

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 09-0713	Issue Date:	CBL: 037 F017001
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Location of Construction: 489 Congress St	Owner Name: Mhs Inc	Owner Address: 485 Congress St	Phone:
Business Name:	Contractor Name: Ranor Inc	Contractor Address: PO Box 88 Jay	Phone 2076455109
Lessee/Buyer's Name	Phone:	Permit Type: HVAC	Zone: B-3

Past Use: Maine Historical Society Research Library	Proposed Use: Library / Insta. boilers in the baseme..	Permit Fee: \$340.00	Cost of Work: \$31,336.00	CEO District: 1
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IRE DEPT: <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied	INSPECTION: Use Group: A-3 Type: HVAC IMC-2003
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Proposed Project Description:
Install 2 natural gas boilers in the basement

Signature: *(KG)* Signature: *JMB 7/15/09*

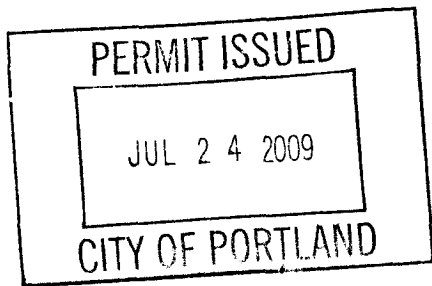
PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action: Approved Approved w/Conditions Denied

Signature: _____ Date: _____

Permit Taken By: gg	Date Applied For: 07/06/2009	Zoning Approval		
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<ol style="list-style-type: none"> This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules. Building permits do not include plumbing, septic or electrical work. Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work.. 	Special Zone or Reviews <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetland <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input type="checkbox"/> Site Plan Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/> Date: <i>OK 7/10/09</i>	Zoning Appeal <input type="checkbox"/> Variance <input type="checkbox"/> Miscellaneous <input type="checkbox"/> Conditional Use <input type="checkbox"/> Interpretation <input type="checkbox"/> Approved <input type="checkbox"/> Denied Date: _____	Historic Preservation <input type="checkbox"/> Not in District or Landmark <input type="checkbox"/> Does Not Require Review <input type="checkbox"/> Requires Review <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied Date: _____
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CERTIFICATION

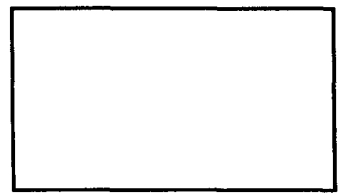
I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE		DATE	PHONE



FILL IN AND SIGN WITH INK

APPLICATION FOR PERMIT HEATING OR POWER EQUIPMENT



037 F017

To the INSPECTOR OF BUILDINGS, PORTLAND, ME.

The undersigned hereby applies for a permit to install the following heating, cooking or power equipment in accordance with the Laws of Maine, the Building Code of the City of Portland, and the following specifications:

Location / CBL _____ Use of Building Public Date 7/1/09
 Name and address of owner of appliance Maine Historical Society Research Library
489 Congress Street, Portland ME 04101
 Installer's name and address Ranor, Inc. 962 Main Street P.O. Box 5036
North Jay, ME 04262 Telephone (207) 645-5109

Location of appliance:

- Basement Floor
 Attic Roof

Type of Fuel:

- Gas Oil Solid

Appliance Name: Boilers (2)

U.L. Approved Yes No

Will appliance be installed in accordance with the manufacture's installation instructions? Yes No

IF NO Explain: _____

The Type of License of Installer:

- Master Plumber # _____
 Solid Fuel # _____
 Oil # _____
 Gas # PNT 4129
 Other _____

Type of Chimney:

- Masonry Lined
 Factory built _____

- Metal
 Factory Built U.L. Listing # _____

- Direct Vent
 Type Corr/Guard Dbl Wall Vent

Type of Fuel Tank

- Oil
 Gas - Natural

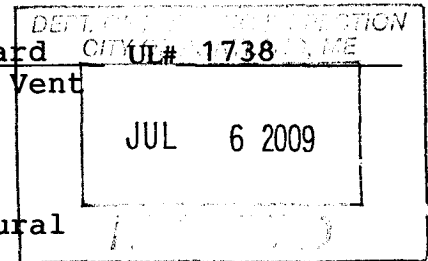
Size of Tank N/A

Number of Tanks N/A

Distance from Tank to Center of Flame N/A feet.

Cost of Work: \$ 31,336

Permit Fee: \$ 340



Approved

Approved with Conditions

Fire: _____
 Ele.: _____
 Bldg.: _____

- See attached letter or requirement

Inspector's Signature

Date Approved

Signature of Installer Phil Nichols

White - Inspection Yellow - File Pink - Applicant's Gold - Assessor's Copy

City of Portland, Maine - Building or Use Permit

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Permit No: 09-0713	Date Applied For: 07/06/2009	CBL: 037 F017001
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Location of Construction: 489 Congress St	Owner Name: Mhs Inc	Owner Address: 485 Congress St	Phone:
Business Name:	Contractor Name: Ranor Inc	Contractor Address: PO Box 88 Jay	Phone (207) 645-5109
Lessee/Buyer's Name	Phone:	Permit Type: HVAC	

Proposed Use: Library / Install 2 natural gas boilers in the basement	Proposed Project Description: Install 2 natural gas boilers in the basement
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Dept: Zoning	Status: Approved	Reviewer: Marge Schmuckal	Approval Date: 07/10/2009	Ok to Issue: <input checked="" type="checkbox"/>
Note:				
Dept: Building	Status: Approved with Conditions	Reviewer: Jeanine Bourke	Approval Date: 07/15/2009	Ok to Issue: <input checked="" type="checkbox"/>
Note:				
1) The installation must comply with the State of Maine Gas Regulations.				
2) The appliance and venting shall be installed in accordance with the UL listing, IMC 2003 and NFPA 211.				
Dept: Fire	Status: Approved with Conditions	Reviewer: Capt Greg Cass	Approval Date: 07/14/2009	Ok to Issue: <input checked="" type="checkbox"/>
Note:				
1) Install shall comply with all manufacture's specifications.				
2) Install shall comply with NFPA 54. A compliance letter is required				

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

to schedule your inspections as agreed upon

Permits expire in 6 months, if the project is not started or ceases for 6 months.

The Owner or their designee is required to notify the inspections office for the following inspections and provide adequate notice. Notice must be called in 48-72 hours in advance in order to schedule an inspection:

By initializing at each inspection time, you are agreeing that you understand the inspection procedure and additional fees from a "Stop Work Order" and "Stop Work Order Release" will be incurred if the procedure is not followed as stated below.

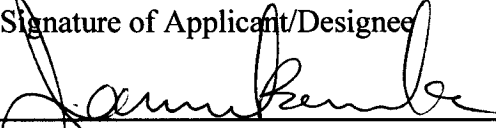
A Pre-construction Meeting will take place upon receipt of your building permit.

 X Final inspection required at completion of work.

Certificate of Occupancy is not required for certain projects. Your inspector can advise you if your project requires a Certificate of Occupancy. All projects DO require a final inspection.

If any of the inspections do not occur, the project cannot go on to the next phase, REGARDLESS OF THE NOTICE OR CIRCUMSTANCES.

CERIFICATE OF OCCUPANICES MUST BE ISSUED AND PAID FOR, BEFORE THE SPACE MAY BE OCCUPIED.

Signature of Applicant/Designee


Signature of Inspections Official

Date
7/15/09

Date

RaNor, Inc.
Mechanical Contractors

PO Box 5036
North Jay, ME 04262
Ph : 207-645-5109

Submittal

Job: 0729
ME Historical Society Library
ME Historical Society Library
489 Congress Street
Portland, ME 04101

Spec Section No: 15500 2.13
Submittal No: 1
Revision No: 0
Sent Date: 11/6/2007

RECEIVED
NOV 07 2007
Consigli Construction Co.

Spec Section Title:
Submittal Title: Boilers

Contractor:
RaNor Inc.

Contractor's Stamp
BCD
RCD

Consigli

Architect's Stamp

Engineer's Stamp

SPECIFICATIONS

KN-6 Boiler - Input 600 MBH, Gross Output 528

	Nominal	Minimum	Maximum
Gas Pressure (" W.C.)	7	2	14
Voltage - 60 Hz / 1 Ph.	120	102	132
Flow (GPM)		10	100
Temperature Rise (°F)		20	100
Flue Length (Equiv. Ft.)		6	80
Air Inlet Length (Equiv. Ft.)		0	80
Water Volume (Gal.)	9.5		
Supply and Return Water Tappings	3"		
Flue Diameter (In.)	5"		
Shipping Weight (Lbs.)	737		
Current (Amps)	5		
Cv. GPM (1 PSID)	60		
Fuel Type	Natural		
Unbalanced Flue Limitations (NOT DIRECT VENT)			
Negative Flue Pressure (Max)	-0.3" W.C.		
Positive Flue Pressure (Max)	0.08" W.C.		

CSD-1 BOILER TRIM & CONTROLS

Main Gas Valve	Dungs DMV-sc 512/11 522	LWCO Manual Reset	750P M/M
Ignition Control	RM7890 Honeywell	Pilot Valve	V4046C-1005 Honeywell
Operator - 1 Boiler	Tekmar BTC MPA 956-10	Air Switch	HUBA 605
Operator - Multiple Boilers	L4007A Honeywell	Blower Motor	Fasco 70430010
Manual Reset High Limit	L4006E-1067 Honeywell	Relief Valve	Conbraco 10-600 Series
Main Gas Lube Cock	Apollo 50-6B501A (1" NPT)	Pilot Press. Regulator	RV12LT Maxitrol
Pilot Cock	Conbraco 56-221-01	A.S.M.E. Design Data	Max. 100 psig & 250° F
Boiler Hp	16		

Category IV Appliance
(see Installation and Operation Manual
for venting information.)

KN-6

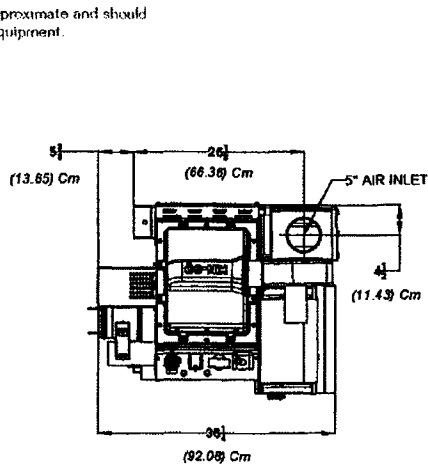
HydroTherm®

Division of Mestek, Inc. Westfield, MA 01085
Ph. (413) 564-5515 Fax (413) 568-9613

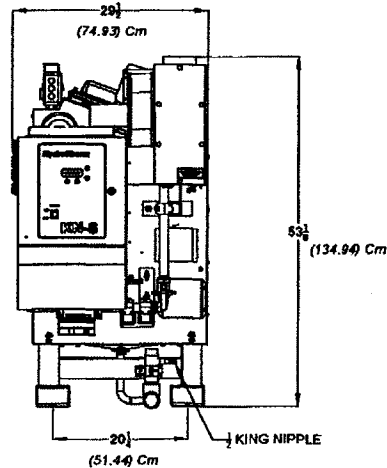
CODE OPTIONS

CSD-1	STANDARD
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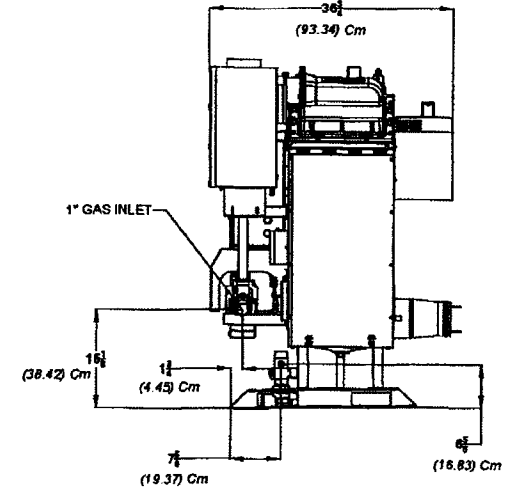
NOTE: Dimensions are approximate and should not be used to "rough-in" equipment.



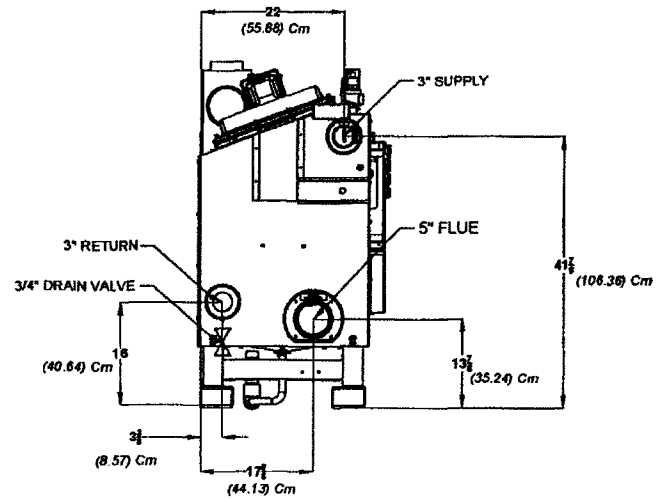
TOP VIEW



FRONT VIEW



SIDE VIEW



REAR VIEW

REP FIRM	_____	<h2 style="margin: 0;">KN-6</h2> <p style="margin: 0;">Category II or Category IV Appliance <small>(see Installation and Operation Manual for venting information)</small></p> <h3 style="margin: 0;">HydroTherm</h3> <p style="margin: 0;"><small>A Product of</small> ADVANCED THERMAL HYDRONICS A Division of Mestek, Inc. Westfield, MA 01085 (413) 564-5515</p>
SUBMITTED BY	_____	
JOB NAME	_____	
ARCHITECT	_____	
ENGINEER	_____	
CONTRACTOR	_____	
DATE	_____	

HydroTherm®

KN SERIES GAS BOILER WITH CONTROL INSTALLATION & OPERATING INSTRUCTIONS



MEA #444-05-E

MASS Plumbers #G1-06-04-28

DESIGNED AND TESTED ACCORDING TO A.S.M.E. BOILER AND PRESSURE VESSEL CODE, SECTION IV FOR A MAXIMUM ALLOWABLE WORKING PRESSURE OF 100 PSI, 700 kPa, WATER.

