heat exchanger when the Advantus™ is in standby.



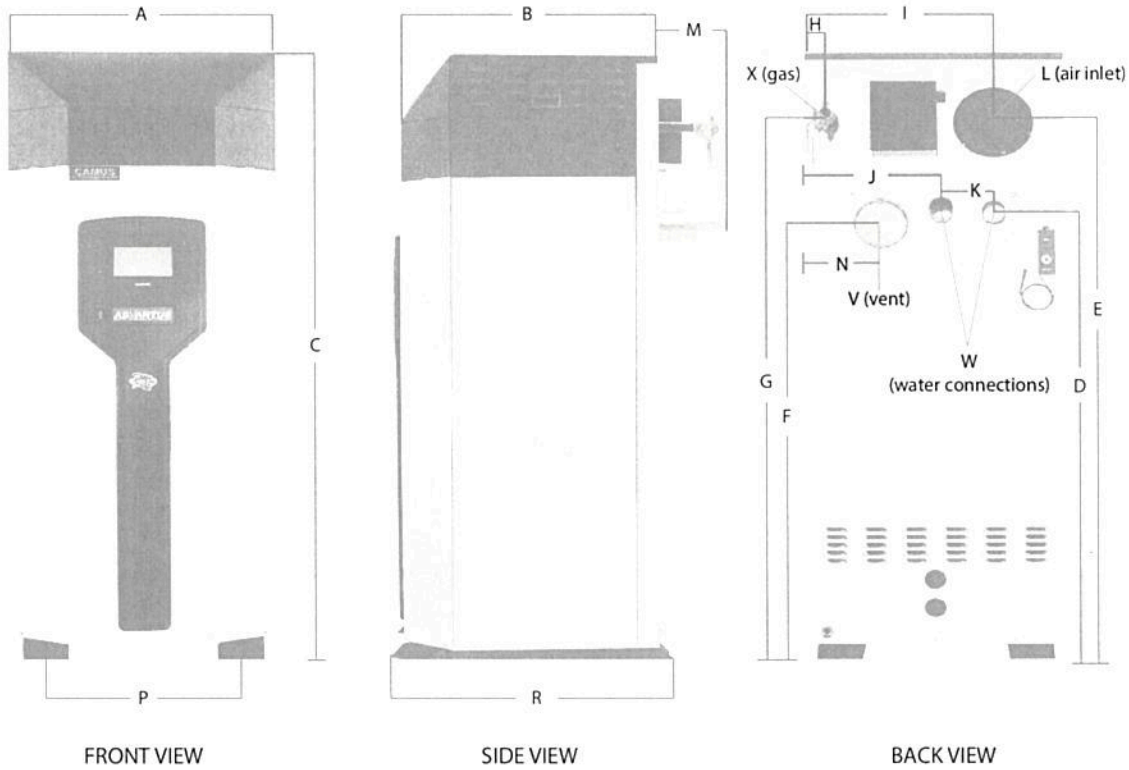
INTEGRATED LEAD LAG



High efficiency is being demanded during the design phase of building construction and each Advantus™ is equipped with a state of the art lead lag algorithm which provides sequencing for up to 8 appliances using a 3-wire RS485 daisy-chain network. This eliminates the need for costly and complex boiler sequencer panels. Combined with an ultra-high turn down ratio of up to 25:1 on an individual appliance, a network of 8 Advantus™ appliances can be operated with an industry leading 200:1 turndown. A high turn down results in significantly reduced short cycling, increases thermal efficiency and provides unmatched levels of comfort with the ability to track building load accurately. An adjustable Base Load Rate parameter ensures that all appliances in the network are firing before modulating in unison up to maximum firing rate. Run time equalization methodology evenly distributes the operation time across the entire boiler plant through the rotation of lead boilers.

The use of a single system sensor wired to the first Advantus™ dictates the sequencing operation. In the event an unexpected incident occurs where the first Advantus™ is disabled, the remaining Advantus™ appliances will intervene and provide heating based on a pre-defined standalone algorithm. The assurance of fail safe operation provides peace of mind operation and this advanced lead lag functionality is equipped with 'shift on the fly' capability where additional appliances are automatically detected and join into the lead lag sequence for optimum efficiency operation.

