Fulton TECHNICAL DATA SHEET

ENDURA+ (EDR+) SERIES:
EDR+4000, EDR+5000, EDR+6000

4,000,000 to 6,000,000 BTU/HR:
Duplex Stainless Steel Firetube Condensing Boilers

Fulton's Endura+ (EDR+) line of boilers are the culmination of comprehensive system optimization encompassing superior efficiencies, reduced thermal stresses, novel heat exchangers, enhanced water flow management, and low emissions. The packaged boiler features an ultra-compact footprint that fits through a standard doorway, access panels which detach in seconds, and simplified service & maintenance. High-turndown Flame-by-Wire™ combustion technology utilizes the surgical precision of independent air and gas servo motors and continuously tunes the air/fuel ratio for ideal excess O_2 levels to automatically adjust for seasonality. This maximizes condensing potential, and outperforms all conventional platforms in durability, reliability and repeatability.

STANDARD FEATURES:

- Factory Packaged and Test Fired Boiler Assembly
- Duplex Stainless Steel Firetube Heat Exchanger
- Fully Condensing Ultra-High Efficiency Operation
- Fulton-Exclusive External Tube Stress Reliever
- Designed for Variable Primary Flow Arrangements
- Fully Modulating Burner; Up to 15:1 Turndown
- Low NOx Emissions <20 ppm; <7 ppm Option
- Flame-by-Wire™ Combustion Control; ± 0.2° Precision
- Real-Time O_2 Compensation™
- Variable Speed High-Pressure Combustion Blower
- Pilot with Spark Electrode Ignition System
- 160 PSIG Maximum Allowable Working Pressure
- 210°F Maximum Allowable Working Temperature
- Maximum Setpoint 185°F, 200°F Capable (See IOM)
- Operating and High Limit Aquastats; 200°F Setting
- Low Water Cut Off Probe with Manual Reset
- MERV 8 Combustion Air Intake Filter
- Air, Blocked Filter, and Blocked Flue Switches
- Ventless Gas Train
- Low and High Gas Pressure Switches
- Emergency Stop (E-Stop) Contact

PURE CONTROL™ CAPABILITIES: v1.3.7.7+

- 7-inch Color Touchscreen Display
- Integrated Lead-Lag of 2 to 10 Boilers
- Universal Data over Ethernet/IP; No Master Boiler Req.
- Modbus Communication Protocol
- Flue Gas Exhaust Temperature Monitoring
- Inlet and Outlet Water Temperature Sensors
- Combustion Air Temperature Sensor
- Wideband Lambda Flue Gas Oxygen Sensor
- Outdoor Air Temperature Reset with Plant Cutoff
- Trending Data Logging
- Setback Modes via Internal Clock
- Accept 4-20mA or 0-10VDC Remote Setpoint Signal
- Two Safety Interlock Contacts for External Device(s)
- Monitoring Contacts (Status, Demand, Alarm)
- Remote Boiler Enable Contact
- Motorized Isolation Valve Control
- Variable Speed Secondary Pump Control (2 Pumps)
- Automatic Rotation of Secondary Pumps
- Variable Speed Primary Pump Control
- Domestic Hot Water Priority with DHW Pump Start/Stop
- Two-Stage Freeze Protection

PROJECT DETAILS:

Project Name		City, State (Province)	
Date Submitted		Engineer of Record	
Fulton Representative		Contractor	

LISTINGS & COMPLIANCE:

- ASME Section IV, "H" Stamp
- ETL Listed to UL-795
- CSD-1 and CSA Controls and Fuel Train
- AXA XL Compliant; Supersedes IRI
- AHRI Certified to BTS-2000
- FM Compliant Fuel Train Components
- SCAQMD Compliant (Certain Configurations)

TRIM KIT ITEMS:

- ASME Safety Relief Valve ☐60, ☐100, ☐125, or ☑160 PSIG
- Pressure & Temperature Gauge
- Installation, Operation and Maintenance Manual
- Condensate Drain Hose and Fitting