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical switch. Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

CAUTION: Do not use automotive anti-freeze in the boiler waterways. If the use of antifreeze is necessary an anti-freeze specifically formulated for hydronic heating systems must be used or damage to the boiler may occur voiding the warranty!

INSTALLER, THESE INSTRUCTIONS TO BE AFFIXED ADJACENT TO THE BOILER / WATER HEATER.
CONSUMER, RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE PURPOSES.

Advanced Thermal Hydronics

 A MESTEK COMPANY

IN UNITED STATES: 260 NORTH ELM ST. • WESTFIELD, MA 01085 • (413) 564-5515 • FAX (413) 568-9613
IN CANADA: 7555 TRANMERE DRIVE • MISSISSAUGA, ONT. L5S 1L4 • (905) 672-2991 • FAX (905) 672-2883
www.hydrothermkn.com

AVERTISSEMENT. Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort

Ne pas entreposer ni utiliser d'essence ou ni d'autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- **Ne pas tenter d'allumer d'appareil.**
- **Ne touchez à aucun interrupteur; ne pas vous servir des téléphones se trouvant dans le bâtiment.**
- **Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les intructions du fournisseur.**
- **Si vous ne pouvez rejoindre le fournisseur, appelez le service des incendies.**

L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

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BEFORE YOU START

This manual covers the application, installation, operation and maintenance of a KN series boiler.

To obtain the safe, dependable, efficient operation and long life for which this boiler was designed, these instructions must be read, understood and followed.

The KN boiler series has been design certified by CSA for use with natural gas under the latest revision of ANSI-Z21.13/CSA 4.9, Gas-Fired Hot Water Boilers and CAN1-3.1, Industrial and Commercial Gas Fired Packaged Boilers. Each unit has been constructed and hydrostatically tested for a maximum working pressure of 100 psi, 700 kPa, in accordance with Section IV of the A.S.M.E. Boiler and Pressure Vessel Code.

All aspects of the boiler installation must conform to the requirements of the authority having jurisdiction, or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA 54-latest revision. Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

If installed in the Commonwealth of Massachusetts, you **MUST FOLLOW** the additional instructions contained in HydroTherm's instruction sheet MACODE-3. Please refer to the back of this manual for required regulations.

In Canada, the installation must be in accordance with the requirements of CSA B149.1 or .2, Installation Code for Gas Burning Appliances and Equipment.

The owner should maintain a record of all service work performed with the date and a description of the work done. Include the name of the service organization for future reference.

Direct all questions to your HydroTherm distributor or contact the HydroTherm Customer Service Department at: 260 North Elm Street, Westfield, MA 01085. Always include the model and serial numbers from the rating plate of the boiler in question.

RATINGS & CAPACITIES

Before installing the KN boiler check the rating plate to ensure that the unit has been sized properly for the job. Also ensure that the unit has been set up for the type of gas available at the installation site. Other important considerations are the availability of an adequate electrical supply, fresh air for combustion and a suitable vent system.

BOILER LOCATION

1. This boiler is suitable for indoor installations only. Locate the boiler in an area that provides good access to the unit. Servicing may require the removal of jacket panels. Allow the minimum clearances between adjacent construction and the boiler as listed in Table 1.

NOTE: Service clearances are not mandatory, but are recommended to ensure ease of service should it be required.

Table 1 - Clearances

	Clearance to Combustibles		Service Clearance	
	in	mm	in	mm
Top	6	153	24	610
Back	6	153	24	610
Left Side	6	153	6	152
Right Side	6	153	6	152
Front	6	153	36	914
Flue	6	153		

2. An optimum site will be level, central to the piping system, close to a chimney or outside wall and have adequate fresh air for combustion. Ensure that the unit is level from front to back and from side to side. Use metal shims if leveling is required. Electrical and electronic components must be protected from exposure to water during operation and maintenance. DO NOT install this boiler in a location that would subject any of the gas ignition and other electronic components to direct contact with water or excessive moisture during operation or servicing.
3. Ensure that the floor is structurally sound and will support the weight of the boiler.

NOTE: The KN may be installed directly on combustible flooring, but never on carpeting.

4. Locate the boiler in an area that will prevent water damage to adjacent construction should a leak occur or during routine maintenance.

5. **DO NOT** place this boiler in a location that would restrict the introduction of combustion air into the unit or subject it to a negative pressure unless the combustion air is piped from the outside, see the COMBUSTION AIR & VENTILATION section.
6. **NEVER** place this boiler in a location that would subject it to temperatures at or near freezing.

WARNING: Never store combustible materials, gasoline or any product containing flammable vapors or liquids in the vicinity of the boiler. Failure to comply with this warning can result in an explosion or fire causing extensive property damage, severe personal injury or death!

COMBUSTION AIR & VENTILATION

WARNING: This boiler must be supplied with combustion air in accordance with Section 5.3, Air for Combustion & Ventilation, of the latest revision of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and all applicable local building codes. Canadian installations must comply with CSA B149.1 or .2 Installation Code for Gas Burning Appliances and Equipment, or applicable provisions of the local building codes. Failure to provide adequate combustion air for this boiler/water heater can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

To operate properly and safely this boiler requires a continuous supply of air for combustion. **NEVER** store objects on or around the boiler!

CAUTION: Combustion air contaminated with fluorocarbons or other halogenated compounds such as cleaning solvents and refrigerants will result in the formation of acids in the combustion chamber. These acids will cause premature failure of the boiler voiding the warranty!

CAUTION: If the boiler is operated while the building is under construction it must be protected from wood, concrete, sheet rock and other types of dust. Failure to properly protect the unit from construction dust will damage the unit voiding the warranty!

Buildings will require the installation of a fresh air duct or other means of providing make-up air if the intake air option isn't used. Any building utilizing other gas burning appliances, a fireplace, wood stove or any type of exhaust fan must be checked for adequate combustion air when all of these devices are in operation at one time. Sizing of an outside air duct must be done to meet the requirements of all such devices.

WARNING: Never operate the KN in an environment subjected to a negative pressure unless it is Direct Vented. Failure to comply with this warning can result in excessive levels of carbon monoxide causing severe personal injury or death!

All Air From Inside The Building

If the boiler is to be located in a confined space the minimum clearances listed in Table 1 must be maintained between it and any combustible construction. When installed in a confined space without the intake air option two permanent openings communicating with an additional room(s) are required. The combined volume of these spaces must have sufficient volume to meet the criteria for an unconfined space. The total air requirements of all gas utilization equipment, fireplaces, wood stoves or any type of exhaust fan must be considered when making this determination. Each opening must have a minimum free area of $1 \text{ in}^2/1000 \text{ Btu/hr}$, $2200 \text{ mm}^2/\text{kW}$ based on the total input rating of ALL gas utilization equipment in the confined area. Each opening must be no less than 100 in^2 , $64,516 \text{ mm}^2$ in size. The upper opening must be within 12 in , 300 mm of, but not less than 3 in , 80 mm from, the top of the enclosure. The bottom opening must be within 12 in , 300 mm of, but not less than 3 in , 80 mm from, the bottom of the enclosure.

All Air From Outside The Building

When installed in a confined space without the intake air option two permanent openings communicating directly with, or by ducts to, the outdoors or spaces that freely communicate with the outdoors must be present. The upper opening must be within 12 in , 300 mm of, but not less than 3 in , 80 mm from, the top of the enclosure. The bottom opening must be within 12 in , 300 mm of, but not less than 3 in , 80 mm from, the bottom of the enclosure.

Where directly communicating with the outdoors or communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of $1 \text{ in}^2/4000 \text{ Btu/hr}$, $550 \text{ mm}^2/\text{kW}$ of the total input rating of all of the equipment in the enclosure.

Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of $1 \text{ in}^2/2000 \text{ Btu/hr}$, $1100 \text{ mm}^2/\text{kW}$ of the total input rating of all of the equipment in the enclosure.

When ducts are used, they must have the same cross-sectional area as the free area of the opening to which they connect.

Table 2 - Make-up Air Duct Sizing

Input (MBH)	Required Cross Sectional Duct Area					
	1/4 in, 6.4 mm Wire Screen		Metal Louvers		Wooden Louvers	
	in ²	cm ²	in ²	cm ²	in ²	cm ²
600	150	967	200	1292	600	3869
1000	250	1612	334	2154	1000	6448
2000	500	3224	668	4308	2000	12,896

When calculating the free area necessary to meet the make-up air requirements of the enclosure, consideration must be given to the blockage effects of louvers, grills and screens.

Screens must have a minimum mesh size of $1/4 \text{ in}$, 6.4 mm . If the free area through a louver or grill is not known ducts should be sized per Table 2 above.

Direct Intake Air Option - General

This configuration provides combustion air directly to the boiler's air intake using a dedicated pipe when using the direct vent option. Combustion air can be drawn in horizontally through an outside wall or vertically through the roof, see Figures 1, 2, 3 & 4. It must be sized per Table 3.

Single wall galvanized smoke pipe, single wall aluminum pipe, flexible aluminum pipe, PVC or CPVC pipe can be used for the intake air pipe.

Table 3 - Intake Air Pipe Sizing

Model Size	Pipe Diameter	
	in ²	mm ²
600	5	127
1000	6	152
2000	9	229

NOTE: All joints in metal intake air systems must be secured using corrosion resistant fasteners and sealed using a suitable Silicone caulk. If PVC or CPVC is used, the joints must be cleaned with a suitable solvent and connected using a solvent based PVC cement. The intake air system **MUST** be supported by the building structure not the boiler.

Direct Intake Air Option - Vertical

The maximum equivalent length for the vertical intake air pipe is 80 ft, 19.7 m. Each 90° mitered elbow and the intake air cap are equal to 10 ft, 3.3 m of straight pipe. If 90° long sweep elbows are installed use the manufacturers recommended equivalent length.

A listed, nonrestrictive intake air cap must be used. The intake air cap must terminate as shown in Figure 3. The penetration point in the roof must be properly flashed and sealed. Approved caps are listed in Table 4.

Direct Intake Air Option - Horizontal

The maximum equivalent length for the horizontal intake air pipe is 80 ft, 19.7 m. Each 90° mitered elbow and the intake air terminal are equal to 10 ft, 3.3 m of straight pipe. If 90° long sweep elbows are installed use the manufacturers recommended equivalent length.

Horizontal runs that exceed 5 ft, 1.5 m must be supported at 3 ft, 0.98 m intervals with overhead hangers. The intake air terminal must terminate as shown in Figures 1, 2 or 4. Approved terminals are listed in Table 5.

Table 4 - Vertical Intake & Vent System Components

Company	Description	Part Number	Dia., in
Flex-L			5
Flex-L			6
Flex-L			9
Heat Fab	Rain Cap	5500CI	5
Heat Fab	Rain Cap	5600CI	6
Heat Fab	Rain Cap	51000CI	9
Pro Tech	Rain Cap	FSRC5	5
Pro Tech	Rain Cap	FSRC6	6
Pro Tech	Rain Cap	FSRC10	9
Z Flex			5
Z Flex			6
Z Flex			9

Table 5 - Horizontal Intake & Vent System Components

Company	Description	Part Number	Dia., in
Flex-L	Vent Adapter		5
Flex-L	Vent Adapter		6
Flex-L	Vent Adapter		9
	Termination T		
	Termination T		
	Termination T		
	Termination EL		
	Termination EL		
	Termination EL		
Heat Fab	Vent Adapter	9501KN10	5
Heat Fab	Vent Adapter	9601KN10	6
Heat Fab	Vent Adapter	91001KN10	9
	Termination T	9590TEE	5
	Termination T	9690TEE	6
	Termination T	90990TEE	9
	Termination EL	7514TERM	5
	Termination EL	9614TERM	6
	Termination EL	90914TERM	9
Pro Tech	Vent Adapter		5
Pro Tech	Vent Adapter	FSA-HFAG	6
Pro Tech	Vent Adapter		9
	Termination T	300313	5
	Termination T	300314	6
	Termination T		9
	Termination EL		5
	Termination EL		6
	Termination EL		9
Z Flex	Vent Adapter		5
	Vent Adapter		6
	Vent Adapter		9
	Termination T	02SVSTTX05	5
	Termination T		6
	Termination T		9
	Termination EL		5
	Termination EL		6
	Termination EL		9

GENERAL VENTING GUIDELINES

WARNING: The vent installation must be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1/NFPA 54-latest revision or applicable provisions of the local building codes. Canadian installations must comply with CSA B149.1 or .2 Installation Code. Improper venting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

All vent systems must be fully supported by the building structure and not by the boiler. Appropriate thimbles and fire-stops must be used where required.

WARNING: Common positive pressure vent systems are not to be used! Improper installation can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

NOTE: A single acting barometric damper must be installed in the vent connector if a vertical vent system produces a negative draft in excess of 0.2 in, 5.08 mm W.C at the flue outlet.

NOTE: One of the vent system adapters listed in Table 5 must be attached to the flue outlet of the boiler before the vent system is connected.

