

SOLAR GAS BACKUP

INTEGRATED SOLAR & HIGH EFFICIENCY GAS BACKUP WATER HEATERS

The ENERGY STAR® Qualified *Solar Gas Backup* blends all of the features of Cyclone® high efficiency gas water heater with a storage tank optimized for solar thermal applications or our commercial heat pump water heater. The integrated space-saving design provides a single tank solution combining storage for heat captured by renewable energy sources with 96% thermally efficient gas backup. This innovative hybrid technology takes efficiency and performance to their highest levels.

Solar Features

- Designed for commercial or large residential with 200-500 gallons daily hot water usage
- Solar loop side connections - supply and return from collectors
- Direct and Indirect models
- STH direct models have open tank solar loop connections and are suitable for open loop systems or closed loop systems using an external heat exchanger
- STHX indirect models have an integrated single wall heat exchanger coil and are suitable for closed loop systems using Propylene Glycol and distilled water mixture as the heat transfer fluid
- Combine with our new two, three and four collector solar package systems that are SRCC certified OG-300 for a complete solar hot water system (package systems available October 2012)
- Compatible with our integrated standard and double wall solar pump stations
- Compatible with model AWH-35 commercial heat pump water heater as an alternate renewable energy heat source
- Recirculation loop side connection
- Factory-installed lower tank temperature sensor for field supplied solar controls

Tank Features

- 100-gallons storage
- Powered anode rod - maintenance free protection against corrosion - permanent design that does not require replacement unless damaged
- Permaglas® Ultra Coat™ glasslined tank provides superior protection against corrosion

Gas Backup Features

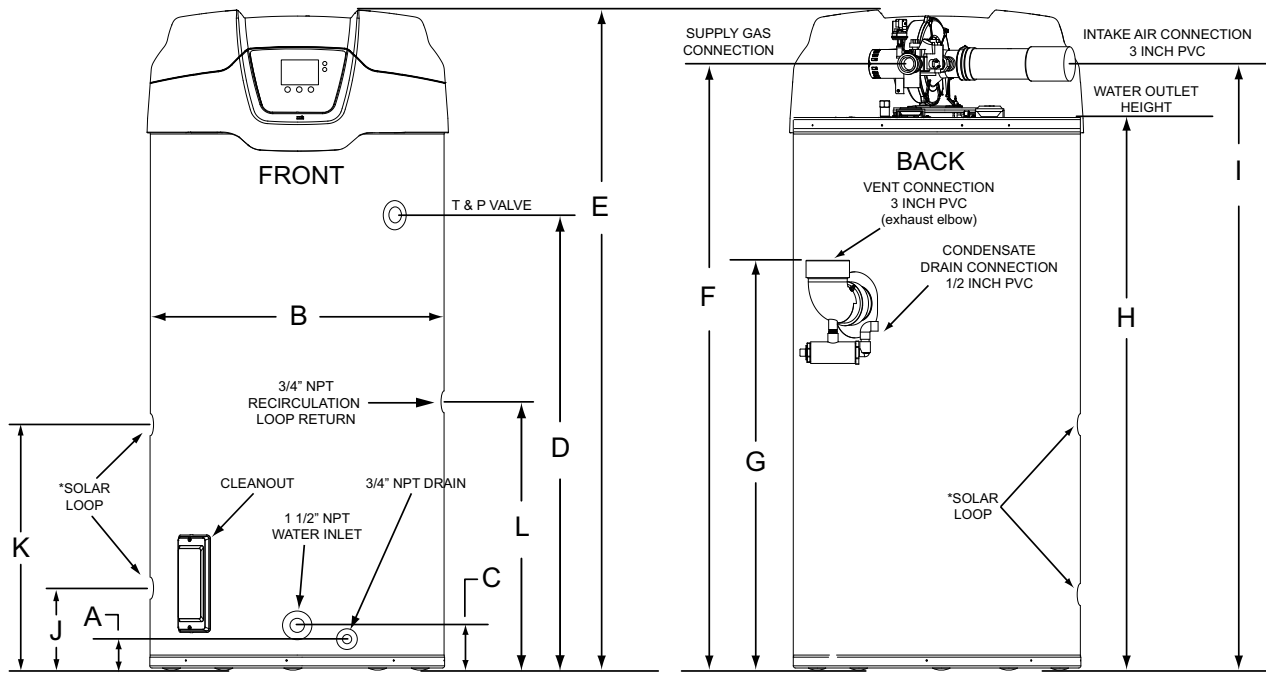
- Maximum operating set point for the gas backup burner is 140°F – allows for optimum solar contribution
- Exclusive A. O. Smith designed control system provides detailed operational information, precise temperature control and built-in diagnostics
- 96% thermally efficient 120,000 Btu/hr gas backup burner - available in natural gas and propane
- Top mounted, down-fired pre-mix burner provides optimum efficiency and quiet operation
- Complies with SCAQMD Rule 1146.2 and other Air Quality Management Districts with similar requirements for low NOx emissions
- Meets the thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition of ASHRAE/IESNA 90.1
- Design-certified by CSA International
- iComm™ compatible for remote monitoring of the gas heat section. Call 1.888.WATER02 for more information.
- Conventional power venting or power direct venting
- Vents vertically or through sidewall
- Direct vent intake and exhaust pipe can terminate separately outside building, or through single opening, using concentric vent assembly
- Uses inexpensive PVC, CPVC, pipe for intake and exhaust
- Flexible venting – uses 3" or 4" pipe – up to 120 equivalent feet