DIMENSIONS & SPECIFICATIONS



Model	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Dim. I	Dim. J	Dim. K	Dim. L	Dim. "M"	Dim. "N"	Dim. "P"	Dim. "R"	Dim. "V" (as shipped)	Ø Dim. "W" Water	Ø Dim. "X" Gas
500	29 1/2"	34"	60"	39 1/2"	50"	37"	50"	4"	21 1/2"	15"	6"	6"	19 1/8"	9 1/2"	22 1/2"	37 1/2"	5"	2"	1"
600	29 1/2"	34"	60"	39 1/2"	50"	37"	50"	4"	21 1/2"	15"	6"	6"	19 1/8"	9 1/2"	22 1/2"	37 1/2"	5"	2"	1"
800	30"	34"	83"	61"	74"	59 1/2"	68 1/2"	4"	21 1/2"	15 1/2"	6"	8"	19"	9"	22"	37 1/2"	6"	2"	1"
1000	30"	34"	83"	61"	74"	59 1/2"	68 1/2"	4"	21 1/2"	15 1/2"	6"	8"	19"	9"	22"	37 1/2"	6"	2"	1"
1200	30"	42"	83"	59"	75"	57"	67"	4"	21 1/2"	15 1/2"	6"	10"	19"	7 1/2"	22"	45 1/2"	7"	2 1/2"	1"
1400	30"	42"	83"	59"	75"	57"	67"	4"	21 1/2"	15 1/2"	6"	10"	19"	7 1/2"	22"	45 1/2"	7"	2 1/2"	1 1/4"
1600	30"	42"	83"	54 1/2"	75"	51"	63"	4"	21 1/2"	16 1/2"	6"	10"	23"	7 1/2"	22"	45 1/2"	8"	3"	1 1/4"
1800	30"	42"	83"	54 1/2"	75"	51"	63"	4"	21 1/2"	16 1/2"	6"	10"	23"	7 1/2"	22"	45 1/2"	8"	3"	1 1/4"
2000	30"	42"	93"	63 1/2"	80"	60"	72"	4"	22"	16 1/2"	6"	12"	23"	7 1/2"	22"	45 1/2"	"	3"	1 1/4"
2500	30"	42"	93"	63 1/2"	80"	60"	72"	4"	22"	16 1/2"	6"	12"	23"	7 1/2"	22"	45 1/2"	"	3"	1 1/2"
3000	35"	47"	101"	66"	90"	62"	78"	5 1/2"	26"	17 1/2"	6"	12"	23"	17 1/2"	27 1/2"	50"	10"	3"	1 1/2"
3500	35"	47"	101"	66"	90"	62"	78"	5 1/2"	26"	17 1/2"	6"	12"	23"	17 1/2"	27 1/2"	50"	10"	4"	2"
4000	35"	47"	101"	66"	90"	62"	78"	5 1/2"	26"	17 1/2"	6"	12"	23"	17 1/2"	27 1/2"	50"	10"	4"	2 1/2" (2")

Model	10°F Rise (Min. Input)		20°F Rise (Max. Input)		40°F Rise (Max. Input)		60°F Rise (Max. Input)	
	US GPM	·P-Ft.	US GPM	·P-Ft.	US GPM	·P-Ft.	US GPM	·P-Ft.
500	N/A	N/A	47.20	1.80	23.60	0.50	15.70	0.20
600	N/A	N/A	56.60	2.60	28.30	0.60	18.90	0.30
800	6.60	0.03	74.80	4.50	37.40	1.10	24.90	0.50
1000	8.20	0.05	93.40	7.00	46.70	1.80	31.20	0.80
1200	9.90	0.02	112.20	2.00	56.10	0.50	37.40	0.20
1400	11.50	0.02	130.80	2.70	65.40	0.70	43.60	0.30
1600	13.20	0.03	149.60	3.90	74.80	0.80	49.90	0.40
1800	14.80	0.04	168.20	4.40	84.10	1.20	56.10	0.50
2000	16.50	0.05	189.80	5.60	94.90	1.40	63.20	0.60
2500	20.60	0.07	237.20	8.80	118.60	2.20	79.10	1.00
3000	24.70	0.01	284.60	1.60	142.30	0.40	95.00	0.20
3500	28.90	0.02	332.00	2.20	166.00	0.60	110.70	0.30
4000	33.00	0.02	379.40	2.90	189.70	0.70	126.50	0.30