VENT SYSTEM OPTIONS

The KN may be vented the following ways:

- 1) **Direct Vent** - Positive Pressure, Category IV uses a vent system certified to UL 1738 for installations in the United States, ULS636 for installations in Canada. Combustion air is piped from the outdoors to the blower inlet.
- 2) **Side Wall Vent** - Positive Pressure, Category IV uses a stainless steel vent system certified to UL 1738 for installations in the United States, ULS636 for installations in Canada. Combustion air is obtained from the space in which the unit is installed.
- 3) **Vertical Vent** - Positive Pressure, Category IV uses a stainless steel vent system certified to UL 1738 for installations in the United States, ULS636 for installations in Canada. Combustion air is obtained from the space in which the unit is installed.
- 4) **Vertical Vent** - Negative Pressure, Category II uses an approved metal chimney system. Combustion air is obtained from the space in which the unit is installed.

DIRECT VENT POSITIVE PRESSURE, CATEGORY IV

In this configuration the boiler blower is used to push the flue products to the outdoors while drawing combustion air from the outdoors. The INTAKE AIR OPTION instructions under the COMBUSTION AIR & VENTILATION SECTION must be followed! The vent system must be sized per Table 6.

Table 6 - Direct Vent Pipe Size, Positive Pressure

Model Size	Pipe Diameter	
	in ²	mm ²
600	5	127
1000	6	152
2000	9	229

Horizontal Direct Vent Systems - Figures 1 & 2

The vent materials used in positive pressure vent systems must be certified to UL 1738 for installations in the United States, ULC S636 for installations in Canada. The vent terminals listed in Table 5 must also be used. Below is a list of some of the manufactures that have systems that meet these requirements. Others manufacturers that have UL certified systems may be used.

Heat-Fab, Inc.
38 Hayward Street
Greenfield, MA 01301, (800) 772-0739.

Z-Flex U.S., Inc.
20 Commerce Park
North, Bedford, NH 03110-6911, (800) 654-5600.

Protech Systems Inc.
26 Gansevoort Street
Albany, NY 12202 (518) 463-7284

The maximum equivalent length for the horizontal vent pipe is **80 ft, 19.7 m**. Each 90° elbow and the vent terminal are equal to **10 ft, 3.3 m** of straight pipe. To maximize the performance of single wall sheet metal vent systems locate 90° elbows as far from the boiler as possible and from one another. For best results, horizontal vent systems should be as short and straight as possible.

The vent system must be both gas and water tight. All seams and joints in metal pipes must be joined and sealed in accordance with the vent system manufacturer's instructions.

When horizontal vent runs exceed **5 ft, 1.5m** they must be supported at **3 ft, 0.98 m** intervals with overhead hangers. The vent system must be pitched down, toward the vent terminal, **1/4 in/ft, 21mm/m**. If any part of a single wall metal vent system passes through an unheated space it must be insulated with insulation rated for **400°F, 20°C**.

Horizontal vent systems shall terminate at least **4 ft, 1.3 m** below, **4 ft, 1.3 m** horizontally from or **1 ft, 0.23 m** above any door, window or gravity air inlet into any building. It must not terminate less than **4 ft, 1.3 m** horizontally from, and in no case above or below, unless a **4 ft, 1.3 m** horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment and not less than **7 ft, 2.3 m** from any adjacent public walkway. The bottom of the vent terminal(s) shall be located at least **5 ft, 1.5 m** above the air intake terminal(s) unless there is a **5 ft, 1.5 m** distance between them.

Avoid terminal locations likely to be affected by winds, snowdrifts, people and pets. Protect building materials and vegetation from degradation caused by the flue gases.

When running horizontal combustion air and venting for single or multiple units, exhaust and combustion air terminals must be installed on the same plane (outside wall) in order to prevent pressure differences due to prevailing winds. In cold climates, double-wall or insulated inlet pipe recommended to prevent condensation.

Vertical Direct Vent Systems - see Figure 3

The vent materials used in positive pressure vent systems must be certified to UL 1738 for installations in the United States, ULC S636 for installations in Canada.

The vent terminals listed in Table 4 must also be used. Below is a list of some of the manufactures that have systems that meet these requirements. Others manufacturers that have UL certified systems may be used.

Heat-Fab, Inc.
38 Hayward Street
Greenfield, MA 01301, (800) 772-0739.

Z-Flex U.S., Inc.
20 Commerce Park
North, Bedford, NH 03110-6911, (800) 654-5600.

Protech Systems Inc.
26 Gansevoort Street
Albany, NY 12202 (518) 463-7284

The maximum equivalent length for the vertical vent pipe is **80 ft, 19.7 m**. Each 90° elbow and the intake air cap are equal to **10 ft, 3.3 m** of straight pipe. If any part of a single wall metal vent system passes through an unheated space it must be insulated with insulation rated for **400°F, 204°C**. Structural penetrations must be made using approved fire-stops.

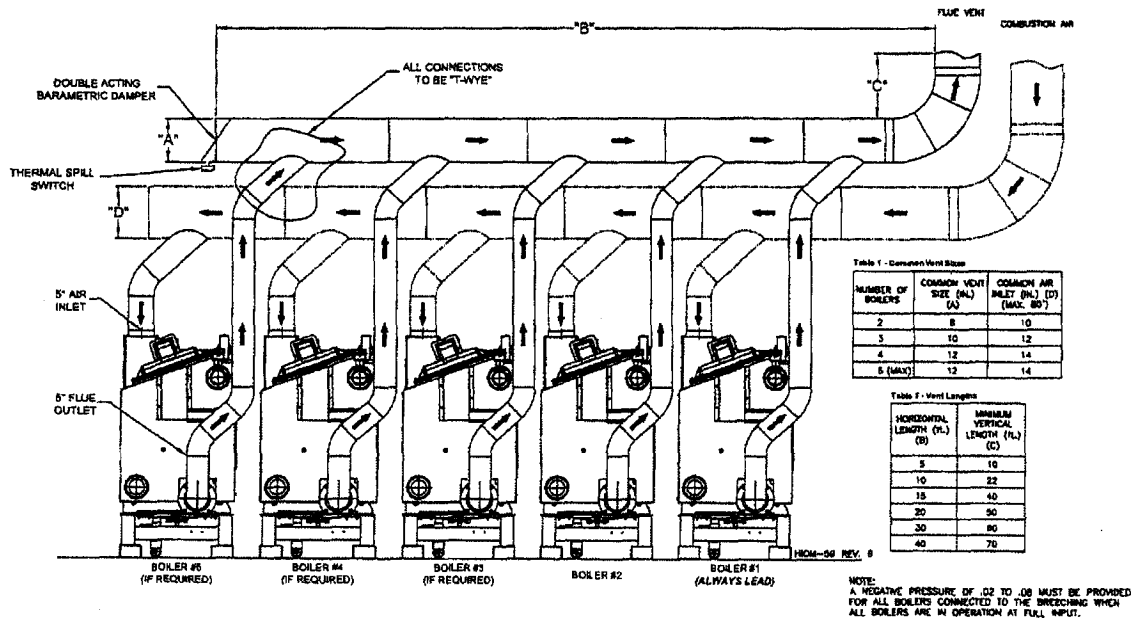
The top of a vertical vent system must extend at least **5 1/2 ft, 1.8 m** above the roof surface that it passes through, **4 ft, 1.3 m** above the intake air cap, see Figure 3. In addition the vent system must conform to the dimensions shown in Figure 3. The penetration point in the roof must be properly flashed and sealed.

The vent system must be gas tight. All seams and joints in metal pipes must be joined and sealed in accordance with the vent system manufacturer's instructions.

Combination Direct Vent Systems - see Figure 4

The boiler can be vented vertically with the intake air piped horizontally through an outside wall. Follow the instructions in the **INTAKE AIR OPTION - HORIZONTAL GUIDELINES** on page 4. Also follow the general instructions in the **COMBUSTION AIR & VENTILATION** and **GENERAL VENTING GUIDELINES** sections.

KN-6 Multiple Boiler Venting Category II Venting (Negative)



KN-10 Multiple Boiler Venting Category II Venting (Negative)

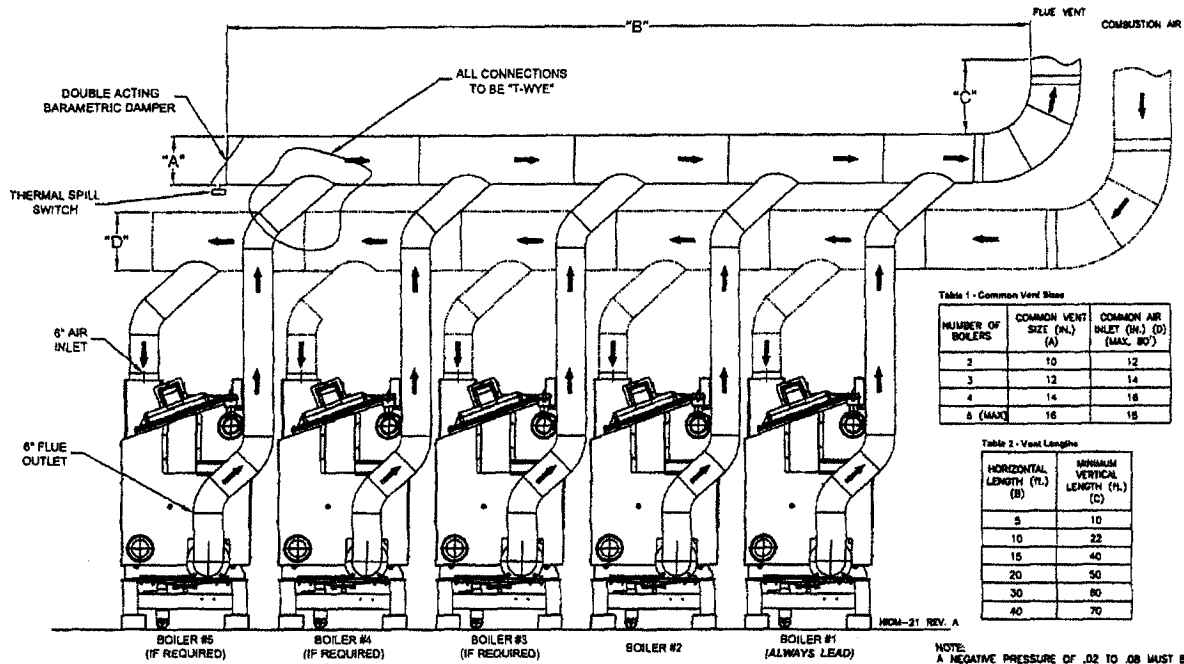


Table 1 - Common Vent Size

NUMBER OF BOILERS	COMMON VENT SIZE (IN.) (A)	COMMON AIR INLET (IN.) (D) (MAX. 80")
2	10	12
3	12	14
4	14	16
5 (MAX)	16	18

Table 2 - Vent Lengths

HORIZONTAL LENGTH (FT.) (B)	MINIMUM VERTICAL LENGTH (FT.) (C)
5	10
10	22
15	40
20	50
30	80
40	70

NOTE: A NEGATIVE PRESSURE OF .02 TO .08 MUST BE PROVIDED FOR ALL BOILERS CONNECTED TO THE BREECHING WHEN ALL BOILERS ARE IN OPERATION AT FULL INPUT.

KN-20 Multiple Boiler Venting Category II Venting (Negative)

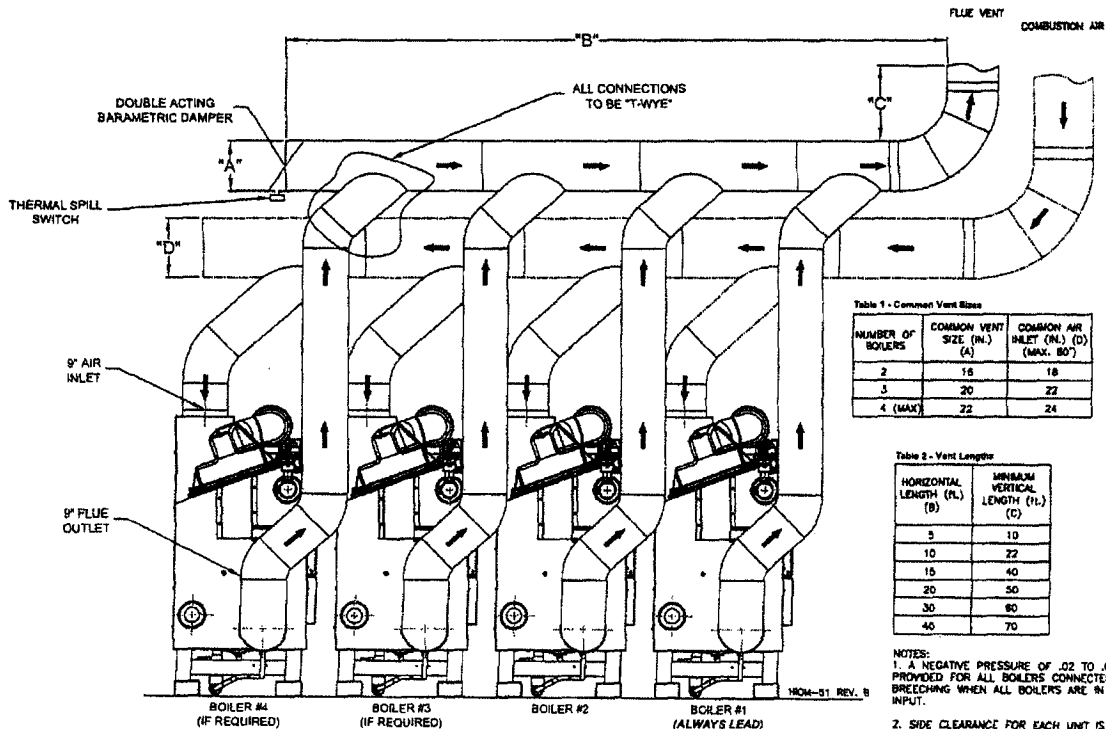


Table 1 - Common Vent Size

NUMBER OF BOILERS	COMMON VENT SIZE (IN.) (A)	COMMON AIR INLET (IN.) (D) (MAX. 80")
2	16	18
3	20	22
4 (MAX)	22	24

Table 2 - Vent Lengths

HORIZONTAL LENGTH (FT.) (B)	MINIMUM VERTICAL LENGTH (FT.) (C)
5	10
10	22
15	40
20	50
30	80
40	70

NOTES:
 1. A NEGATIVE PRESSURE OF .02 TO .08 MUST BE PROVIDED FOR ALL BOILERS CONNECTED TO THE BREECHING WHEN ALL BOILERS ARE IN OPERATION AT FULL INPUT.
 2. SIDE CLEARANCE FOR EACH UNIT IS 6 INCHES TO COMBUSTIBLES AND 24 INCHES FOR SERVICE.

