

### CYCLONE® FLEX™

#### ADAPTIVE GAS TECHNOLOGY AND MAXIMUM FLEXIBILITY

The A. O. Smith Cyclone Flex family of condensing water heaters are designed to deliver years of dependable service while providing optimal efficiency. The Flex enhancements represent the latest in water heating and gas combustion technology. Models are now available from 100,000 to 500,000 Btu/h and all deliver thermal efficiencies of 95% or greater. The time proven and unique helical coil heat exchanger makes Cyclone the clear choice for demanding commercial applications.

Cyclone is the industry leader in high efficiency commercial gas water heating. Since its initial launch in 1996, A. O. Smith has continued the tradition of innovative enhancements and new model offerings. The current Flex design is no exception, and offers commercial customers the very best in water heating performance and overall cost of ownership.

#### AIQ™ ADAPTIVE GAS CONTROL

- Smart combustion system includes gas valve with servo motor and electronic controller
- Improves combustion and light off
- Adjusts to fuel qualities or abnormalities

#### INTELLIGENT CONTROL SYSTEM WITH 7" COLOR TOUCH DISPLAY AND iCOMM CONNECTIVITY

- Exclusive A. O. Smith engineered color touch display system
- Provides detailed water heater status information
- Precise Temperature control adjustable from 90 to 180 degrees
- Built-in diagnostics and run history
- Capable of receiving over-the-air software updates
- Integrated iCOMM remote connectivity via the iCOMM app.
- Intelligent Demand Response (IDR) feature senses large water draws and automatically adjusts the differential set-point. This feature increases the hot water available when it is needed most.

#### SUBMERGED COMBUSTION CHAMBER, WITH HELICAL HEAT EXCHANGER COIL

- Positioned in center of tank, surrounded by water to virtually eliminate radiant heat loss from chamber
- Direct spark ignition
- Spiral heat exchanger keeps hot burner gases swirling, uses centrifugal force to maximize efficiency of heat transfer to water in tank

- Spiral heat exchanger reduces lime scale from forming on water-side surfaces, which maintains energy efficiency over time

#### LEAK DETECTION AND WARNING

- Ships with leak detection module that allows installing contractor to install where needed
- Provides audible alarm and alert notification via iCOMM connectivity

#### POWERED ANODES STANDARD ON ALL MODELS

- Provides long-lasting tank protection in varying water conditions
- Powered anodes are non-sacrificial
- Automatically adjusts output needed to properly protect the tank

#### PERMAGLAS® ULTRA COAT™ GLASS LINING

- Glass coating is applied using a liquid slush coating technique to ensure uniform coating
- Heat exchanger coil is glassed both externally and internally for optimum protection

#### HIGH EFFICIENCY MODULATING PRE-MIX POWERED BURNER

- Down-fired pre-mix burner provides optimum efficiency and quiet operation
- Top-mounted burner position prevents condensation from affecting burner operation



**BTH-100(A) THROUGH BTH-500(A)**  
**MODEL SHOWN: BTH-199**  
**400/401 SERIES**





# Commercial Gas Water Heaters

## OTHER FEATURES:

### SPACE-SAVING DESIGN FOR INSTALLATION FLEXIBILITY

- Easy-to-remove top cover for convenient access to serviceable parts
- 0" installation clearances on sides and rear  
1-1/2" installation clearance on top
- Handhole cleanout allows easy access to tank interior for cleaning
- 0" clearance to combustibles, approved for installation on combustible floors

### MECHANICAL VENTING VERSATILITY

- Conventional power venting or direct venting
- Vents vertically or through a sidewall
- Front located exhaust and condensate connections allow for easy install and access
- Vents with low cost PVC Schedule 40 intake and exhaust pipe. Approved for optional CPVC Schedule 40, Polypropylene and AL29-4C stainless steel vent materials
- Direct-vent intake and exhaust pipe can terminate separately outside building or through single opening, using concentric vent assembly
- Canadian installations require ULC S636 PVC/CPVC, ULC S636 Polypropylene and AL29-4C stainless steel pipe for intake and exhaust