STH-120 and STHX-120



These models are eligible for a 30% federal tax credit for the total installed costs (no cap) when installed as part of a complete commercial or residential solar thermal hot water system. State and local incentives may also apply.



*Solar loop connections are 1 1/2" NPT female on STH-120 models and 1" NPT female on STHX models.

These designs comply with the current edition of the American National Standard for Gas Water Heaters, Volume III, ANSI Z21.10.3 / CSA 4.3 as an automatic circulating tank water heater, and automatic storage water heaters.

MODEL	DIMENSIONS												SHIP WEIGHT STD
	A	B	C	D	E	F	G	H	I	J	K	L	
	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	INCHES/CM	
STH-120	3 / 7.62	27.75 / 70.5	6.3 / 16	55.5 / 141	75.5 / 191.8	68.5 / 174	32 / 81.3	63 / 160	69 / 175.3	5.5 / 14	26.5 / 67.3	31.8 / 80.7	535 / 245
STHX-120	3 / 7.62	27.75 / 70.5	6.3 / 16	55.5 / 141	75.5 / 191.8	68.5 / 174	32 / 81.3	63 / 160	69 / 175.3	5.5 / 14	26.5 / 67.3	31.8 / 80.7	568 / 258

STH models have open tank solar loop connections and are suitable for use in open systems or closed systems using an external heat exchanger.

STHX models have an integrated single wall heat exchanger coil in the bottom of the tank and are suitable for closed loop active systems using non-toxic Propylene Glycol and distilled water mixture as the heat transfer fluid. Glycol used must contain corrosion inhibitors.

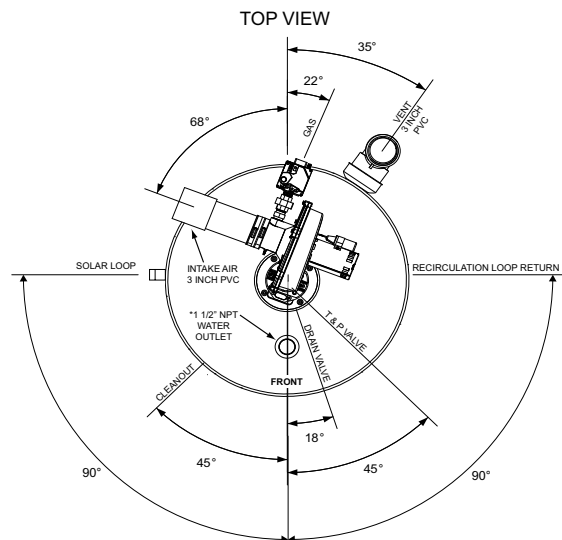
STHX MODEL HEAT EXCHANGER COIL DATA

MODEL NUMBER	TUBE SIZE I.D. (inches)	SURFACE AREA (square feet)	COIL CAPACITY (gallons)	TUBE LENGTH (feet)
STHX-120	1.63	18.8	4	43.5

Heat exchanger must only be used with a propylene glycol heat transfer fluid containing corrosion inhibitors such as Dowfrost™.