Figure 1 - Horizontal Air Intake and Venting for a Single Direct Vent System

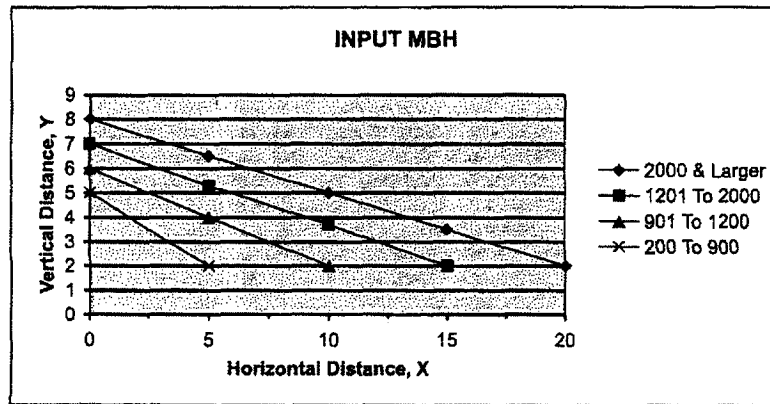
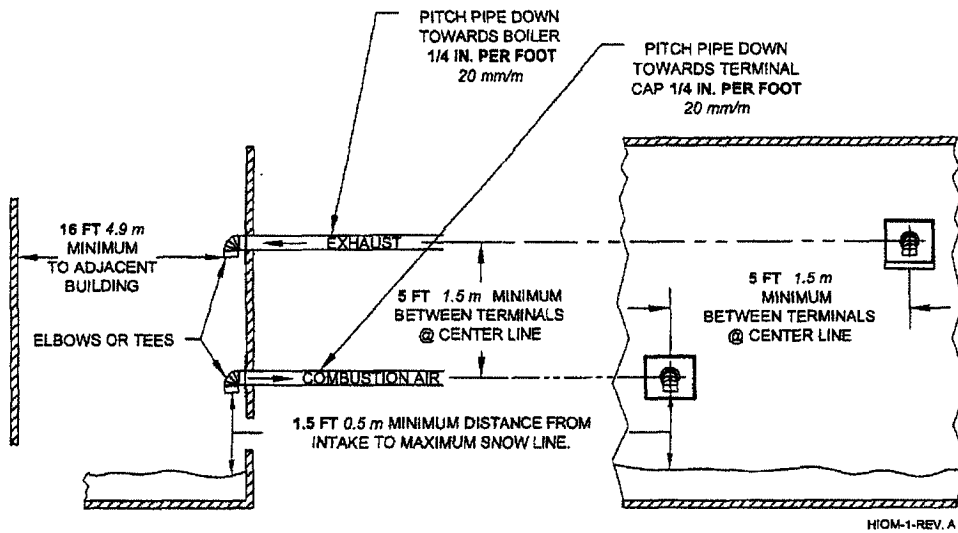


Figure 2 - Horizontal Air Intake and Venting for Multiple Direct Vent Systems

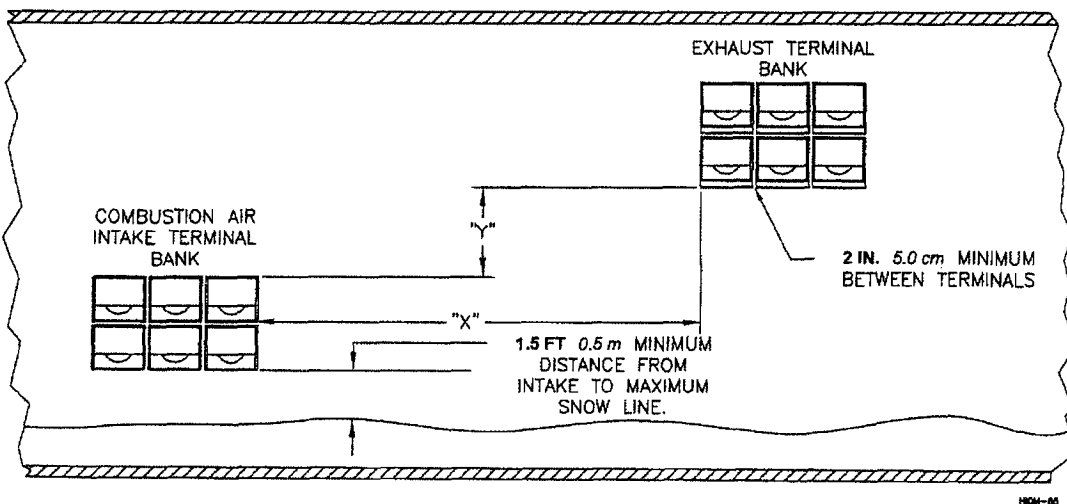


Figure 3 - Vertical Air Intake and Venting for Direct Vent System

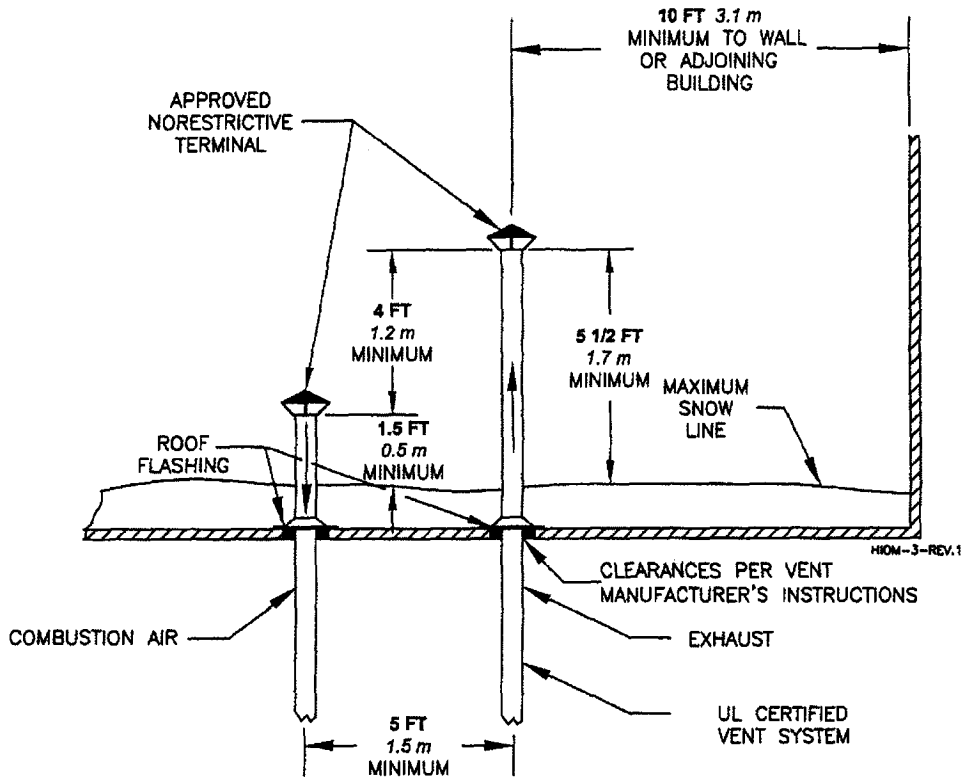
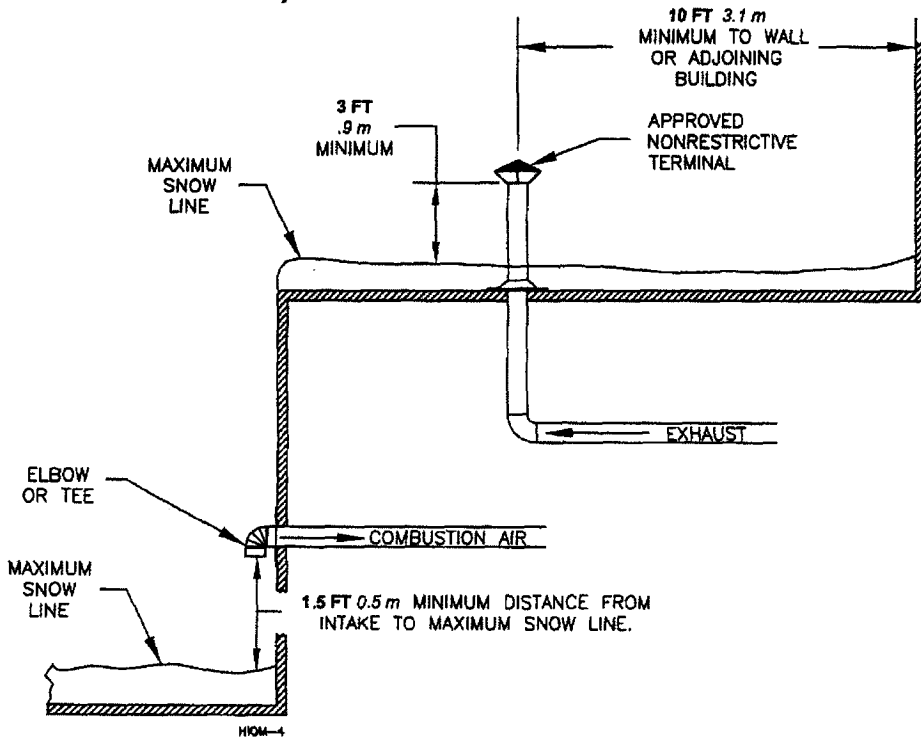


Figure 4 - Combination Direct Vent Systems



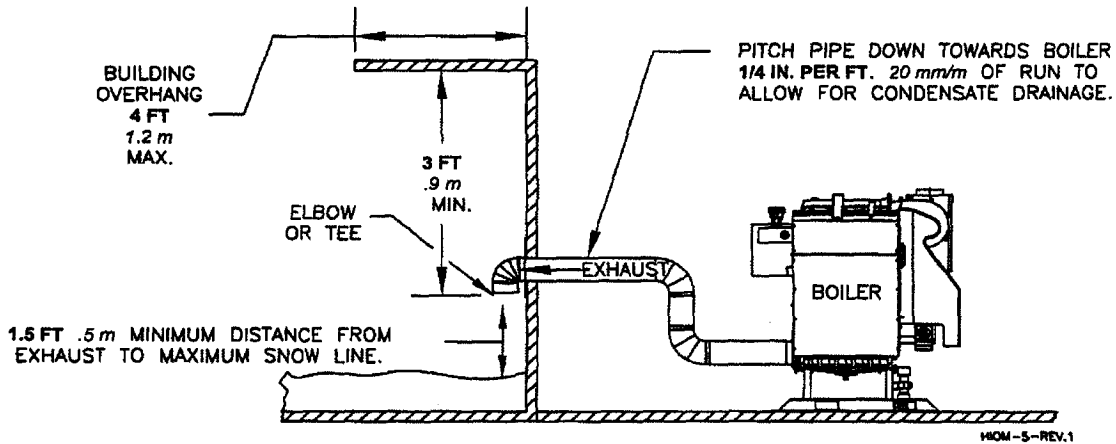
SIDE WALL VENT

POSITIVE PRESSURE, CATEGORY IV

In this configuration the boiler blower is used to push the flue products horizontally to the outdoors, see Figure 5.

The air for combustion is taken from the space in which the unit is installed. The applicable instructions under the COMBUSTION AIR & VENTILATION SECTION must be followed! The vent guidelines under the HORIZONTAL DIRECT VENT SYSTEMS section must also be followed.

Figure 5 - Side Wall Venting

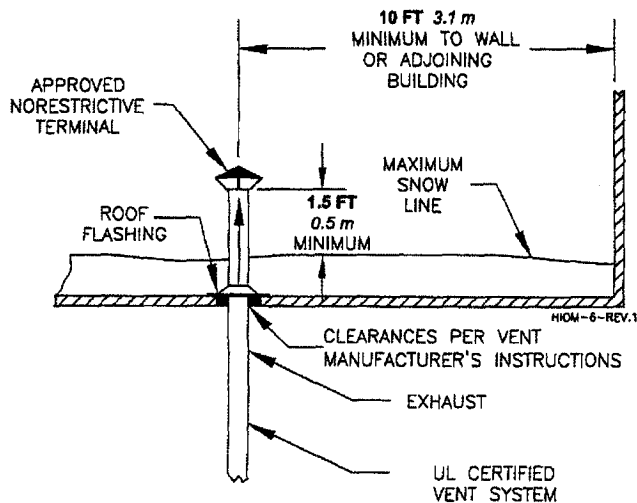


VERTICAL VENT

POSITIVE PRESSURE - CATEGORY IV

In this configuration the boiler blower is used to push the flue products vertically to the outdoors, see Figure 6. The air for combustion is taken from the space in which the unit is installed. The applicable instructions under the COMBUSTION AIR & VENTILATION SECTION must be followed! The vent guidelines under the VERTICAL DIRECT VENT SYSTEMS section must also be followed.

Figure 6 - Vertical Positive Pressure Venting



**VERTICAL VENT
NEGATIVE PRESSURE - CATEGORY II**

The KN is listed as a Category II appliance when vented vertically into a listed metal chimney system, Figure 7. The chimney system must provide a negative pressure of 0.02 to 0.2 in, 0.51 to 5.08 mm W.C. at the boiler flue collar with the unit running.