## CODES AND STANDARDS

- CSA certified and ASME rated T&P relief valve
- Maximum hydrostatic working pressure: 160 psi
- All models are design certified by Underwriters Laboratories (UL), Inc., to ANSI Z21.10.3 - CSA 4.3 Standards
- Meets the thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition ASHRAE/IES 90.1
- Design Certified by Underwriters Laboratories to NSF standard 5 for 180°F (82°C) water
- Complies with SCAQMD Rule 1146.2 and other Air Quality Management Districts with similar requirements for low-NOx emissions
- ASME tank construction optional on 100-500 model sizes

### 3-YEAR LIMITED TANK / 1-YEAR LIMITED PARTS WARRANTY

- For complete warranty information, consult written warranty or go to [hotwater.com](http://hotwater.com)

## VENT REQUIREMENTS FOR BTH 100 - 145

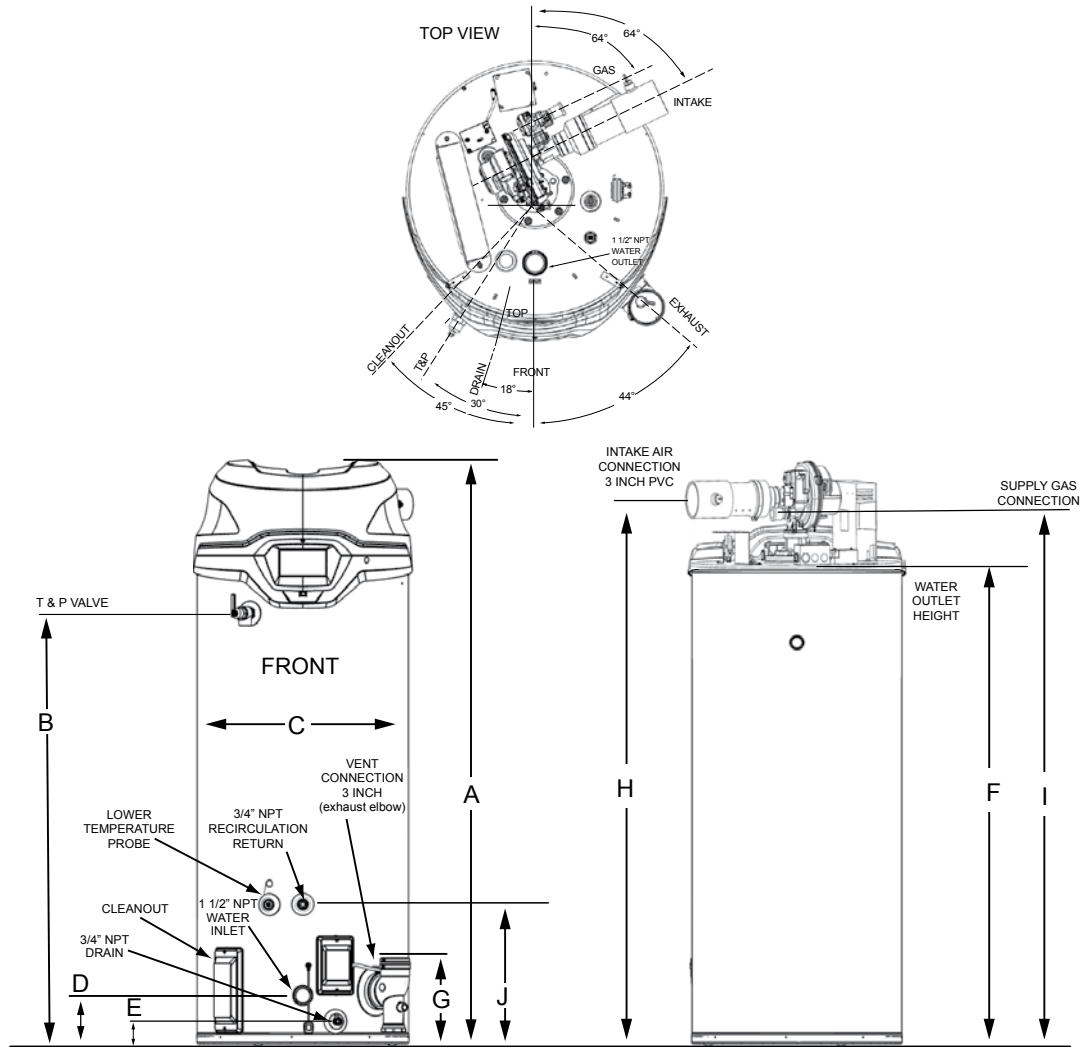
PVC/CPVC Equivalent Length and Maximum Number of Elbows - 60 Gallon Models						
Model	Maximum Equivalent Length, Feet (Meters)			Maximum Number of Elbows		
	2" Pipe	3" Pipe	4" Pipe	2"	3"	4"
BTH-100(A)	75 (22.86)	100 (30.48)	150 (45.72)	4	4	6
BTH-120(A)	75 (22.86)	100 (30.48)	150 (45.72)	4	4	6
BTH-145(A)	75 (22.86)	100 (30.48)	150 (45.72)	4	4	6