Model	Up to 100 ft. Equiv. Length Air Inlet	Ø Dim. "V" Cat IV	Ø Dim. "X" Vent CAT. II
500	5	5	6
600	5	5	6
800	6	6	6
1000	6	6	7
1200	6	7	8
1400	6	7	8
1600	8	7	9
1800	8	8	10
2000	8	8	10
2500	8	9	10
3000	10	10	10
3500	10	10	12
4000	10	10	14

Model	Recovery Capacity					Model	Input and Output		Model	Water Exchanger Water Content	
	100°F Rise GPH	56°C Rise LPH	80°F Rise GPH	44°C Rise LPH	60°F Rise GPH		33°C Rise LPH	Maximum Input MBTU/hr		Maximum Output MBTU/hr	Model
500	565	2137	707	2672	942	3562	500	450	425	500	25
600	678	2565	848	3206	1131	4274	600	600	567	600	28
800	898	3394	1122	4242	1496	5656	800	800	749	800	35
1000	1122	4242	1403	5303	1871	7071	1000	1000	936	1000	42
1200	1347	5091	1683	6363	2245	8485	1200	1200	1123	1200	50
1400	1571	5939	1964	7424	2619	9899	1400	1400	1310	1400	50
1600	1796	6788	2245	8485	2993	11313	1600	1600	1498	1600	60
1800	2020	7636	2525	9545	3367	12727	1800	1800	1685	1800	60
2000	2279	8614	2849	10768	3798	14357	2000	2000	1900	2000	80
2500	2849	10768	3561	13460	4748	17946	2500	2500	2375	2500	80
3000	3418	12921	4273	16152	5697	21536	3000	3000	2850	3000	130
3500	3988	15075	4985	18844	6647	25125	3500	3500	3325	3500	130
4000	4558	17228	5697	21536	7596	28714	4000	4000	3800	4000	165



CONTACT US

Camus® Hydronics Ltd. is a manufacturer of replacement parts for most copper finned water heaters and heating boilers as well as a supplier of specialty HVAC products. Our service line is open 24 hours a day, 7 days a week!

CAMUS HYDRONICS LTD.

6226 Netherhart Road
Mississauga, ON
L5T 1B7

p: 905.696.7800

f: 905.696.8801



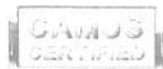
Camus® Hydronics is taking a leading role in the development of environment-friendly products through innovative engineering as we incorporate the very latest technologies designed to create higher efficiency levels while lowering emissions. Our high efficiency units either meet or surpass the standards of both the Canadian and US Green Building Councils while earning the Energy Star rating. This means our products meet the strict energy efficiency guidelines set by the Canadian and US Environmental Protection Agency and the Department of Energy.

Camus® is continually setting new benchmarks of excellence through skillfully engineered and solidly constructed high-efficiency products designed to provide years of reliable service and comfort.

Additional specifications can be obtained by visiting our website or by calling your local Camus® representative.



The Camus® Certified seal assures you that reliability, efficiency and serviceability are built into every single unit.





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

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.
- 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.
- Model has an input range of 80 MBTUH to 2000 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 0.50". 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 AV2500 – AV4000). Optional high gas pressure switch is available for Models AV0500 - AV2000. A factory pre-set combination metering valve and orifice shall be provided for setting combustion parameters. Models AV0500 – AV0600 operate with a minimum 10:1 turndown ratio, AV0800 – AV1800 shall operate with a minimum 22:1 turndown ratio and AV2000 – AV4000 shall operate with a minimum 25:1 turndown ratio.

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 rattle free soft start. Combustion shall be optionally suitable for natural gas, propane and dual fuel operation.



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

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 retrials. 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 Through-wall 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

- 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	25
0600	28
0800	35
1000	42
1200	50
1400	50
1600	60
1800	60
2000	80
2500	80
3000	130
3500	130
4000	165

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 - 1600	115VAC, 1, 60Hz
800 - 1600	208/230VAC, 60Hz, 1 Phase*
1800-3500	208/230VAC, 60Hz, 1 Phase*
1800-3500	208/230VAC, 60Hz, 3 Phase**
3500 - 4000	208/230VAC, 60Hz, 3 Phase**
800 - 4000	460VAC, 60Hz, 3 Phase

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

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

† Optional power supply available upon request



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

Hydronics Ltd.