NOTE: When using a listed metal chimney system the chimney system manufacturer's instructions must be followed.

Multiple KN's can be vented into a single vertical chimney system. Refer to HydroTherm KN-10 Venting page 7. Consult factory for multiple KN-6 and KN-20 venting applications.

WARNING: Multiple boiler vent systems must be designed and verified by a qualified professional and stack manufacturer. The vent system must prevent backflow of exhaust gas through idle boilers.

When more than one appliance is connected to the same chimney system the system must be large enough to safely vent the combined output of all of the appliances.

Table 7 lists the equivalent breeching and chimney sizes required for a single boiler installation.

WARNING: If an appliance using any type of a mechanical draft system operating under positive pressure is connected to a chimney flue, never connect any other appliances to this flue. Doing so can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

Table 7 - Equivalent Breeching & Chimney Size, Negative Pressure - Single Boiler

Model Size	Breech & Flue Diameter	
	in ²	mm ²
600	8	204
1000	12	305
2000	18	457

NOTE: These sizes are based on a 20 ft, 6.1m chimney height.

Vent Connections

Locate the boiler as close to the chimney system as possible. Use the shortest, straightest vent connector possible for the installation. If horizontal runs exceed 5 ft, 1.5 m they must be supported at 3 ft, 0.9 m intervals with overhead hangers. Use the appropriate vent connector of the same diameter as the flue collar to connect the boiler to a listed metal chimney system.

Follow the chimney system manufacturer's instructions for proper assembly.

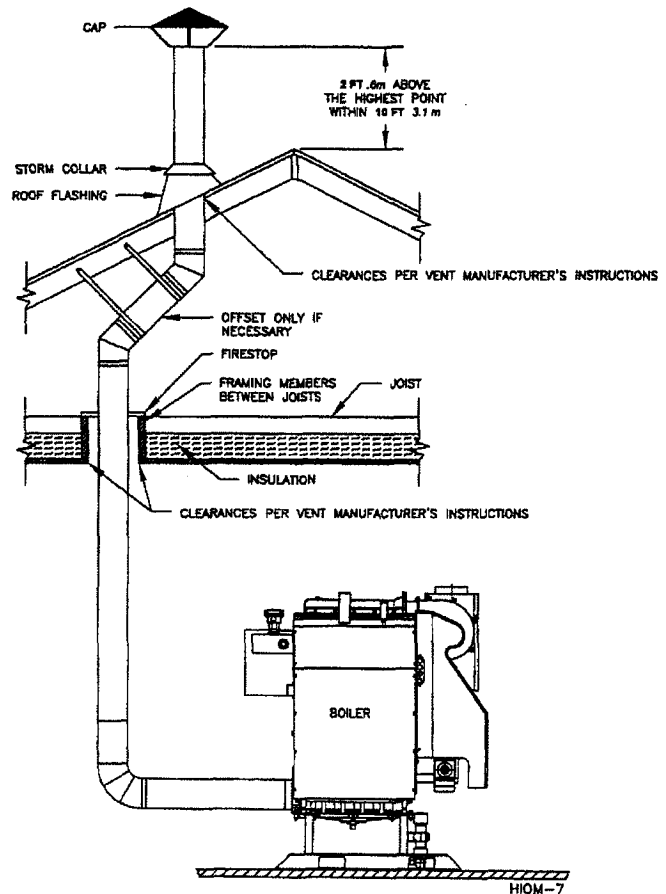
The vent system should be sloped up toward the chimney at a minimum rate of 1/4 in/ft, 2 cm/m.

WARNING: Never install a vent pipe of a diameter different than that specified in Table 7. Failure to comply with this warning can result in excessive levels of carbon monoxide which can cause severe personal injury or death.

Always provide a minimum clearance of 6 in, 152 mm between single wall vent pipe and any combustible materials.

WARNING: Failure to maintain minimum clearances between vent connectors and any combustible material can result in a fire causing extensive property damage, severe personal injury or death!

Figure 7 - Vertical Venting with a Metal Chimney System



COMMON VENT SYSTEMS

If an existing boiler is removed from a common venting system, the common venting system may then be too large for the proper venting of the remaining appliances connected to it. At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

Au moment du retrait d'une chaudière existante, les mesures suivantes doivent être prises pour chaque appareil toujours raccordé au système d'évacuation commun et qui fonctionne alors que d'autres appareils toujours raccordés au système d'évacuation ne fonctionnent pas: système d'évacuation

- a) Seal any unused openings in the common venting system.

Sceller toutes les ouvertures non utilisées du système d'évacuation.

- b) Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

Inspecter de façon visuelle le système d'évacuation pour déterminer la grosseur et l'inclinaison horizontale qui conviennent et s'assurer que le système est exempt d'obstruction, d'étranglement de fuite, de corrosion et autres défaillances qui pourraient présenter des risques.

- c) Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhaust, so they will operate at maximum speed. Do not operate a summer exhaust fan for a boiler installation. Close fireplace dampers.

Dans la mesure du possible, fermer toutes les portes et les fenêtres du bâtiment et toutes les portes entre l'espace où les appareils toujours raccordés du système d'évacuation sont installés et les autres espaces du bâtiment. Mettre en marche les sècheuses, tous les appareils non raccordés au système d'évacuation commun et tous les ventilateurs d'extraction comme les hottes de cuisinière et les ventilateurs des salles de bain. S'assurer que ces ventilateurs fonctionnent à la vitesse maximale. Ne pas faire fonctionner les ventilateurs d'été. Fermer les registres des cheminées.

- d) Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

Mettre l'appareil inspecté en marche. Suivre les instructions d'allumage. Régler le thermostat de façon que l'appareil fonctionne de façon continue.

- e) After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

Une fois qu'il a été déterminé, selon la méthode indiquée ci-dessus, que chaque appareil raccordé au système d'évacuation est mis à l'air libre de façon adéquate. Remettre les portes et les fenêtres, les ventilateurs, les registres de cheminées et les appareils au gaz à leur position originale.

- f) Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix F in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and or CSA B149 Installation Codes.

Tout mauvais fonctionnement du système d'évacuation commun devrait être corrigé de façon que l'installation soit conforme au National Fuel Gas Code, ANSI Z223.1/NFPA 54 et (ou) aux codes d'installation CSA-B149. Si la grosseur d'une section du système d'évacuation doit être modifiée, le système devrait être modifié pour respecter les valeurs minimales des tableaux pertinents de l'appendice F du National Fuel Gas Code, ANSI Z223.1/NFPA 54 et (ou) des codes d'installation CSA-B149.

GENERAL PIPING REQUIREMENTS

CAUTION: Improper piping of this boiler will void the manufacturer's warranty and can cause boiler failure resulting in flooding and extensive property damage!

NOTE: Shut off valves and unions should be installed at the inlet and outlet connections of the boiler to provide for isolation of the unit should servicing be necessary.

Relief Valve

Pipe the discharge of the pressure relief valve as shown in Figure 8. Mount on rear section or vertically on supply nipple.

WARNING: Never install any type of valve between the boiler and the relief valve or an explosion causing extensive property damage, severe personal injury or death may occur!

Flow Switch

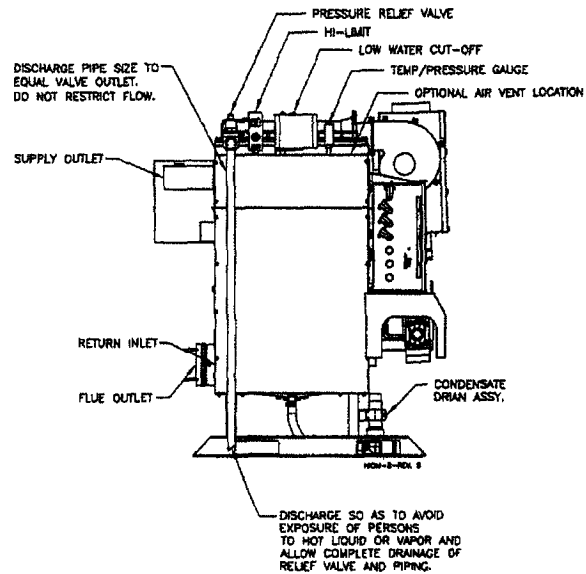
The flow switch (optional) is wired to prevent the boiler from firing unless there's adequate water flow through the unit.

NOTE: If using the optional flow switch, failure to maintain the minimum flow rates listed below at the boiler outlet will prevent the flow switch from closing. If a minimum flow rate cannot be maintained at the boiler outlet the flow switch will have to be relocated in the system.

	Water Flow Rates (GPM)		ΔT Across Heat Exchanger	
	Min.	Max.	Min.	Max.
KN-6	10	100	20°F	100°F
KN-10	15	150	20°F	100°F
KN-20	30	300	20°F	100°F

Increase flow rates approximately 30% for glycol mixtures.

Figure 8 - Relief Valve Piping



HEATING SYSTEM PIPING

General Piping Requirements

All heating system piping must be installed by a qualified technician in accordance with the latest revision of the ANSI/ASME Boiler and Pressure Vessel Code, Section IV.

Where required, the piping must comply with ANSI/ASME CSD-1, Standard for Controls and Safety Devices for Automatically Fired Boilers.

All applicable local codes and ordinances must also be followed. A minimum clearance of 1 in, 25 mm must be maintained between heating system pipes and all combustible construction. All heating system piping must be supported by suitable hangers not the boiler. The thermal expansion of the system must be considered when supporting the system. A minimum system pressure of 12 psig, 84 kPa must be maintained at the highest point in the system piping. A minimum system pressure of 25 psig, 172 kPa fill pressure is required on glycol mixtures within a closed loop.

Cleaning Boiler

Installer must flush and clean out boiler cavity to ensure unit is cleansed of various impurities.

Boiler Piping Connections

The supply and return connections should be sized to suit the system, see Table 8.

Table 8 - Supply & Return Pipe Sizing

Model Size	Supply Size	Return Size
600	2" NPT	2" NPT
1000	3" NPT	3" NPT
2000	3" NPT	3" NPT

Water Treatment

This boiler was designed to operate in a closed loop heating system. Water treatment is required when fill or make-up water contains dissolved solids greater than 200 ppm or if PH level is not within the 6.5-11 range.

Pump Requirements

This boiler requires a continuous minimum water flow for proper operation. The system pump must be sized to overcome the head loss of the boiler and the heating system in order to achieve the required temperature rise. If the system contains hydronic antifreeze this must be considered when sizing the pump. The temperature rise across the boiler must never exceed 100°F, 55.6°C.

Low Water Cutoff

Each KN boiler comes equipped with a factory installed low water cutoff.

Expansion Tank & Air Separator

An expansion tank or other means to control thermal expansion must be installed in the heating system. An expansion tank must be installed close to the boiler on the suction side of the pump. An air scoop and automatic air vent must also be installed to eliminate air trapped in the system.

Reverse Return Piping (RECOMMENDED)

Systems using multiple boilers can also be installed using a reverse return system, Figure 10.

Primary/Secondary Piping

Although acceptable, the system is not as cost effective as reverse return piping. Figure 11 shows a typical primary/secondary piping system. A dedicated pump is used to maintain a constant water flow through the boiler. Systems using multiple boilers can be installed using a primary/secondary manifold system, Figure 12.

Piping For Use With Cooling Units

The boiler, when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler. Appropriate valves must be used to prevent the chilled water from entering the boiler.

When a boiler is connected to a heating coil that may be exposed to refrigerated air from an air handling device, the piping system must be equipped with flow-control valves or some other automatic means of preventing gravity circulation of the boiler water during the cooling cycle.

NOTE: It is essential that following boiler shut off, the boiler pump continue to operate for approximately (5) minutes to dissipate the heat away from the heat exchanger.

Figure 9 - Typical Single Boiler Piping (RECOMMENDED)

(Circulator pump **must** be sized for minimum water flow rate of boiler, including system pressure drop)

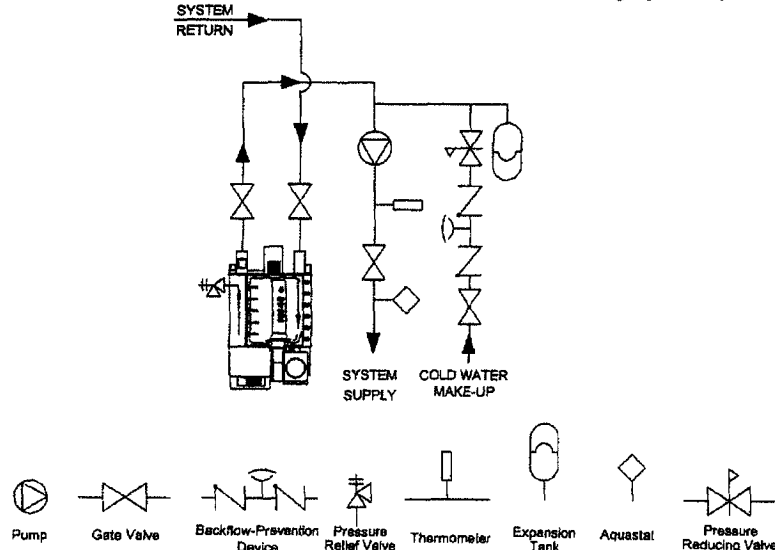
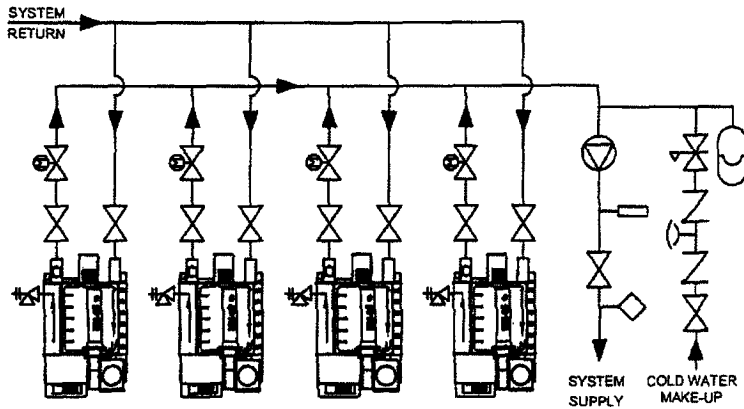


Figure 10 - Typical Multiple Boiler Reverse Return Piping (RECOMMENDED)

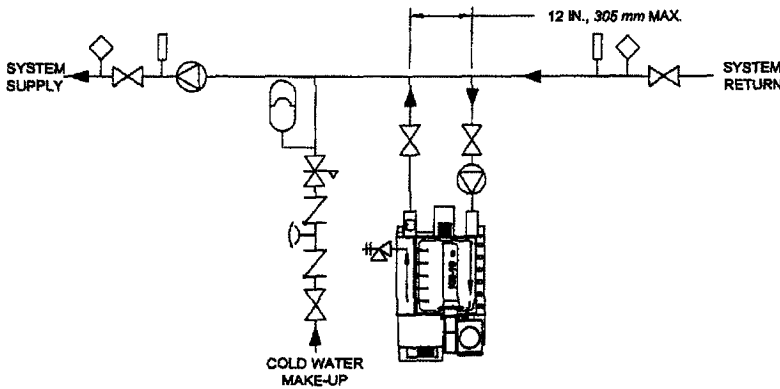
(Careful consideration as to minimum boiler and system water flow rates must be taken. Please consult our local manufactures representative for assistance.)