## VENT REQUIREMENTS BTH 150 - 250

PVC/CPVC Equivalent Length and Maximum Number of Elbows - 100 Gallon Models						
Model	Maximum Equivalent Length, Feet (Meters)			Maximum Number of Elbows		
	2" Pipe	3" Pipe	4" Pipe	2"	3"	4"
BTH-150(A)	50 (15.2)	150 (45.72)	200 (60.96)	4	4	6
BTH-199(A)	40 (12.2)	150 (45.72)	200 (60.96)	4	4	6
BTH-250(A)	20 (6.10)	150 (45.72)	200 (60.96)	2	4	6

## VENT REQUIREMENTS BTH 251 - 500

PVC/CPVC Equivalent Length and Maximum Number of Elbows - 119 Gallon Models				
Model	Maximum Equivalent Length, Feet (Meters)		Maximum Number of Elbows	
	4" Pipe	6" Pipe	4" Pipe	6" Pipe
BTH-251(A)	100 (30.48)	150 (45.72)	6	6
BTH-300(A)	100 (30.48)	150 (45.72)	6	6
BTH-400(A)	100 (30.48)	150 (45.72)	6	6
BTH-500(A)	100 (30.48)	150 (45.72)	6	6



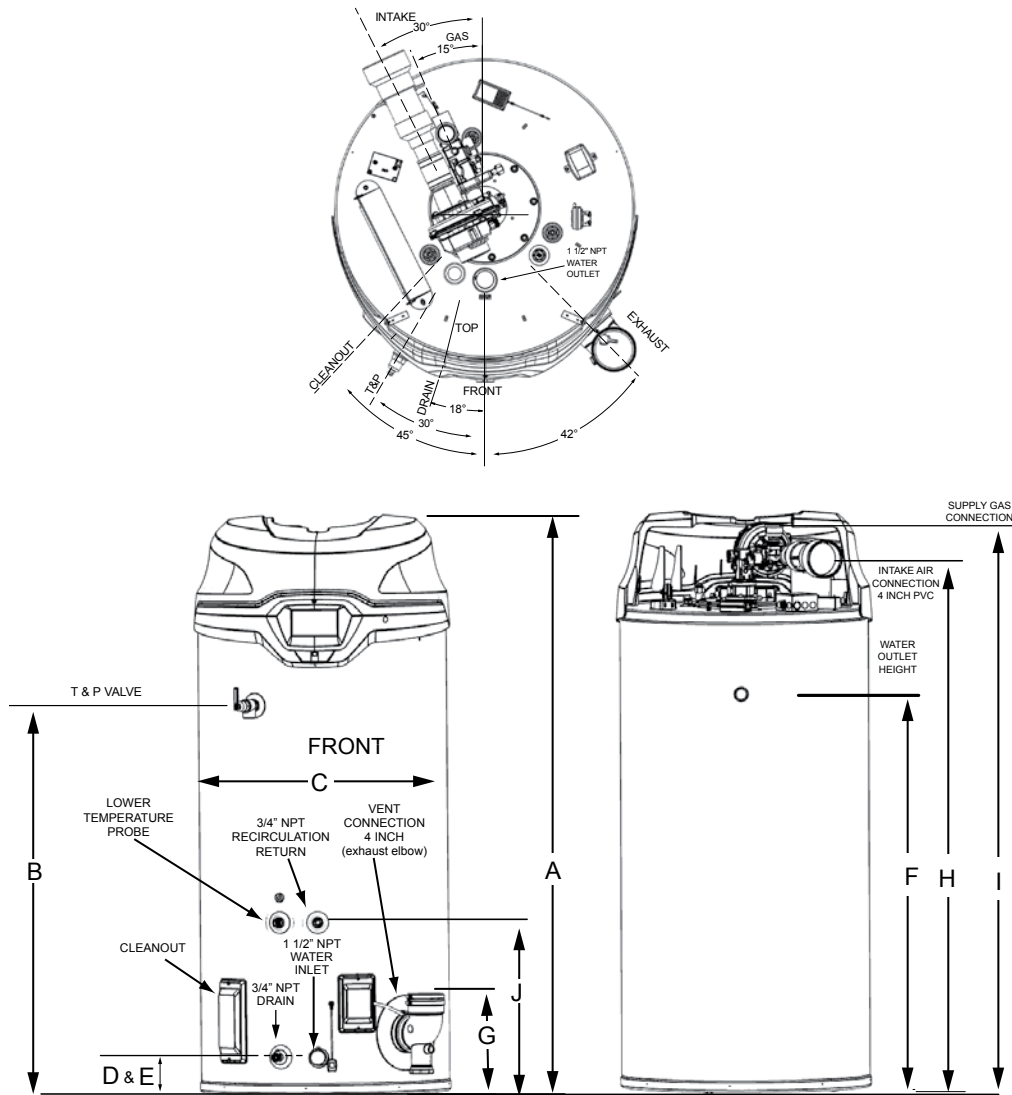
Model Number	Approx. Capacity		Dimensions										lb/kg	Approx. Shipping Weight Std	Approx. Shipping Weight ASME
			A	B	C	D	E	F	G	H	I	J			
BTH-100(A)	Gallons	60	55 1/2	35	27 3/4	6 5/16	3	42 1/4	11 1/4	48 1/2	53 1/2	18 1/4	lb	460	490
	Liters	227	141	88.9	70.5	16	7.62	107.32	28.6	123.2	135.9	46.36	kg	208	220