OPTIONAL ACCESSORIES: PARTS SHIP LOOSE FOR FIELD INSTALLATION

- ☐ BACnet Protonode with Remote Cloud Access *2-45-001058-30*
- ☐ Lead/Lag IP Switch (8 Port, 120VAC) *2-45-315010*
- ☐ Lead/Lag IP Switch (5 Port, DIN Mount, 24VDC) *2-45-315044-31*
- ☐ 12-Inch Flue Gas Exhaust FasNSeal Adapter (4MM) *2-35-001656*
- ☐ 14-Inch Flue Gas Exhaust FasNSeal Adapter (5/6MM) *2-35-001654*
- ☐ Multiple Boiler Condensate Drain Trap (12MM Max) *4-57-000440*
- ☐ Individual Boiler Condensate Drain Trap (6MM Max) *4-57-005500*
- ☐ pH Neutralization Kit (12MM Max) *4-50-000008*
- ☐ 6-Inch Butterfly Valve with 120VAC 2-Position Actuator *2-30-001386*
- ☐ Combination Natural Gas and Propane "Dual Gas" Kit *7-91-315610*
- ☐ Supply Header Temperature Sensor *4-30-000510*
- ☐ Return Header Temperature Sensor *4-30-000510*
- ☐ Outdoor Air Temperature Sensor Kit *4-30-000500*
- ☐ Domestic Hot Water Temperature Sensor *4-30-315300*
- ☐ Second (Auxiliary) Low Water Cut Off Kit *4-30-000330*
- ☐ Spare Combustion Air Filter *2-30-001279*
- ☐ Fused External Disconnect Switch (UL Only) *P/N Varies*
- ☐ _____
- ☐ _____
- ☐ _____

NOTE: Information provided in this document is based on standard boiler configurations only. Alternate configurations may result in deviations.

CAPACITIES: **STANDARD NATURAL GAS; REFER TO PERFORMANCE DATA FOR CAPACITY AT HIGH ELEVATION**

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Rated Input at High Fire	**BTU/hr**	**4,000,000**	**5,000,000**	**6,000,000**
	kW	*1,172*	*1,465*	*1,758*
Minimum Input at Low Fire	**BTU/hr**	**400,000**	**400,000**	**400,000**
	kW	*118*	*118*	*118*
Rated Output (AHRI-1500)	**BTU/hr**	**3,784,000**	**4,725,000**	**5,754,000**
	Boiler HP	113	141	172
	kW	*1,109*	*1,385*	*1,686*
Thermal Efficiency (AHRI-1500)	**%**	**94.6**	**94.5**	**95.9**
Burner Turndown	-	**10:1**	**13:1**	**15:1**

NOTES:

- Minimum Input at Low Fire is 1,200,000 BTU/hr (351 kW) when operating on propane.

CONNECTION SIZES:

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Boiler Supply Water Outlet (ANSI 150# FLG)	**inches**	**6**	**6**	**6**
	mm	*152*	*152*	*152*
Boiler Return Water Inlet (ANSI 150# FLG)	**inches**	**6**	**6**	**6**
	mm	*152*	*152*	*152*
Flue Gas Condensate Drain (Barbed)	**inches**	**1**	**1**	**1**
	mm	*25*	*25*	*25*
Boiler Pressure Vessel Drain (NPT)	**inches**	**1-1/2**	**1-1/2**	**1-1/2**
	mm	*38*	*38*	*38*
Natural Gas Train Inlet (NPT)	**inches**	**2**	**2**	**2**
	mm	*51*	*51*	*51*
Combustion Air Inlet (ID)	**inches**	**12**	**12**	**12**
	mm	*305*	*305*	*305*
Minimum Flue Gas Exhaust Vent (ID) *(Adapter Required)*	**inches**	**12**	**14**	**14**
	mm	*305*	*356*	*356*
Boiler Exhaust Outlet (ID)	**inches**	**9-3/4**	**9-3/4**	**9-3/4**
	mm	*248*	*248*	*248*
Boiler Exhaust Outlet (OD)	**inches**	**10-3/4**	**10-3/4**	**10-3/4**
	mm	*273*	*273*	*273*

FUEL REQUIREMENTS: STANDARD NATURAL GAS AT 1,020 BTU/SCF (9,082 KCAL/M³)

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Fuel Usage at Rated Input	**SCFH**	**3,922**	**4,902**	**5,882**
	m³/hr	*111*	*139*	*167*
Minimum Gas Pressure *(Req. at High Fire)*	**in W.C.**	**4**	**8**	**8**
	kPa	*1*	*2*	*2*
Maximum Gas Pressure	**in W.C.**	**28**	**28**	**28**
	kPa	*7*	*7*	*7*

FUEL REQUIREMENTS: STANDARD HD5 PROPANE AT 2,500 BTU/SCF (22,260 KCAL/M³)

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Fuel Usage at Rated Input	**SCFH**	**1,600**	**2,000**	**2,400**
	m³/hr	*45*	*57*	*68*
Minimum Gas Pressure *(Req. at High Fire)*	**in W.C.**	**7**	**11**	**11**
	kPa	*1.74*	*2.74*	*2.74*
Maximum Gas Pressure	**in W.C.**	**14**	**14**	**14**
	kPa	*3.5*	*3.5*	*3.5*

NOTES:
- Field conversion during commissioning is required by an authorized service technician.
- Propane-fired operation is suitable for use with HD5 (standard commercial) grade Liquid Petroleum Gases conforming to ASTM D1835-82.