NOTE: Not all system valves may be shown. Consult local codes for additional system components which may be necessary.

HIOM-11 REV.3

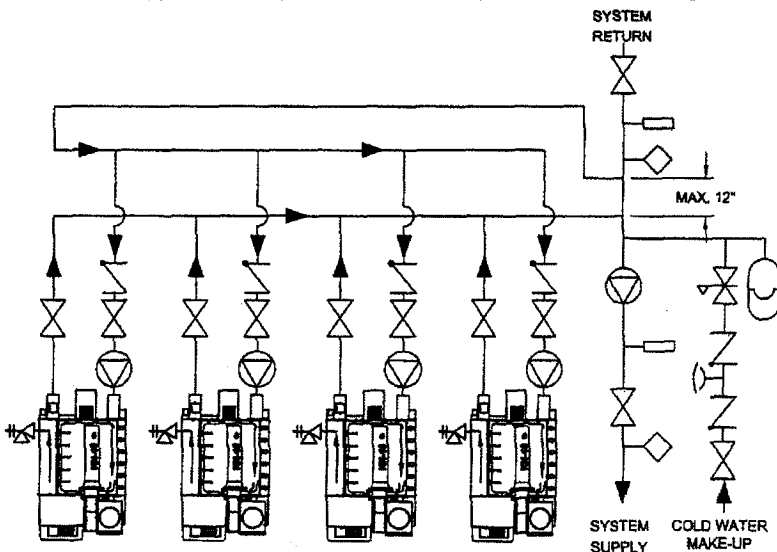
Figure 11 - Typical Single Boiler Primary/Secondary Piping



NOTE: Not all system valves may be shown. Consult local codes for additional system components which may be necessary.

HIOM-9 REV.2

Figure 12 - Typical Multiple Boiler Primary/Secondary Piping



NOTE: Not all system valves may be shown. Consult local codes for additional system components which may be necessary.

HIOM-10 REV.2



DOMESTIC WATER SUPPLY PIPING

CAUTION: Proper controls must be used to prevent water supplied for domestic use from exceeding 130°F, 54°C or a scald injury will occur! When higher water temperatures are required for appliances such as a dishwasher, a mixing valve or some other tempering means must be installed. Households with small children may require water temperatures less than 120°F, 49°C. Local codes must be complied with!

General Piping Requirements

The KN boiler can be use in combination with an indirect tank to provide hot water for domestic use. Piping and components must be suitable for use with potable water. The indirect storage tank must be equipped with a temperature and pressure relief valve that complies with ANSI Z21.22 or CAN-4.4 and CAN-4.6.

NOTE: The storage tank must be located as close to the boiler as possible to prevent excessive head loss which will reduce flow.

Expansion Tank

An expansion tank or other means to control thermal expansion must be installed in the water heating system if back flow prevention devices are installed.

Two typical water heating systems are shown in Figures 13 & 14.

Thermostatic Mixing Valve- Water Above 140°F, 60°C

Water can be stored a temperatures above 140°F, 60°C provided that a thermostatically controlled mixing valve is used to temper the hot water to an acceptable temperature before it's supplied for domestic use. The mixing valve **MUST** be set to prevent a scald injury from occurring, see the caution against scalding above. Storage of water for domestic use above 140°F, 60°C will provide an increased quantity of tempered water and help prevent the growth of water born bacteria.

Figure 13 - Typical Single Boiler with Indirect Storage Tank Piping

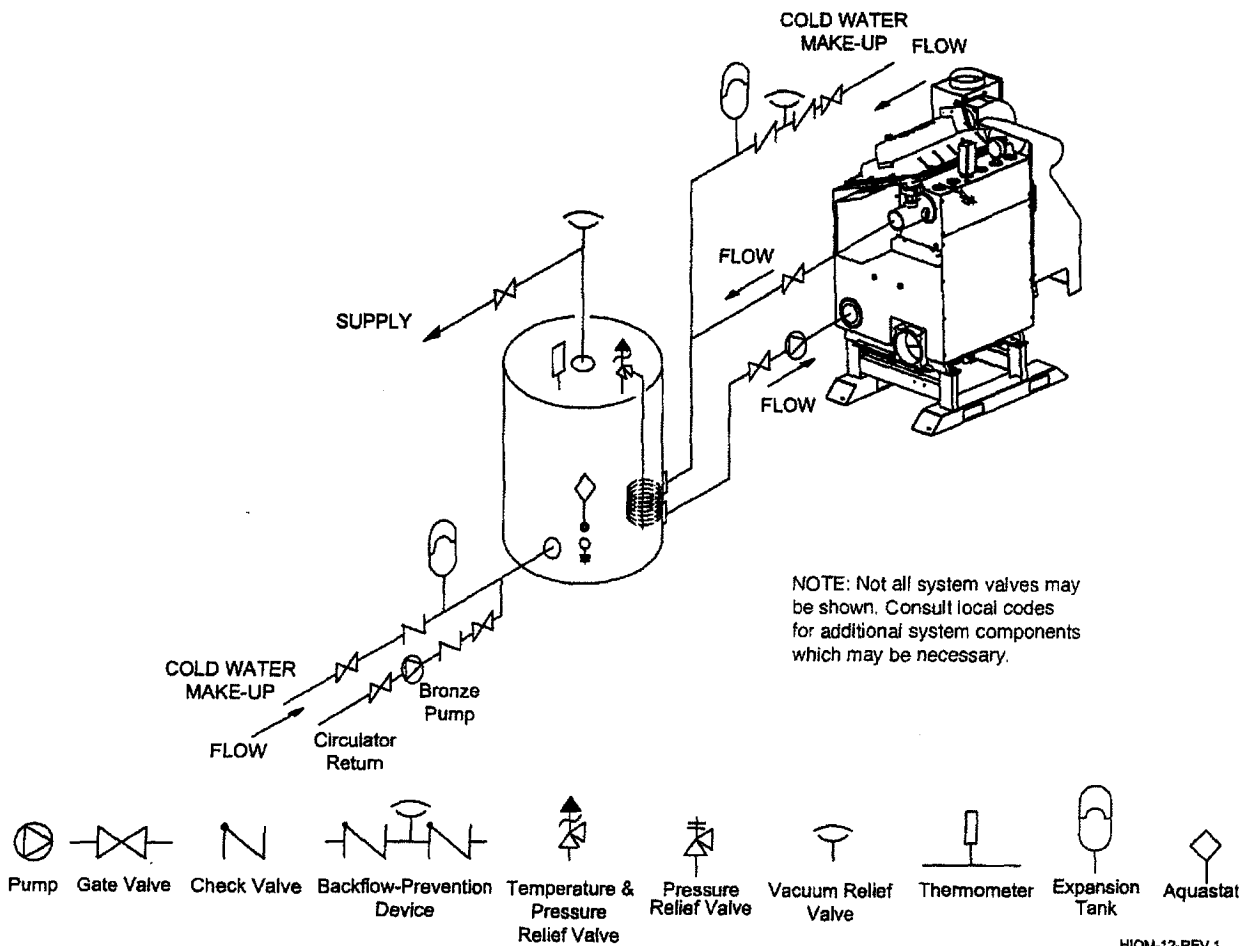
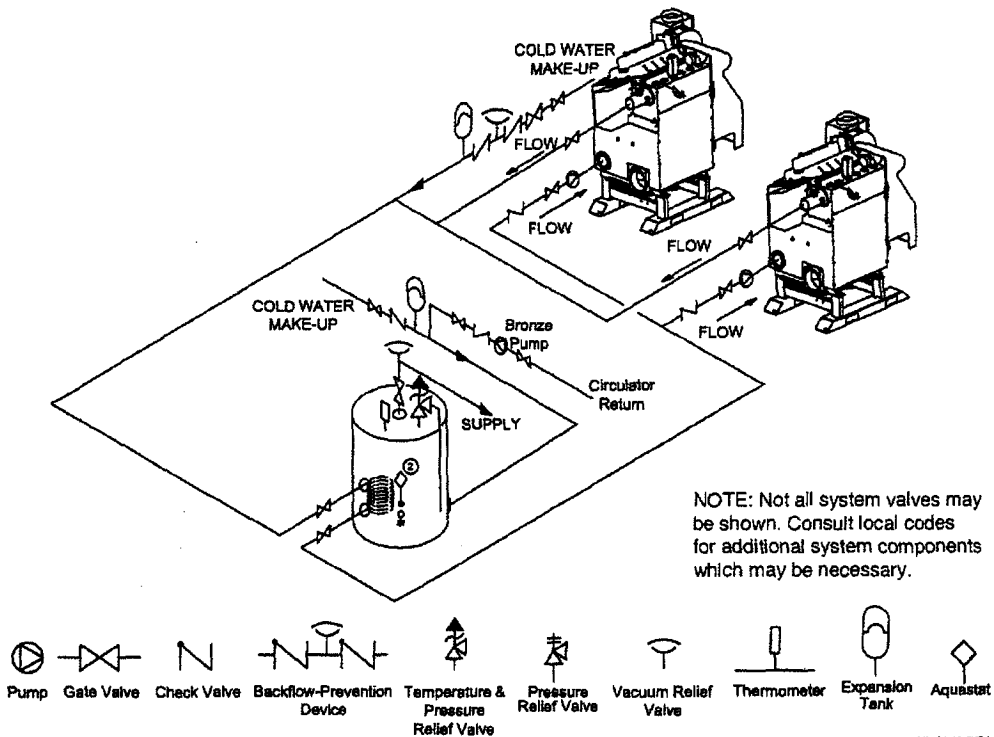


Figure 14 - Typical Multiple Boiler with Indirect Storage Tank Piping

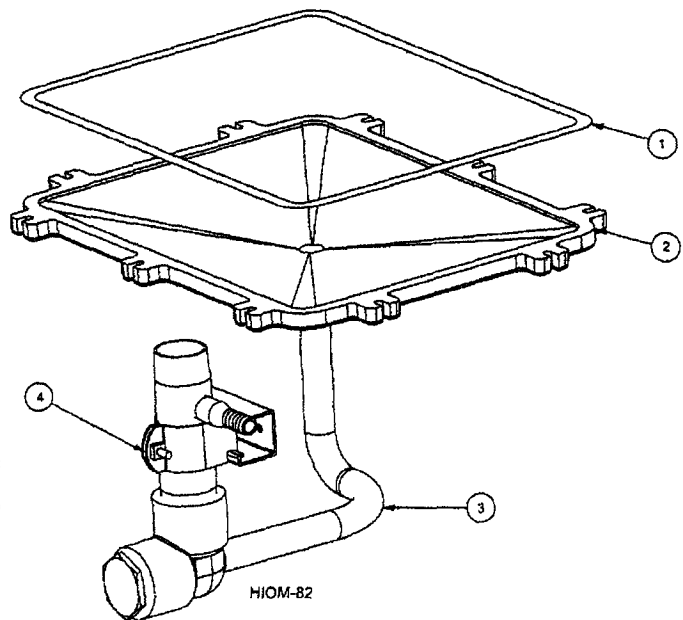


HIOM-13-REV.1

CONDENSATE PIPING

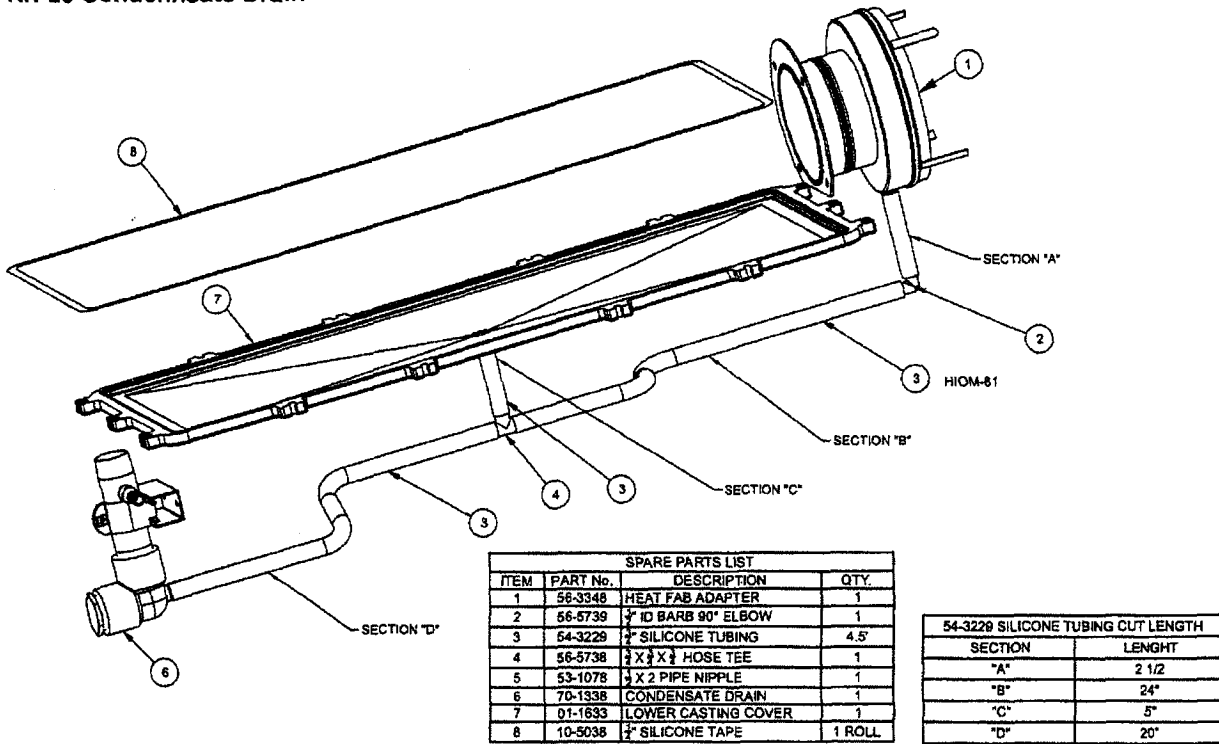
The condensate trap provided with the boiler must be attached to the bottom pan and piped to a suitable floor drain (consult local code) or condensate pump. If a condensate neutralization device is installed, it must be positioned prior to boiler room drain. Fill the condensate fill trap with water and antifreeze solution prior to start-up.