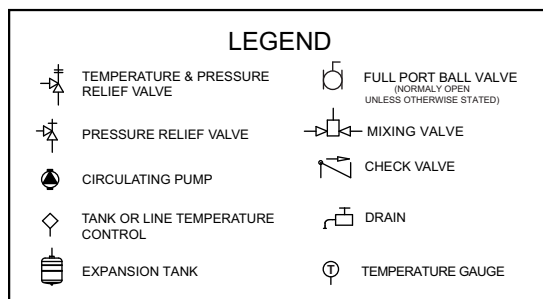
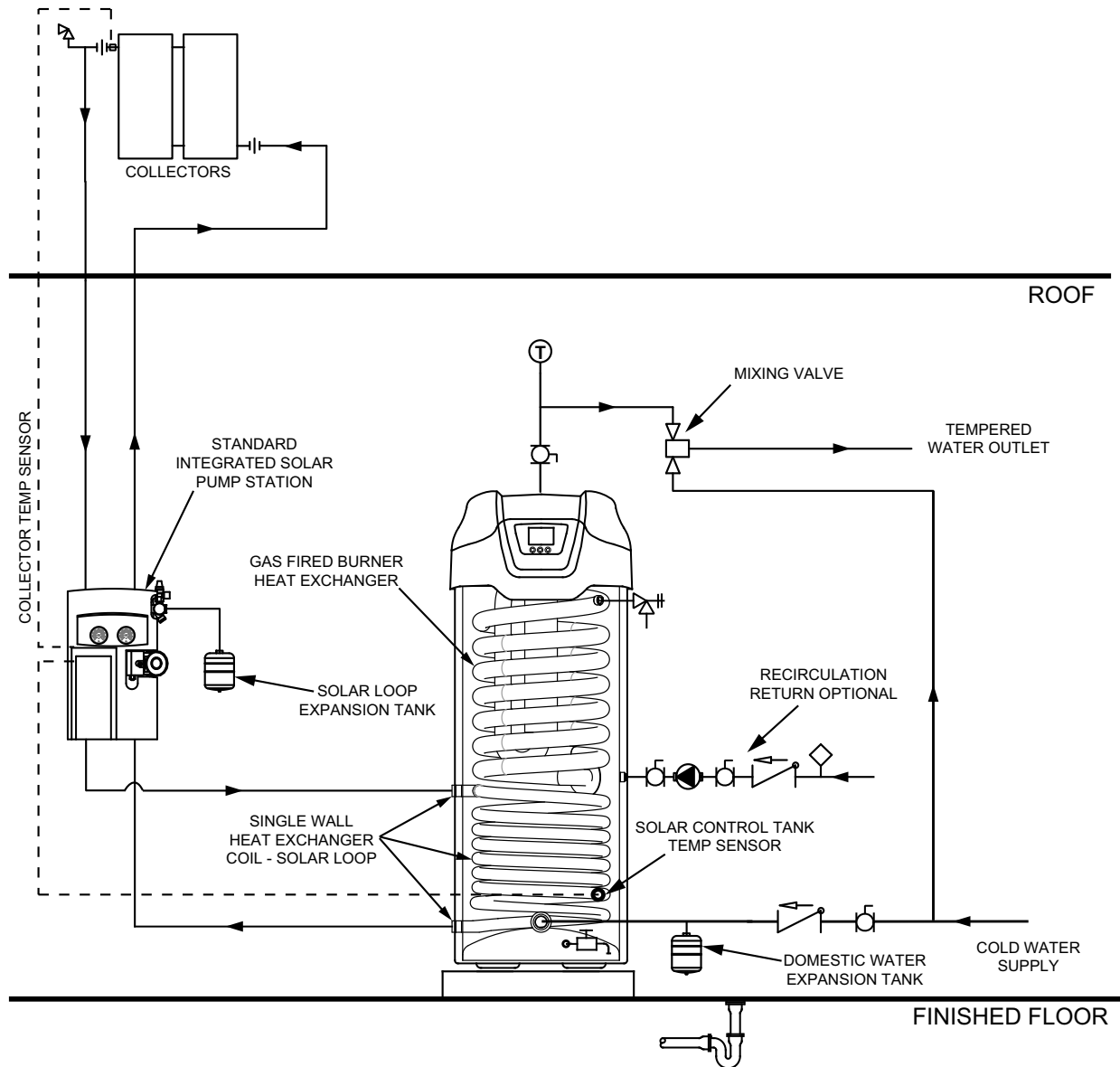
Working pressure of the internal heat exchanger coil is 150 PSI.