BTH-120(A)	Gallons	60	55 1/2	35	27 3/4	6 5/16	3	42 1/4	11 1/4	48 1/2	53 1/2	18 1/4	lb	460	490
	Liters	227	141	88.9	70.5	16	7.62	107.32	28.6	123.2	135.9	46.36	kg	208	220
BTH-145(A)	Gallons	60	55 1/2	35	27 3/4	6 5/16	3	42 1/4	11 1/4	48 1/2	53 1/2	18 1/4	lb	460	490
	Liters	227	141	88.9	70.5	16	7.62	107.32	28.6	123.2	135.9	46.36	kg	208	220
BTH-150(A)	Gallons	100	76 1/2	56 3/8	27 3/4	6 5/16	3	64	11 1/4	70	75 1/2	18 1/4	lb	523	553
	Liters	379	194.9	143.2	70.5	16	7.62	162.6	28.6	177.8	191.8	46.36	kg	237	251
BTH-199(A)	Gallons	100	76 1/2	56 3/8	27 3/4	6 5/16	3	64	11 1/4	70	75 1/2	18 1/4	lb	523	553
	Liters	379	194.9	143.2	70.5	16	7.62	162.6	28.6	177.8	191.8	46.36	kg	237	251
BTH-250(A)	Gallons	100	76 1/2	56 3/8	27 3/4	6 5/16	3	64	11 1/4	70	75 1/2	18 1/4	lb	523	553
	Liters	379	194.9	143.2	70.5	16	7.62	162.6	28.6	177.8	191.8	46.36	kg	237	251

Electrical characteristics-120V-60Hz A.C., 5.0 A

"A" in model represents ASME construction

Propane gas models available, specify gas type when ordering

Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.