KN-6 and KN-10 Condensate Drain



SPARE PARTS LIST				
ITEM #	MODEL	PART No.	DESCRIPTION	QTY
1	KN-6 & 10	10/1/5038	1/4" SILICONE TAPE	1 ROLL
2	KN-6	01-1635	LOWER CASTING COVER	1
	KN-10	01-1631	LOWER CASTING COVER	1
3	KN-6	54-3229	3/4" SILICONE TUBING	2'
	KN-10			3'
4	KN-6 & 10	70-1338	CONDENSATE DRAIN	1

KN-20 Condensate Drain



SPARE PARTS LIST			
ITEM	PART No.	DESCRIPTION	QTY.
1	58-3348	HEAT FAB ADAPTER	1
2	56-5739	1" ID BARB 90° ELBOW	1
3	64-3229	1/2" SILICONE TUBING	4.5'
4	56-5738	1/2" X 1/2" HOSE TEE	1
5	53-1078	1/2" X 2" PIPE NIPPLE	1
6	70-1938	CONDENSATE DRAIN	1
7	01-1633	LOWER CASTING COVER	1
8	10-5038	1/2" SILICONE TAPE	1 ROLL

54-3229 SILICONE TUBING CUT LENGTH	
SECTION	LENGTH
"A"	2 1/2"
"B"	24"
"C"	5"
"D"	20"

GAS SUPPLY PIPING

WARNING: Check the boiler rating plate to make sure that the boiler is for the type of gas that will be used. If it isn't, do not connect the boiler to the gas supply. Failure to comply with this warning can result in extensive property damage, severe personal injury or death!

The KN comes from the factory ready to be piped to the gas supply. If for any reason the boiler is not for the type of gas available at the installation site, call your HydroTherm representative to resolve the problem.

Table 9 should be used to ensure that the gas supply piping is sized properly. If more than one appliance is supplied by the same supply pipe, the piping must be sized based on the maximum possible demand. Do not neglect the pressure drop due to pipe fittings. Table 9 should be used in conjunction with Table 10 to ensure that the gas supply piping has the capacity to meet the demand.

Figure 15 depicts the proper way to connect the boiler to the gas supply piping. The manual shut-off valve MUST be installed in the supply piping. It should be installed 5 feet above the floor where required by local codes. Provide a sediment trap at the bottom of the vertical section of the gas supply pipe upstream of the gas controls.

A ground joint union should be installed between the boiler gas controls and the supply piping. Each of these items are needed to ensure long life and ease of servicing. Always use a pipe sealant that is suitable for use with LP gas.

Table 9 - Gas Pipe Capacity

Maximum pipe capacity in ft ³ /hr based on 0.60 specific gravity gas at a pressure of 0.5 psig or less and a 0.3" WC pressure drop.									
Nominal Iron Pipe Size, (in)	Pipe length in feet								
	10	20	30	40	50	60	80	100	150
Maximum gas volume of pipe (ft ³ /hr)									
1"	520	350	285	245	215	195	170	150	120
1 1/4"	1050	730	590	500	440	400	350	305	250
1 1/2"	1600	1100	890	760	670	610	530	460	380
2"	3050	2100	1650	1450	1270	1150	990	870	710

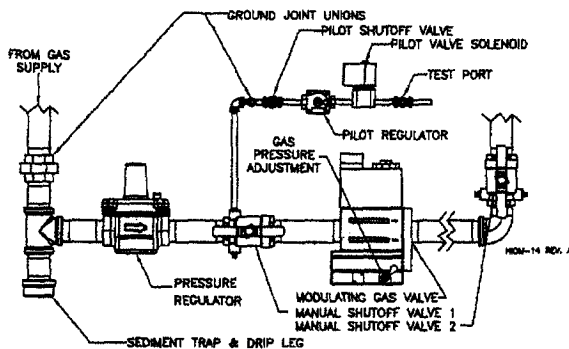
Note: Multiply the gas volume by 0.62 for propane flow capacity in ft³/hr. Multiply the propane flow capacity by 2500 Btu/ft³ to determine the propane Btu/hr capacity for a given pipe size and length.

Table 10 - Equivalent Pipe Length Chart

Nominal Iron Pipe Size, (in)	Type of pipe fitting			
	90° Elbow	Tee ¹	Gas Valve ²	Gas Cock ²
	Equivalent pipe length, (ft)			
1"	2.6	5.2	0.6	1.5
1 1/4"	3.5	6.9	0.8	1.9
1 1/2"	4.0	8.0	0.9	2.3
2"	5.2	10.3	1.2	3.0

Notes: 1. For flow through branch.
2. For flow at full open.

Figure 15 - Gas Supply Piping



NOTE: All boilers ship with a Maxitrol gas pressure regulator. The regulator must be installed in the gas supply piping. The regulator should be installed at a distance of at least 10 pipe diameters from the boiler's main gas valve. The regulator should be adjusted to provide 4" w.c. pressure to the gas valve.

NOTE: All boilers are calibrated and factory test fired at 4" w.c. supply gas pressure.

CAUTION: Always use a wrench on the gas valve body when making gas connections to it. Never over-tighten the piping entering the gas valve body or gas valve failure may result!

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler. All gas connections **MUST** be leak tested before putting the boiler into operation.

WARNING: Never use an open flame to test for gas leaks. Always use an approved leak detection method. Failure to comply with this warning can cause extensive property damage, severe personal injury or death!

Whenever the gas supply piping is pressure tested the boiler gas controls must be protected. If the test pressure is equal to, or less than 1/2 psig, 3.5 kPa isolate the boiler by closing its' manual shut off valve, see Figure 15. If the test pressure is greater than, or equal to 1/2 psig, 3.5 kPa, disconnect the boiler and its individual shut-off valve.

ELECTRICAL WIRING

Electrical Power Connections

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation! Verify proper operation after servicing.

ATTENTION. Au moment de l'entretien des commandes, étiquetez tous les fils avant de les débrancher. Des erreurs de câblage peuvent entraîner un fonctionnement inadéquat et dangereux. S'assurer que l'appareil fonctionne adéquatement une fois l'entretien terminé.

The electrical connections to this boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI / NFPA-70. Installation should also conform with CSA C22.1 Canadian Electrical Code Part I if installed in Canada. Install a separate 120 volt 15 amp circuit for each KN-6 or KN-10 boiler. Install a separate 208/230 volt 20 amp circuit for each KN-20 boiler. A properly rated shut-off switch should be located at the boiler. The boiler must be grounded in accordance with the authority having jurisdiction, or if none, the latest revision of the National Electrical Code, ANSI/NFPA-70.

Line voltage field wiring of any controls or other devices must use copper conductors with a minimum size of #14 awg. Use appropriate wiring materials for units installed outdoors.

Refer to point of connection diagram in back of this manual and the wiring diagram supplied with the boiler for proper wiring connections.

BOILER OPERATION

WARNING: Before proceeding read and fully understand the instructions contained in this manual. Do not attempt to operate this boiler if it has not been installed in accordance with the guidelines set forth in this manual. Failure to comply with this warning can result in extensive property damage, severe personal injury or death!

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance. **Do Not interrupt water flow through the boiler.**

En cas de surchauffe ou si l'alimentation en gaz ne s'arrête pas, fermez manuellement le robinet d'arrêt de l'admission de gaz.

Hydronic Heating Boilers

Open the make-up water valve and slowly fill the boiler and all of the radiation with water. Ensure that all bleed and drain valves are closed.

Adjust the make-up water pressure regulator so a minimum **12 psig, 84 kPa** system pressure is maintained at the highest point in the system piping (minimum **25 psig, 172 kPa** for anti-freeze systems). If a make-up water pump is used adjust it as stated above.

Open the system bleed and drain valves, one at a time, to purge the air trapped in the heating system piping.

With the boiler off, run the system pump for at least 30 minutes and bleed the system piping using the bleed valves. If strainers are used in the system piping the make-up water valve should be closed and the strainers checked and cleaned.

The system expansion tank should be checked to ensure that tank air pressure equals cold static fill pressure.

Start the boiler as described in the OPERATING INSTRUCTIONS below. Run the boiler for at least an hour. The system pump(s) and all radiation units must be operated during this time. Ensure that the make-up water valve is open.

Shut the boiler off and open the bleed valves to purge the air trapped in the heating system piping. Close the make-up water valve and check and clean the strainers and make-up water pressure reducing valve.

Open the make-up water valve and adjust the system pressure if necessary.

The system should be checked and bled after three days of operation.

OPERATING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE OPERATING. ONLY QUALIFIED LICENSED SERVICE TECHNICIANS SHALL START, TROUBLESHOOT, AND SERVICE THIS APPLIANCE WITH APPROVED COMBUSTION ANALYZER.

POUR VOTRE SÉCURITÉ LISEZ AVANT DE METTRE EN MARCHÉ

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

Cet appareil est muni d'un dispositif d'allumage qui allume automatiquement la veilleuse. Ne tentez pas d'allumer la veilleuse manuellement.

B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers instructions.
- If you cannot reach your gas supplier, call the fire department.

AVANT DE FAIRE FONCTIONNER, renifliez tout autour de l'appareil pour déceler une odeur de gaz. Renifliez près du plancher, car certains gaz sont plus lourds que l'air et peuvent s'accumuler au niveau du sol.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

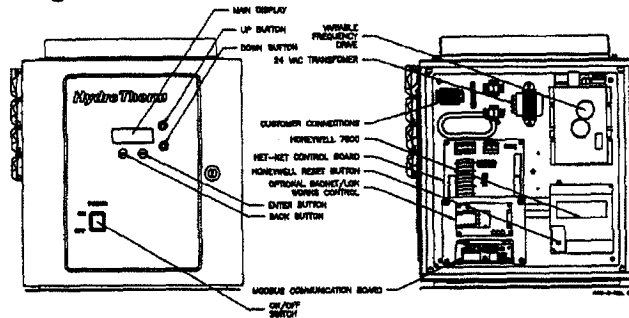
- Ne pas tenter d'allumer d'appareil.
- Ne touchez à aucun interrupteur; ne pas vous servir des téléphones se trouvant dans le bâtiment.
- Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suives les instructions du fournisseur.
- Si vous ne pouvez rejoindre le fournisseur, appelez le service de incendies.

C. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.

N'utilisez pas cet appareil s'il a été plongé dans l'eau, même partiellement. Faites inspecter l'appareil par un technicien qualifié et remplacez toute partie du système de contrôle et toute commande qui ont été plongés dans l'eau.

Operating Instructions

1. **STOP!** Read the safety information above. If, at any time, the appliance will not operate properly, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.
2. Set the operating control to off and disable any outside (BMS) call for heat.
3. Turn off all electric power to the appliance.
4. Remove the front cover.
5. Close manual main shut-off valves 1 and 2 and the pilot gas shut-off valve, Figure 15.
6. Purge the gas piping up to the manual valve ahead of the main gas control of air. When the bleeding is complete, check all gas joints up to the gas valve for leaks.
7. Install a fitting at the bleed point and connect a manometer having a minimum range of 20 in, 508 mm WC to it, Figure 15.
8. Remove the 1/8" pipe plug from the pilot tee and connect a manometer having a minimum range of 6 in, 154 mm WC to it.
9. Wait five (5) minutes to clear out any gas.
10. Open the manual main shut-off valves 1 and 2 and the pilot gas shut-off valve, Figure 15.
11. Place the "Remote/Local" switch to Remote.
12. Turn the power switch on the front of the boiler to "on". It will light up when the power is on. If all interlocks are properly closed, the display will say "Standby", Figure 16.
13. Create a min input demand by jumping the TI terminals, Figure 22.
14. The boiler will begin the start sequence.
15. When the main display reads "PILOT RUNNING" and the flame current is 5VDC, switch the Honeywell 7800 to the "test" position, Figure 16. This will hold the Honeywell 7800 in its ignition state.
16. Adjust the pilot pressure per the CHECKING, ADJUSTMENT & OPERATION section below.
17. Remove the demand from the 7800 control by opening the TI terminals, allowing the boiler to stop.