MODEL NUMBER	FLOW RATE (gallons per minute)	PRESSURE DROP THROUGH COIL (feet of H2O)
STHX-120	2	0.05
	4	0.15
	6	0.25



* Center line of water outlet on top of the water heaters is approximately 7 inches from the front edge of the water heater.

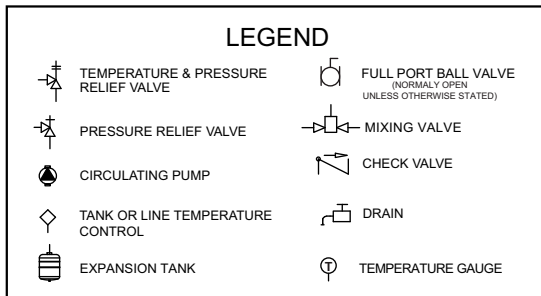
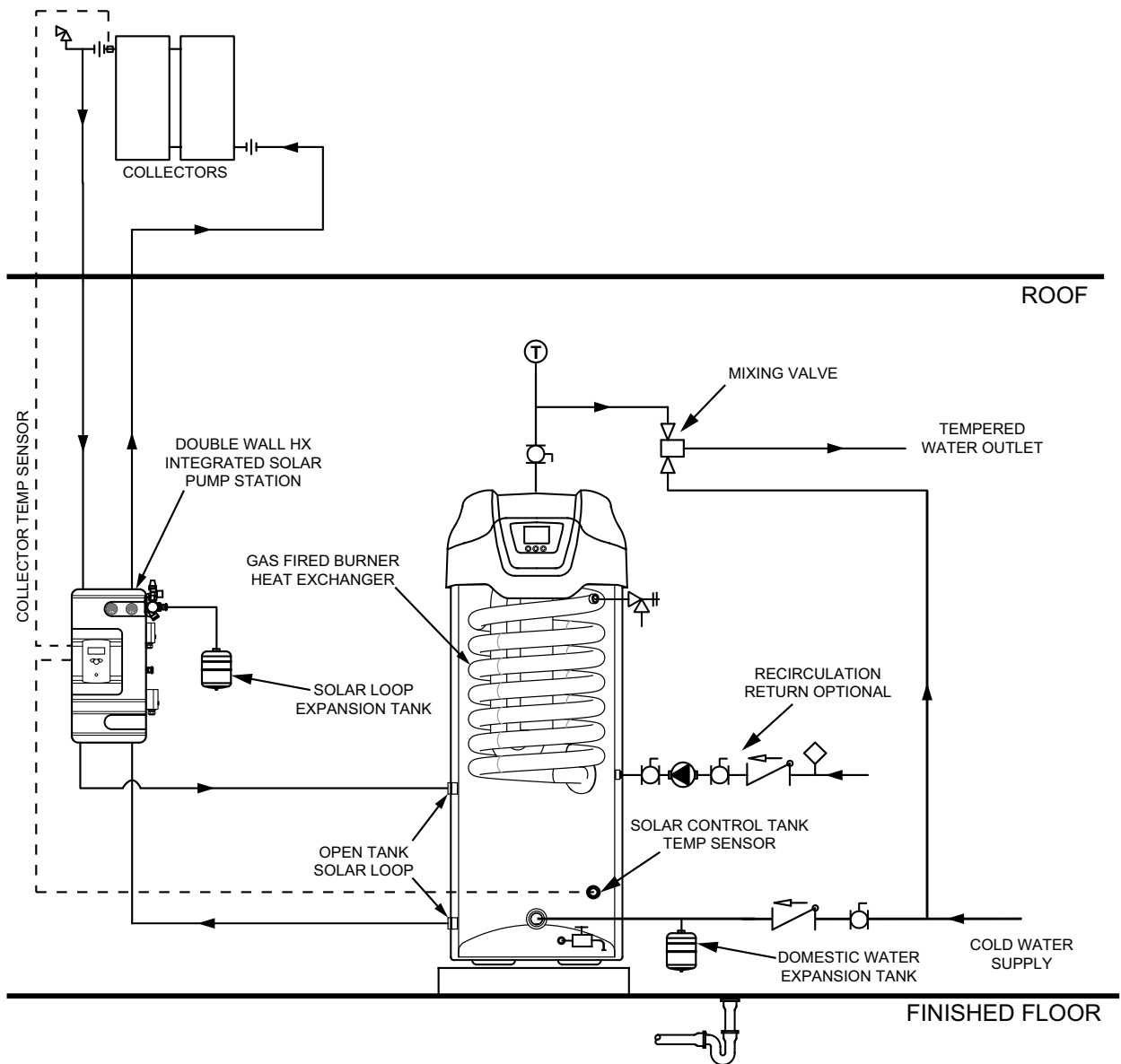
TYPICAL APPLICATION STHX-120