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

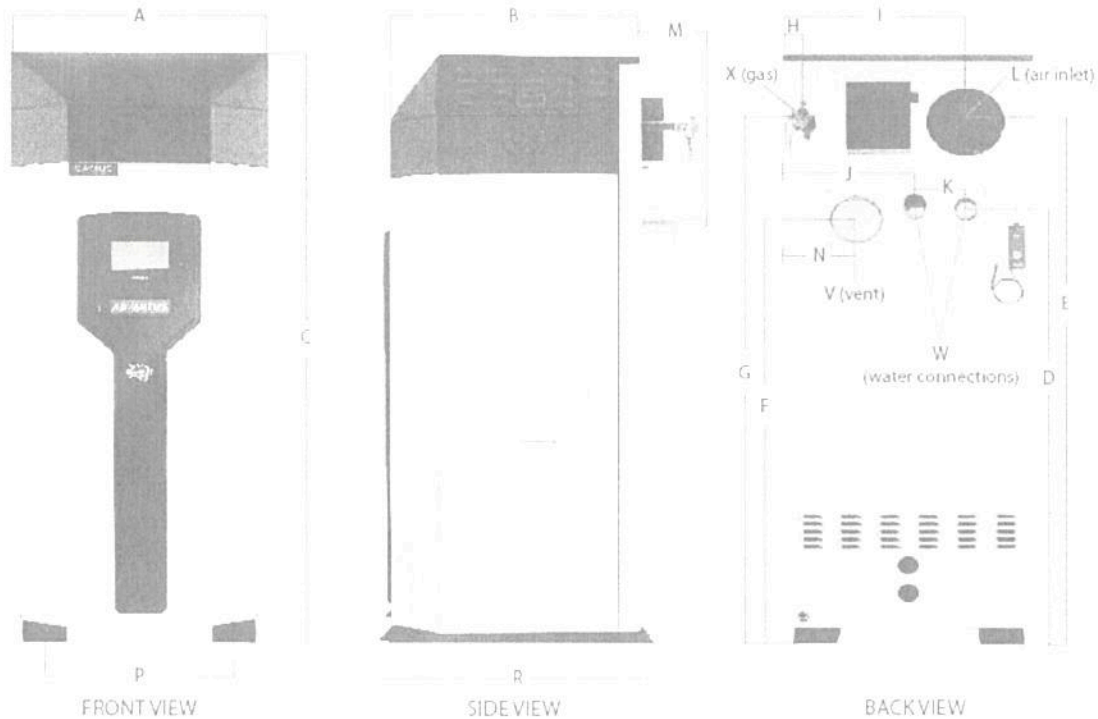
Vent Sizes

Model	Air Inlet 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	5	5	5	6
600	5	5	5	6
800	6	6	6	6
1000	6	6	6	7
1200	6	7	7	8
1400	6	7	7	8
1600	8	8	7	9
1800	8	8	8	10
2000	8	9	8	10
2500	8	9	9	10
3000	10	10	10	10
3500	10	10	10	12
4000 (Natural Gas)	10	10	10	12
4000 (Propane)	10	10	10	14

SUBMITTAL DATA SHEET – ADVANTUS™ – HYDRONIC HEATING

Engineer:
 Prepared by:
 Job Name:

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



Model	"A" [in.]	"B" [in.]	"C" [in.]	"D" [in.]	"E" [in.]	"F" [in.]	"G" [in.]	"H" [in.]	"I" [in.]	"J" [in.]	"K" [in.]	"L" [in.]	"M" [in.]	"N" [in.]	"P" [in.]	"R" [in.]	"W" [Ø] [in.] Water	"X" [Ø] [in.] Gas	Weight [lbs.]
500	29½	34	60	39½	50	37	50	4	21½	15	6	6	19 1/8	9	22	37½	2	1	830
600	29½	34	60	39½	50	37	50	4	21½	15	6	8	19 1/8	9	22	37½	2	1	860*
800	30	34	83	61	74	59½	68½	4	21½	15½	6	8	19	9	22	37½	2	1	1000*
1000	30	34	83	61	74	59½	68½	4	21½	15½	6	8	19	9	22	37½	2	1	1100
1200	30	42	83	59	75	57	67	4	21½	15½	6	10	19	7½	22	37½	2½	1	1200*
1400	30	42	83	59	75	57	67	4	21½	15½	6	10	19	7½	22	37½	2½	1¼	1630
1600	30	42	83	54 ½	75	51	63	4	21½	16 ½	6	10	23	7½	22	37½	3	1¼	1840
1800	30	42	83	54 ½	75	51	63	4	21½	16 ½	6	10	23	7½	22	37½	3	1¼	1900*
2000	30	42	93	63 ½	80	60	72	4	22	16 ½	6	12	23	7½	22	37½	3	1¼	2160
2500	30	42	93	63 ½	80	60	72	4	22	16 ½	6	12	23	7½	22	37½	3	1½	2200*
3000	35	47	101	66	90	62	78	5 ½	26	17 ½	6	12	23	17½	27½	50	3	1½	2400*
3500	35	47	101	66	90	62	78	5 ½	26	17 ½	24	12	23	17½	27½	50	4	2	2700*
4000 (Natural Gas)	35	47	101	66	90	62	78	5 ½	26	17 ½	24	12	23	17½	27 ½	50	4	2½	3000
4000 (Propane)	35	47	101	66	90	62	78	5 ½	26	17 ½	24	12	23	17½	27 ½	50	4	2	3000

*Preliminary estimates

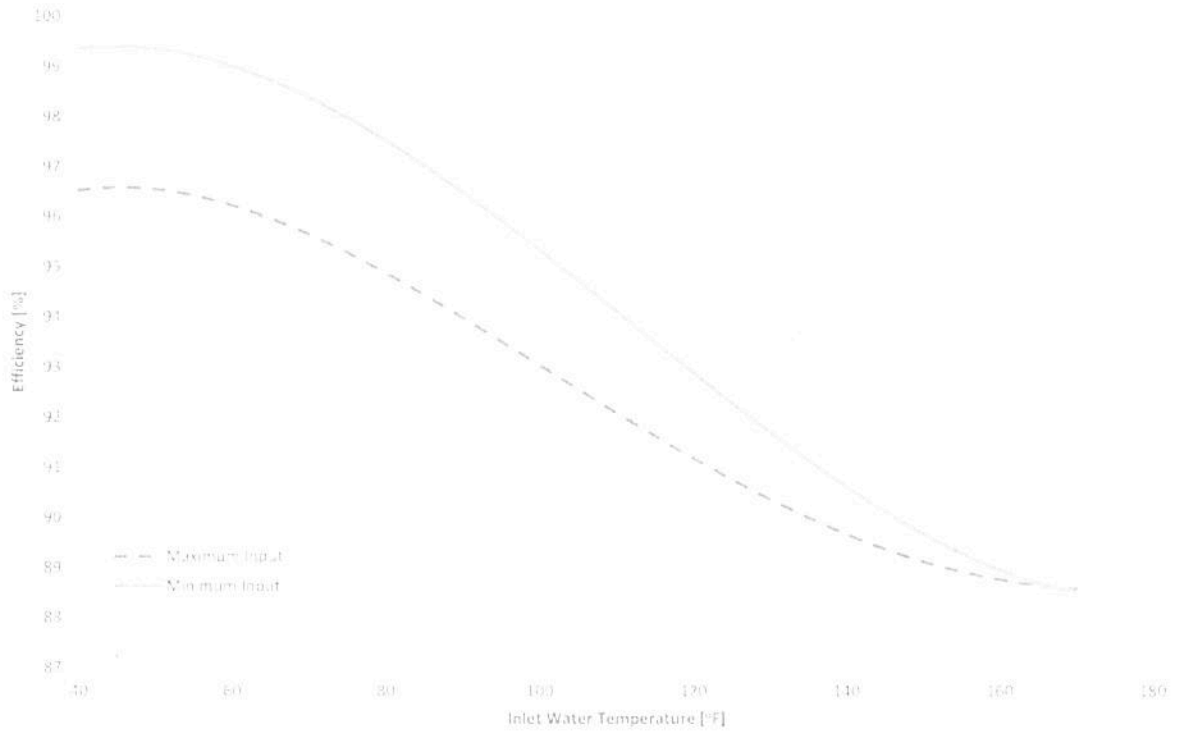
Model # # Of Units Type of Gas

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

Total Output BTU/hr

Optional Accessories

Camus® Advantus™ Efficiency and Inlet Water Temperature



99-0211
Rev 01