Model Number	Approx. Capacity		Dimensions										lb/kg	Approx. Shipping Weight Std	Approx. Shipping Weight ASME
			A	B	C	D	E	F	G	H	I	J			
BTH-251(A)	Gallons	119	75 3/4	52	33 1/8	4 3/4	4 3/4	63 1/8	12 3/4	69 1/4	74 1/2	23	lb	855	855
	Liters	450.96	192.41	132.08	84.12	12.07	12.07	160.35	32.39	175.9	189.23	58.43	kg	387	387
BTH-300(A)	Gallons	119	75 3/4	52	33 1/8	4 3/4	4 3/4	63 1/8	12 3/4	69 1/4	74 1/2	23	lb	855	855
	Liters	450.96	192.41	132.08	84.12	12.07	12.07	160.35	32.39	175.9	189.23	58.43	kg	387	387
BTH-400(A)	Gallons	119	75 3/4	52	33 1/8	4 3/4	4 3/4	63 1/8	12 3/4	69 1/4	74 1/2	23	lb	855	855
	Liters	450.96	192.41	132.08	84.12	12.07	12.07	160.35	32.39	175.9	189.23	58.43	kg	387	387
BTH-500(A)	Gallons	119	75 3/4	52	33 1/8	4 3/4	4 3/4	63 1/8	12 3/4	69 1/4	74 1/2	23	lb	855	855
	Liters	450.96	192.41	132.08	84.12	12.07	12.07	160.35	32.39	175.9	189.23	58.43	kg	387	387

Electrical characteristics-120V-60Hz A.C., 5.0 A

"A" in model represents ASME construction

Propane gas models available, specify gas type when ordering

Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.



# Commercial Gas Water Heaters

## RECOVERY CAPACITY

Model Number	Type of Gas	Input		Thermal Efficiency
		BTU/HR	kW	
BTH-100(A)	Natural/Propane	100,000	29	97%
BTH-120(A)	Natural/Propane	120,000	35	97%
BTH-145(A)	Natural/Propane	145,000	42	95%
BTH-150(A)	Natural/Propane	150,000	44	97%
BTH-199(A)	Natural/Propane	199,900	58	96%
BTH-250(A)	Natural/Propane	250,000	73	95%
BTH-251(A)	Natural/Propane	251,000	74	97%
BTH-300(A)	Natural/Propane	300,000	88	97%
BTH-400(A)	Natural/Propane	399,900	117	95%
BTH-500(A)	Natural/Propane	499,900	146	95%

Model Number	Table 2. Recovery Capacities														
	Input		U.S. Gallons/hr & liters/hr at temperature rise indicated												
			°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
Btu/hr	kW	°C	17°C	22°C	28°C	33°C	39°C	44°C	50°C	56°C	61°C	67°C	72°C	78°C	
BTH-100(A)	100,000	29	GPH	384	288	230	192	165	144	128	115	105	96	89	82
			LPH	1453	1090	872	726	623	545	484	436	396	363	335	311
BTH-120(A)	120,000	35	GPH	461	345	276	230	197	173	154	138	126	115	106	99
			LPH	1743	1308	1046	872	747	654	581	523	475	436	402	374
BTH-145(A)	145,000	42	GPH	551	413	331	276	236	207	184	165	150	138	127	118
			LPH	2084	1563	1250	1042	893	781	695	625	568	521	481	446
BTH-150(A)	150,000	44	GPH	576	432	345	288	247	216	192	173	157	144	133	123
			LPH	2179	1634	1308	1090	963	817	726	654	594	545	503	467
BTH-199(A)	199,900	58	GPH	768	576	461	384	329	294	288	256	230	209	192	177
			LPH	2906	2179	1744	1453	1245	1112	1090	967	872	793	726	671
BTH-250(A)	250,000	73	GPH	960	720	576	480	411	360	320	288	262	240	221	206
			LPH	3632	2724	2179	1816	1557	1362	1211	1090	991	908	838	778
BTH-251(A)	251,000	74	GPH	963	723	578	481	413	361	321	289	263	241	222	206
			LPH	3647	2735	2188	1823	1563	1368	1214	1094	995	912	842	781
BTH-300(A)	300,000	88	GPH	1152	864	691	576	494	432	384	345	314	288	266	247
			LPH	4359	3269	2615	2179	1868	1635	1453	1307	1189	1090	1005	934
BTH-400(A)	399,900	117	GPH	1535	1152	921	768	658	576	512	461	419	384	354	329
			LPH	5812	4358	3487	2906	2491	2179	1937	1744	1585	1453	1341	1245
BTH-500(A)	499,000	146	GPH	1919	1439	1152	960	823	720	640	576	523	480	443	411
			LPH	7265	5448	4358	3632	3114	2724	2421	2179	1981	1816	1677	1557