SOLAR SYSTEM PACKAGE MODEL	SOLAR GAS BACKUP MODEL	NUMBER OF COLLECTORS	COLLECTOR SIZE (FT)	HEAT EXCHANGER TYPE
SACI 02 500202-T41	STHX-120	2	3.5' x 7'	Single Wall Internal Coil
SACI 03 500203-T41	STHX-120	3	3.5' x 7'	Single Wall Internal Coil
SACI 04 500204-T41	STHX-120	4	3.5' x 7'	Single Wall Internal Coil

Solar system packages available October 2012

TYPICAL APPLICATION STH-120



SOLAR SYSTEM PACKAGE MODEL	SOLAR GAS BACKUP MODEL	NUMBER OF COLLECTORS	COLLECTOR SIZE (FT)	HEAT EXCHANGER TYPE
SACE 02 400202-T41	STH-120	2	3.5' x 7'	Double Wall External Plate
SACE 03 400203-T41	STH-120	3	3.5' x 7'	Double Wall External Plate
SACE 04 400204-T41	STH-120	4	3.5' x 7'	Double Wall External Plate

Solar system packages available October 2012

HEAT INPUT SOLAR LOOP - SOLAR THERMAL COLLECTORS

COLLECTOR MODEL/SIZE	COLLECTOR APERTURE AREA		THERMAL PERFORMANCE (per collector)		MAXIMUM SOLAR THERMAL INPUT	
	Square Feet	Square Meters	SRCC Data Warm Climate Clear Day	SRCC Data Cool Climate Clear Day	Maximum Number CR-110-AP Collectors	Maximum kBtu/day
CR-110-AP FLAT PLATE COLLECTOR (3.5' X 7')	25.5	2.37	25.1 kBtu/day	15.5 kBtu/day	4	100.4 kBtu/day

Notes: CR-110-AP collector model specification sheet available for download on company website. Contact your local distributor or sales representative for more information.
If other collectors are used in place of CR-110-AP do not exceed maximum Btu/day input above.

HEAT INPUT SOLAR LOOP - AIR TO WATER HEAT PUMP

AIR TO WATER HEAT PUMP MODEL NUMBER	PERFORMANCE				
	WATER HEATING CAPACITY		COOLING CAPACITY		C.O.P. (Heating)
	kW	Btu/hr	Btu/hr	Tons of Cooling	
AWH-35	10.4	35,500	27,500	2.3	3.9

Notes: Performance rating at 75° F Entering Air Temperature and 55% Relative Humidity, 100°F Entering Water Temperature.