ELECTRICAL REQUIREMENTS: APPLIES TO <20 PPM NOx STANDARD BLOWER AND CONTROL OPTIONS

Endura+ Model		EDR+4000			EDR+5000			EDR+6000		
Electrical Supply	**Volts**	**208**	**460**	**575**	**208**	**460**	**575**	**208**	**460**	**575**
	ø	3	3	3	3	3	3	3	3	3
	Hz	*60*	*60*	*60*	*60*	*60*	*60*	*60*	*60*	*60*
Operating Amps at Low Fire (Typical)	**Amps**	**2.2**	**1.0**	**0.8**	**2.0**	**0.9**	**0.7**	**2.0**	**0.9**	**0.7**
Operating Amps at High Fire (Typical)	**Amps**	**19.9**	**9.0**	**7.2**	**23.0**	**10.0**	**8.0**	**27.0**	**12.0**	**9.6**
Full Load Amps (FLA)	**Amps**	**23**	**12**	**10**	**43**	**22**	**17**	**43**	**22**	**17**
Minimum Current Ampacity (MCA)	**Amps**	**29**	**15**	**13**	**54**	**28**	**22**	**54**	**28**	**22**
SCCR	**Amps**	**10,000**			**10,000**			**10,000**		

NOTES:
- The boiler may be factory configured for either 460/3/60, 208/3/60, or 575/3/60 electrical service; it is not field convertible.
- Operating Amps are typical and will vary based on site specific factors and operating parameters.
- When commissioned for <7 or <9 ppm NOx operation, the operating amps will increase by up to 25%.
- <7 and <9 ppm NOx operation is available for 460/3/60 or 575/3/60 electrical configurations only.
- SCCR of 100,000 Amps when equipped with the field installed fused external disconnect switch option incorporating type J fuses.
- Provide separate power supplies for external devices. Do not power external devices through the boiler control circuits.

WATER AND FLOW REQUIREMENTS: **SPECIFICATIONS APPLY TO 100% WATER SYSTEMS; SEE IOM FOR GLYCOL SYSTEMS**

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Typical Flow Rate at Rated Output 20°F ΔT	**GPM**	**383**	**480**	**580**
	LPM	*1,450*	*1,817*	*2,196*
Typical Flow Rate at Rated Output 40°F ΔT	**GPM**	**192**	**240**	**290**
	LPM	*725*	*909*	*1,098*
Water Pressure Drop at Rated Output 20°F ΔT	**PSI**	**2.8**	**4.1**	**6.0**
	kPa	*19.3*	*28.3*	*41.4*
Water Pressure Drop at Rated Output 40°F ΔT	**PSI**	**0.7**	**1.1**	**1.5**
	kPa	*4.8*	*7.6*	*10.3*
Maximum ΔT Capable *(100% Water)*	**°F**	**100**	**100**	**100**
	°C	*55.5*	*55.5*	*55.5*
Minimum Flow Rate	**GPM**	**75**	**75**	**75**
	LPM	*284*	*284*	*284*
Maximum Flow Rate	**GPM**	**700**	**700**	**700**
	LPM	*2,650*	*2,650*	*2,650*

NOTES:

- Flow rates will vary for glycol systems; review Application Guide for details.
- Maximum delta-T for glycol systems is 40°F (22°C). Minimum static fill pressure for glycol systems is 30 psi (207 kPa).
- 100°F (55°C) delta-T requires water heating system (0% glycol) and minimum 35 psi (241 kPa) at the boiler outlet flange. The maximum setpoint is 185°F (85°C).
- Refer to the Installation, Operation, and Maintenance Manual for the water pressure drop at flow rates not listed above.