Recovery capacities are based on 95% thermal efficiency.

## STORAGE CAPACITY

Model Number	U.S. Gallons	Liters
BTH 100(A)	60	227
BTH 120(A)	60	227
BTH 145(A)	60	227
BTH 150(A)	100	379
BTH 199(A)	100	379
BTH 250(A)	100	379
BTH 251(A)	119	451
BTH 300(A)	119	451
BTH 400(A)	119	451
BTH 500(A)	119	451

## GAS LINE CONNECTION SIZE

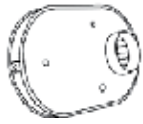
Model	Series	Natural Gas	Propane Gas
BTH 100(A)	400/401	3/4" NPT	3/4" NPT
BTH 120(A)	400/401	3/4" NPT	3/4" NPT
BTH 145(A)	400/401	3/4" NPT	3/4" NPT
BTH 150(A)	400/401	3/4" NPT	3/4" NPT
BTH 199(A)	400/401	3/4" NPT	3/4" NPT
BTH 250(A)	400/401	3/4" NPT	3/4" NPT
BTH 251(A)	400/401	1-1/2" NPT	1-1/2" NPT
BTH 300(A)	400/401	1-1/2" NPT	1-1/2" NPT
BTH 400(A)	400/401	1-1/2" NPT	1-1/2" NPT
BTH 500(A)	400/401	1-1/2" NPT	1-1/2" NPT

## OPTIONAL KITS



### OPTIONAL CONCENTRIC VENT KITS

- BTH-100 - 250 vent kit p/n 100111100
- BTH-251 - 500 vent kit p/n 100113124



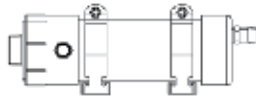
### OPTIONAL LOW PROFILE TERMINATION VENT KITS

- 2" Flush Mount Vent Kit p/n 100187903
- 3" Flush Mount Vent Kit p/n 100187887
- 4" Flush Mount Vent Kit p/n 100187888
- 6" Flush Mount Vent Kit p/n 100187889

## COMMON VENTING KITS FOR UP TO 3 WATER HEATERS (ONE KIT PER WATER HEATER REQUIRED)

Kit	Description
100227396	PVC Common Vent Kit, 100-250 Models
100223775	PVC Common Vent Kit, 251 - 500 Models
100227395	Polypropylene Common Vent Kit, 100-250 Models
100223774	Polypropylene Common Vent Kit, 251 - 500 Models

Installations must comply with all national, state and local codes.  
See kit instructions and corresponding water heater manual for detailed installation instructions and additional information.  
50 Feet maximum equivalent length of straight pipe common vent and elbows  
NOTE: 1 kit per water heater required  
See the Common Vent Kit manual or spec sheet for detailed information.