C.O.P. = coefficient of performance

Standard 208/230V, 3-phase, 60 Hz. Optional: 208/230v, 1-phase, 60Hz and 460v, 3-phase, 60Hz.

AWH model specification sheet available for download on company website. Contact your local distributor or sales representative for more information.

GAS BACKUP RECOVERY CAPACITY

MODEL	TYPE OF GAS	INPUT		THERMAL EFFICIENCY	U.S. GALLONS/HR AND LITRES/HR AT TEMPERATURE RISE INDICATED													
					APPROX. CAPACITY	F°	30F°	40F°	50F°	60F°	70F°	80F°	90F°	100F°	110F°	120F°	130F°	140F°
		BTUH	kW			C°	17C°	22C°	28C°	33C°	39C°	44C°	50C°	56C°	61C°	67C°	72C°	78C°
STH/STHX 120	NATURAL/ PROPANE	120,000	35	96%	60 U.S. Gal	GPH	461	345	276	230	197	173	154	138	126	115	106	99
					227 Litres	LPH	1744	1308	1046	872	747	654	581	523	476	436	402	374

Recovery capacities are based on heater performance at 96% thermal efficiency.

Maximum gas supply pressure: 10.5" W.C. natural gas 14" W.C. propane.

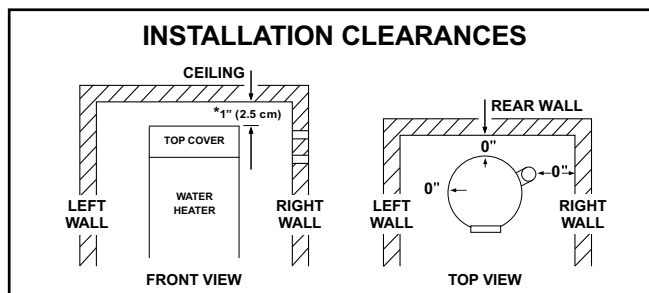
Electrical requirements: 120 VAC/60Hz, Blower 2.2 Amps FL, Igniter 4.0 Amps.

MAXIMUM EQUIVALENT VENT LENGTHS STH/STHX-120

*NUMBER OF 90° ELBOWS INSTALLED	3 INCH PIPE	4 INCH PIPE
	MAXIMUM FEET (METERS)	MAXIMUM FEET (METERS)
One (1)	45 feet (13.7 meters)	115 feet (35.0 meters)
Two (2)	40 feet (12.2 meters)	110 feet (33.5 meters)
Three (3)	35 feet (10.7 meters)	105 feet (32.0 meters)
Four (4)	30 feet (9.1 meters)	100 feet (30.5 meters)
Five (5)	-----	95 feet (29.0 meters)
Six (6)	-----	90 feet (27.4 meters)

* Maximum number of 90° elbows allowed for the vent (exhaust) pipe is four (4) when installing 3 inch pipe and six (6) when installing 4 inch pipe. Maximum number of 90° elbows allowed for intake air pipe is four (4) when installing 3 inch pipe and six (6) when installing 4 inch pipe. Two (2) 45° elbows equal one (1) 90° elbow.

MINIMUM SUPPLY GAS LINE SIZE		
MODEL	NATURAL GAS	PROPANE GAS
STH/STHX 120	3/4" NPT	3/4" NPT



*Minimum clearance to remove top cover



Commercial Solar Water Heaters

OTHER FEATURES

SPACE-SAVING DESIGN FOR INSTALLATION FLEXIBILITY

- Reduced footprint, ease of service, protection from water damage in case of flooding
- 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, 4" alcove installation clearance in front Handhole Cleanout of unit
- Handhole cleanout allows easy access to tank interior for cleaning
- 0" clearance to combustibles, approved for installation on combustible floors