WEIGHTS AND VOLUMES:

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Dry Weight	**lbs**	**5,039**	**5,087**	**5,092**
	kg	*2,286*	*2,307*	*2,310*
Operating Weight	**lbs**	**6,540**	**6,588**	**6,593**
	kg	*2,966*	*2,988*	*2,991*
Approximate Shipping Weight	**lbs**	**5,199**	**5,247**	**5,252**
	kg	*2,358*	*2,380*	*2,382*
Pressure Vessel Water Volume	**Gallons**	**180**	**180**	**180**
	Liters	*681*	*681*	*681*

VENTING REQUIREMENTS:

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Combustion Air Intake Flow Rate	**SCFM**	**867**	**1,080**	**1,300**
Flue Gas Exhaust Flow Rate	**SCFM**	**929**	**1,162**	**1,394**
	ACFM	*1,147*	*1,435*	*1,720*
Minimum Allowable Draft Pressure	**in W.C.**	**-0.10**	**-0.10**	**-0.10**
	kPa	*-0.025*	*-0.025*	*-0.025*
Maximum Allowable Draft Pressure	**in W.C.**	**+1.0**	**+1.0**	**+1.0**
	kPa	*+0.25*	*+0.25*	*+0.25*

NOTES:
- Maximum draft pressure is the total sum of the venting system and is inclusive of both the flue gas vent and combustion air intake pressure losses.
- Refer to the Installation, Operation, and Maintenance Manual for complete venting guidelines including certifications, materials, common venting requirements.

EMISSIONS: STANDARD NATURAL GAS AT 1,020 BTU/SCF (9,082 KCAL/M^3)

Endura+ Model		EDR+4000		EDR+5000		EDR+6000	
NOx	**ppm**	**< 20**	**< 7**	**< 20**	**< 7**	**< 20**	**< 7**
CO_2	**%**	**8.6**	**7.5**	**8.6**	**7.5**	**8.6**	**7.5**
CO	**ppm**	**< 45**	**< 45**	**< 50**	**< 45**	**< 60**	**< 50**
	lbs/hr	0.1314	0.1314	0.1788	0.1606	0.2584	0.2146
	g/hr	*59.60*	*59.60*	*81.10*	*72.85*	*117.2*	*97.34*
SOx	**lbs/hr**	**0.0024**		**0.0029**		**0.0035**	
	g/hr	*1.089*		*1.315*		*1.588*	
Total Particulates (PM)	**lbs/hr**	**0.0298**		**0.0373**		**0.0447**	
	g/hr	*13.52*		*16.92*		*20.28*	
Total Organics (TOC)	**lbs/hr**	**0.0431**		**0.0539**		**0.0647**	
	g/hr	*19.55*		*24.45*		*29.35*	
Lead	**lbs/hr**	**2.0×10^{-6}**		**2.5×10^{-6}**		**2.9×10^{-6}**	
	g/hr	*9.1×10^{-4}*		*0.0011*		*0.0013*	
Volatile Organic Compounds (VOC)	**lbs/hr**	**0.0216**		**0.0270**		**0.0324**	
	g/hr	*9.798*		*12.25*		*14.70*	

NOTES:
- <7 ppm NOx operation is available for 460/3/60 electrical configurations only.
- NOx and CO are stated at a 3% O_2 correction.
- Emissions data is typical for standard natural gas operation.
- Emissions will vary based on site specific factors and operating parameters.
- Site specific conditions and emissions requirements will determine the appropriate CO_2 settings for each application.
- VOC, SOx, PM, TOC and Lead are achieved through calculation using the AP 42 method as published by the US EPA, and are stated at rated input.
- AP 42, Fifth Edition, Vol 1, Ch 1, Table 1.4-2 determines the emissions components that cannot be measured with a combustion analyzer.
- Jacket losses: 0.2% of output at maximum capacity, IAW ASHRAE Standard 103-2007.

MINIMUM CLEARANCES:

Endura+ Model		EDR+4000	EDR+5000	EDR+6000
Front	**inches**	**36**	**36**	**36**
	mm	*914*	*914*	*914*
Rear	**inches**	**36**	**36**	**36**
	mm	*914*	*914*	*914*
Top	**inches**	**18**	**18**	**18**
	mm	*457*	*457*	*457*
Sides	**inches**	**1; 24**	**1; 24**	**1; 24**
	mm	*25; 610*	*25; 610*	*25; 610*

NOTES:

- A 1-inch (25 mm) clearance is acceptable between each pair of boilers.
- A 24-inch (610 mm) minimum clearance is required on one side of each boiler to facilitate maintenance.
- Local codes may supersede Fulton requirements, the more stringent of the two shall prevail.

DIMENSIONS:

Refer to the 7-91 type Product Data Submittal End Assembly Drawing for dimensions.