### OPTIONAL CONDENSATE NEUTRALIZATION KITS

- BTH-100-300 kit p/n 100289339
- BTH-400-500 kit p/n 100374577



### OPTIONAL BMS GATEWAY DEVICE

- BTH-100(A) - BTH-500(A) kit p/n 100378810

## SPECIFICATION

(Natural or Propane) gas water heater(s) shall be A. O. Smith Cyclone Flex model # \_\_\_\_\_ or equal, minimum 95% thermal efficiency, a storage capacity of \_\_\_\_\_ gallons, an input rating of \_\_\_\_\_ BTUs per hour, a recovery rating of \_\_\_\_\_ gallons per hour (gph) at 100°F rise and a maximum hydrostatic working pressure of 160 psi. Water heater(s) shall: 1. Adaptive gas controlled modulating gas burner that automatically adjusts the input based on demand. 2. Powered anodes that are non sacrificial and maintenance free. 3. Have seamless glass-lined steel tank construction, with glass lining applied to all water-side surfaces after the tank has been assembled and welded; 4. Meets the thermal efficiency and/or standby loss requirements of the U. S. Department of Energy and current edition of ASHRAE/IES 90.1; 5. Have foam insulation and a CSA Certified and ASME rated T&P relief valve; 6. Have a down-fired power burner designed for precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up; 7. Be approved for 0" clearance to combustibles. 8. Come standard with leak detection module that provides audible and display notification if leak is detected.

The control shall be an integrated solid-state temperature and ignition control device with integral diagnostics, graphic user interface, fault history display, and shall have digital temperature readout. 1. All models are design certified by Underwriters Laboratories (UL), Inc., according to ANSI Z21.10.3 - CSA 4.3 standards governing storage type water heaters; 2. Meet the thermal efficiency and standby loss requirements of the U. S. Department of Energy and current edition ASHRAE/IES 90.1. Complies with SCAQMD Rule 1146.2 and other air quality management districts with similar requirements for low NOx emissions.

60 Gallon Models: For Standard Power Venting: Water heater(s) shall be suitable for power venting using a (2", 3" or 4") \_\_\_\_\_ diameter PVC pipe for a maximum total distance of (75 ft, 100 ft or 150 ft.) \_\_\_\_\_ equivalent feet of vent piping. For Power Direct Venting: Water heater(s) shall be suitable for power direct venting using a (2", 3" or 4") \_\_\_\_\_ diameter PVC pipe for a maximum total distance of (75 ft, 100 ft or 120 ft.) \_\_\_\_\_ equivalent feet of vent piping and (75 ft, 100 ft. or 150 ft.) \_\_\_\_\_ equivalent feet of intake air piping.

100 Gallon Models: For Standard Power Venting: Water heater(s) shall be suitable for power venting using a (2", 3" or 4") \_\_\_\_\_ diameter PVC pipe for a maximum total distance of (50 ft, 150 ft or 150 ft.) \_\_\_\_\_ equivalent feet of vent piping. For Power Direct Venting: Water heater(s) shall be suitable for power direct venting using a (2", 3" or 4") \_\_\_\_\_ diameter PVC pipe for a maximum total distance of (50 ft, 150 ft or 200 ft.) \_\_\_\_\_ equivalent feet of vent piping and (50 ft, 150 ft. or 200 ft.) \_\_\_\_\_ equivalent feet of intake air piping.

119 Gallon Models: For Standard Power Venting: Water heater(s) shall be suitable for standard power venting using a (4" or 6") \_\_\_\_\_ diameter PVC pipe for a maximum total distance of (100 ft. or 150 ft.) \_\_\_\_\_ equivalent feet of vent piping. For Power Direct Venting: Water heater(s) shall be suitable for power direct venting using a (4" or 6") \_\_\_\_\_ diameter PVC pipe for a maximum total distance of (100 ft. or 150 ft.) \_\_\_\_\_ equivalent feet of vent piping and (100 ft. or 150 ft.) \_\_\_\_\_ equivalent feet of intake air piping.

Operation of the water heater(s) in a closed system where thermal expansion has not been compensated for (with a properly sized thermal expansion tank) will void the warranty.

Water heater should incorporate the iCOMM™ system for remote monitoring, leak detection and fault alert.