LIMITED WARRANTY

- Three year tank warranty standard (5 year tank warranty optional)
- One year parts warranty
- For complete warranty details, consult written warranty shipped with heater

INSTALLATION CONSIDERATIONS

1. Condensate Drain – This is a fully condensing water heater and should be located near a drain to permit proper disposal of condensate.
2. Vent Termination – Exhaust gases of this water heater are less than 140°F. In cold climates water vapor in flue gases will condense into a cloud of vapor where the vent exits the building. This vapor can gradually discolor exterior building surfaces when terminated through a side wall. The vent termination should be located where this is not a concern or through the roof to avoid the potential problem. Always locate vent termination above the maximum snowline, and do not locate vent termination above a walkway.
3. Air Intake – In cold climates, air intake should be located at least four feet from the vent termination of the water heater and any other appliance vents that discharge moisture-laden air (such as clothes dryers). This will help prevent freeze-over of the intake screen. Air intake should be located above the maximum snowline.
4. Noise – Vent terminal should be located away from bedroom windows or other areas where blower noise will be objectionable.
5. Optional Concentric Vent Kit - Helps to minimize unsightly wall/roof penetrations. STH/STHX-120 vent kit p/n 9006328005

SUGGESTED SPECIFICATION

Water heater shall be A. O. Smith model # _____ or equal and shall be an integrated solar thermal _____ (direct/indirect) water heater with a gas fired backup burner to maintain system temperature during periods when solar energy is not available. The water heater shall have a water storage capacity of 100 gallons. The water heater shall be fitted with a dedicated recirculation loop connection in the mid portion of the storage tank for applications with hot water building recirculation to maximize solar energy gain in the lower portion of the tank.

Direct models shall have two open tank solar loop connections in the lower portion of the tank for connection to a solar thermal collector array. Direct models will be compatible with open loop solar thermal water heating systems or closed loop solar thermal systems with external heat exchangers.

Indirect models shall have an integrated single wall coil type heat exchanger with two solar loop connections in the lower portion of the tank for connection to a solar thermal collector array. Indirect models will be compatible with closed loop solar thermal systems using heat transfer fluid containing a mixture of distilled/demineralized water and propylene glycol with corrosion inhibitors.

The gas fired backup burner shall be fueled by _____ (Natural/Propane) gas and be 96% thermally efficient with an input rating of 120,000 BTUs per hour, a recovery rating of 138 gallons per hour (gph) at 100°F rise and a maximum hydrostatic working pressure of 160 PSI. Water heater(s) shall: 1. Have seamless glasslined steel tank construction, with glasslining applied to all domestic water-side surfaces after the tank has been assembled and welded; 2. Meets the thermal efficiency and standby loss requirements of the U. S. Department of Energy and current edition of ASHRAE/IESNA 90.1 3. Have foam insulation and a CSA Certified and ASME rated T&P relief valve; 4. Have a down-fired power burner designed for precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up; 5. Be approved for 0" clearance to combustibles.

Heater shall be supplied with maintenance-free powered anode.

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.

The water heater(s) shall be: 1. Design certified by CSA; 2. Meets the thermal efficiency and standby loss requirements of the U. S. Department of Energy and current edition ASHRAE/IESNA 90.1.; 3. Comply with SCAQMD Rule 1146.2 and other air quality management districts with similar requirements for low NOx emissions.

For conventional-vent specification: The water heater(s) shall be suitable for venting in 3" PVC pipe for a total equivalent distance of 50 ft and 4" PVC pipe for a total equivalent distance of 120 ft.

For sealed-combustion direct vent specification: The water heater(s) shall be suitable for venting with (3" or 4") _____ diameter PVC pipe for a total equivalent distance of (50 ft or 120 ft) _____ feet. [Alternative venting: the heater(s) shall be suitable for sealed combustion direct venting using a (3" or 4") _____ diameter PVC exhaust pipe for a total distance of (50 ft or 120 ft) _____ equivalent feet of vent and (50 ft or 120 ft) _____ equivalent feet of intake.]

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 of the gas fired backup burner, leak detection and fault alert.