Figure 16 - Control Panel

18. Remove the manometer fitting from the pilot tee and replace the plug. Close manual main shut-off valve 2 and the pilot gas shut-off valve, Figure 15.
19. Switch the Honeywell 7800 back to "run".
20. Create a min (TI) input demand as before. The boiler will begin the start sequence.
21. Monitor the flame current on the 7800. No flame current should be detected and the 7800 should lock out. If flame current is detected at any time up to the 7800 locking out, the 120V wiring on the ignition transformer must be reversed and the test run again to insure that no flame is detected.

WARNING: Improper wiring of the ignition transformer can result in an explosion causing extensive property damage, severe personal injury or death!

22. Open both manual main shut-off valves and the pilot gas shut-off valve.
23. Reset the Honeywell 7800. The boiler will start and will run at minimum input rate.
24. **Setting the low fire:** Allow the low fire to settle out for a few minutes and observe the combustion reading. They should be as follows:

	CO ₂	O ₂
Low Fire	7.8-8.5%	7.3-6.0%
High Fire	8.5-9.5%	6.0-4.2%

The low fire O₂-CO₂ can be adjusted in the field by opening the low fire adjustment door located on the forward facing side of the main gas valve. Inserting an allen wrench and rotating the allen screw clockwise will increase the CO₂ and lower the O₂, rotating counter clockwise will decrease the CO₂ and increase the O₂. **DO NOT LEAVE THE BURNER IN AN INFRARED STATE.** A few random speckles of red are fine, but large concentrations of spots or large areas of red are not. If large amounts of red concentrations are observed, decrease CO₂ until burner plaque transitions to a more uniform blue.

25. Jumper the "AA" terminals. The boiler input will rise to its maximum input, "Run 100%", see Fig. 22.
26. Allow the boiler to stabilize and adjust the input rate per the CHECKING, ADJUSTMENT & OPERATION section below.
27. When all adjustments are finished, remove jumpers on terminals "TI" and "AA", see Fig. 22.
28. Boiler allows for many modes of operation and control methods. Reference the "Model KN-Series Control-IOM" and the "Model KN-Series Control-Programming Examples" for instruction.

Instructions De Mise En Marche

1. ARRÊTEZ! Lisez les instructions de sécurité sur la portion supérieure de cette étiquette.
2. Réglez le thermostat à la température la plus basse.
3. Coupez l'alimentation électrique de l'appareil.
4. Cet appareil est muni d'un dispositif d'allumage qui allume automatiquement la veilleuse. Ne tentez pas d'allumer la veilleuse manuellement.
5. Fermer la vanne manuelle d'arrêt d'alimentation de gaz.
6. Attendre cinq (5) minutes pour laisser échapper tout le gaz. Reniflez tout autour de l'appareil, y compris près du plancher, pour déceler une odeur de gaz. Si vous sentez une odeur de gaz, ARRÊTEZ! Passez à l'étape B des instructions de sécurité sur la portion supérieure de cette étiquette. S'il n'y a pas d'odeur de gaz, passez à l'étape suivante.
7. Ouvrir la vanne manuelle d'arrêt d'alimentation de gaz.
8. Mettez l'appareil sous tension.
9. Réglez le thermostat à la température désirée.
10. Si l'appareil ne se met pas en marche, suivez les instructions intitulées couper l'admission de gaz de l'appareil et appelez un technicien qualifié ou le fournisseur de gaz.

TO TURN OFF GAS TO APPLIANCE

1. Set the operating control to its lowest setting.
2. Turn off all electric power to the boiler if service is to be performed.
3. Close the manual main and pilot gas shut-off valves.

COMMENT COUPER L'ADMISSION DE GAZ DE L'APAREIL

1. Réglez le thermostat à la température la plus basse.
2. Coupez l'alimentation électrique de l'appareil s'il faut procéder à l'entretien.
3. Fermer la vanne manuelle d'arrêt d'alimentation de gaz.

SEQUENCE OF OPERATION

NO DEMAND

Standby

1. The boiler is idle with no interlocks in the fault condition.

DEMAND

Pre-Purge

1. The blower operates at purge RPM. The water flow interlock must 'make' within 15 seconds after the demand signal is initiated.
2. The Honeywell 7800 starts a 10 second purge delay once the air prove switch contacts close.

Pilot Run - %Input

1. The blower operates at minimum ignition setting. See the calibration section in the "KN-Series Control-IOM" to enter the calibration menus.
2. The ignition transformer is energized. The pilot solenoid valve opens for the 10 second pilot ignition trial.

Main Run %Input

1. The main gas valve opens.
2. The ignition transformer is de-energized.
3. The pilot solenoid valve closes.
4. The blower stays at the minimum input setting for 3 seconds then operates at demand % input. See the calibration section in the "KN-Series Control-IOM" to enter the calibration menus.

NO DEMAND

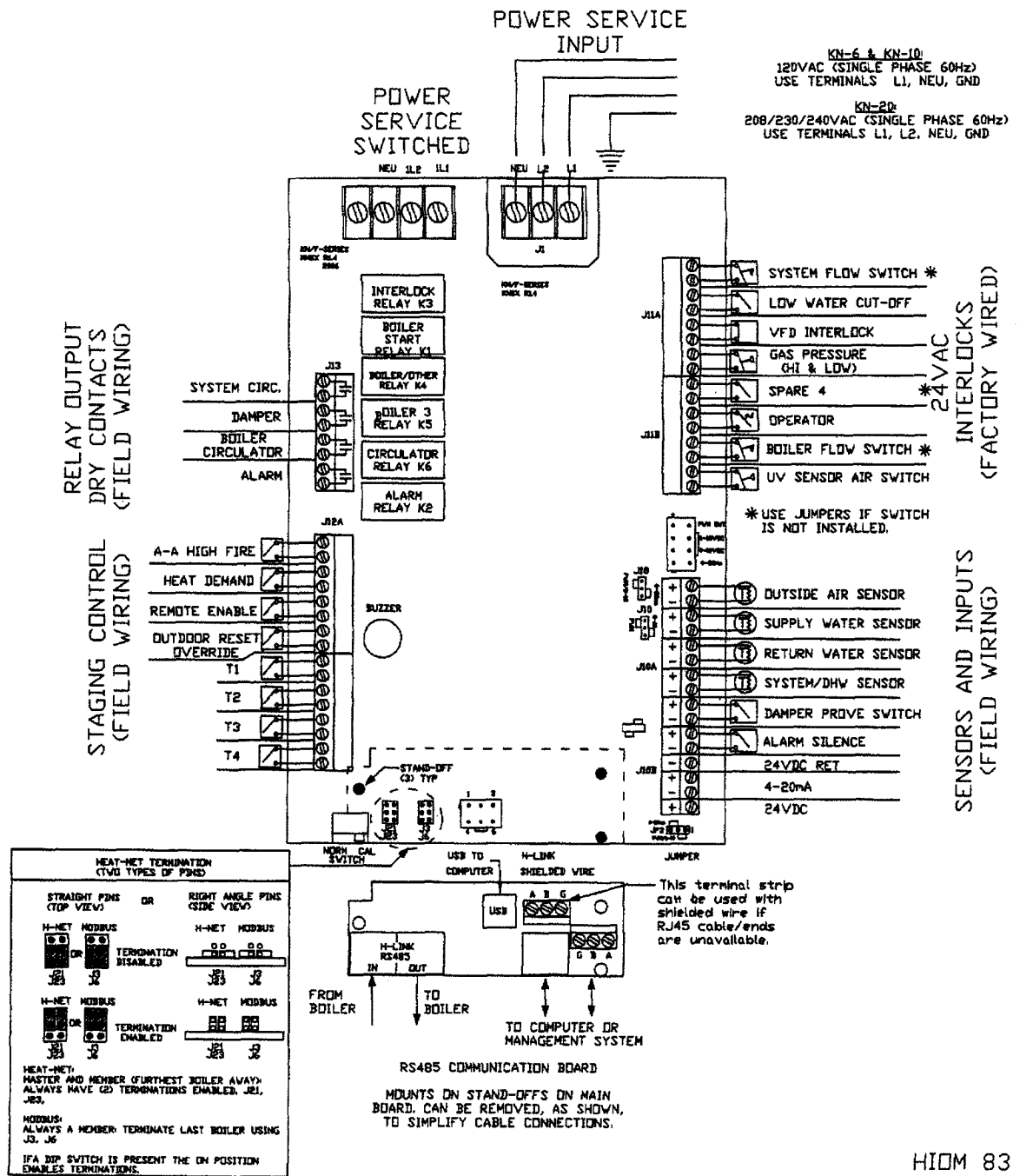
Post-Purge

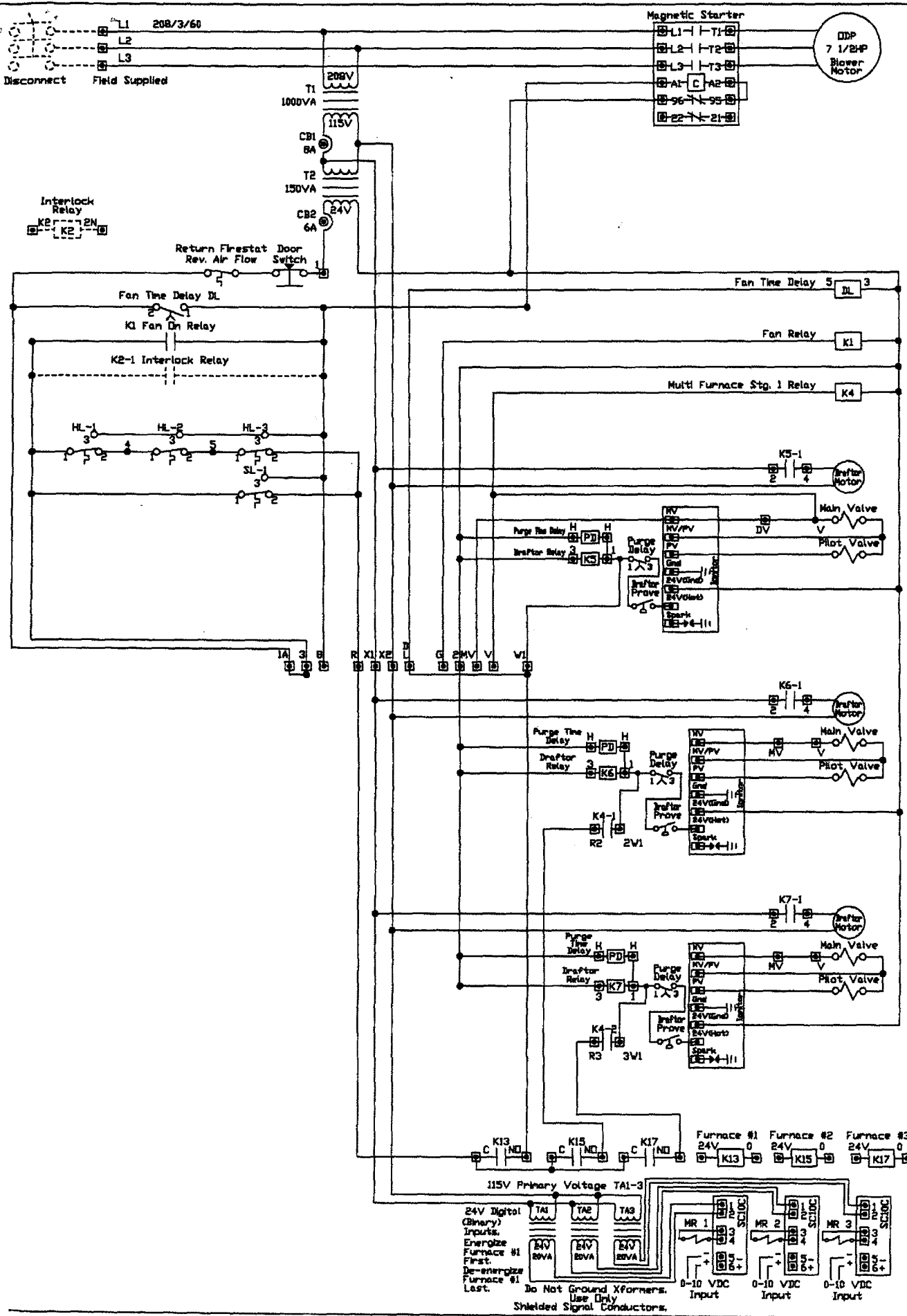
1. The main gas valve closes.
2. The blower operates at purge RPM for 10 seconds.
3. The boiler is idle with no interlocks in the fault condition.

Figure 22

HEAT-NET FIELD WIRING

(SEE HEAT-NET MANUAL FOR FULL DETAILS)





MS12B6G01P41S10B5M4
 358765
 1466-98
 10-22-2007

Factory Wiring
 Field Wiring

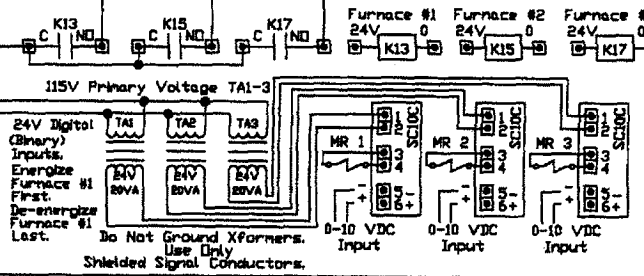
Terminal Block
 Connection
 No Connection

Warning Disconnect and Lockout Power before smelting. Any Replacement wire must be copper with a temp. rating of 125 deg. C. Refer to the installation instructions for piping, venting and start-up procedures.

Caution - Never Jumper or disconnect any factory wiring. Consult the manufacturer before making any modifications.

Optional Relays K1 and K2 are plug-in type, and can be mounted on the Main Connection Board in the Electrical Cabinet.

Note:





Ranor Mechanical

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