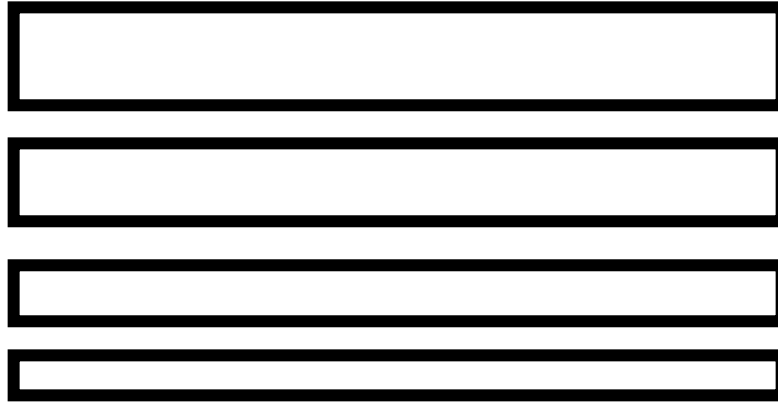


Reflect-O-Ray®

ALPHA PACKAGES



Pre Engineered Packages

LOW INTENSITY

VACUUM VENTED INFRARED

HEATING SYSTEMS

Supplemental Installation Manual
Radiant Tube Assembly Instructions

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause death, injury or property damage. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

www.combustionresearch.com



Reflect-O-Ray®

INSTALLER

Please take time to read and understand these instructions prior to any installation. Contact your representative or the factory if you have any questions

OWNER

Retain this manual in a safe place to provide your serviceman with information if the situation arises.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. This appliance could expose you to substances in fuel or from fuel combustion which have been determined by the State of California to cause cancer, birth defects or other reproductive harm. For industrial, commercial or agricultural use only.

WARNING

If this heating appliance and associated hardware is used in agricultural structures which support life were failure of this appliance could result in loss or injury, the user should provide an adequate back-up system and a failure alarm system. The user must accept the risk of such loss or injury from the failure of the heating system.

FOR YOUR SAFETY

If you smell gas: open windows and doors; DO NOT touch electrical switches, extinguish any open flames; evacuate the structure; call you gas supplier immediately. The use or storage of gasoline or other flammable vapors and liquids within the vicinity of this appliance may result in property damage, personal injury or death.

This manual is a supplement to the Reflect-O-Ray® Engineering, Installation, Service and Parts Manual. The intent of this manual is solely for the purpose of assembling the radiant tubing and reflectors enclosed in the "Reflect-O-Ray® ALPHA®" package. For complete instructions on the installation and maintenance of the Reflect-O-Ray® system and components, consult the Reflect-O-Ray® Owners, Maintenance Manual enclosed with this unit. Read all instructions carefully before attempting to install, operate or service the equipment. Retain these instructions for future reference.

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Reflect-O-Ray® Alpha® Package heating systems DO NOT qualify for use in explosion proof installations.

Revised 7/98

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CHECKING SHIPMENT:

Upon receipt of shipment, check shipment against Bill of Lading for shortages. Also check for external damage to cartons or tube bundles. Shortages and/or external damage to cartons or tubes must be noted on the Bill of Lading in the presence of delivery trucker. The delivery trucker should acknowledge any shortages or damage by initialing this "noted" Bill of Lading.

Claims for damaged material, or shortages that were not evident upon receipt of shipment must be reported to carrier and to your Combustion Research Corporation sales representative within 72 hours.

Before starting to assemble the heater, make sure that all optional and accessory items are accounted for and are available for assembly. It is also important to verify that the correct gas burner is supplied for the gas service, i.e., natural gas burner for natural gas supply.

IMPORTANT:

A thorough understanding of the installation instructions, layout drawing, local codes and ordinances, and applicable standards such as apply to gas piping and electrical wiring must be understood before proceeding with the installation.

TESTED UNDER STANDARDS:

AMERICAN STANDARDS

ANSI Z83.6 (current standard)

CANADIAN STANDARDS

CAN 1-2.16-M8 & CAN 1-2.17-M91

BUILDING CODES:

Installation must comply with local building codes. In the absence of local codes, installation must comply with the National Fuel Gas Code, ANSI Z223.1 (current standard) NFPA No. 54.

1. Aircraft Hangers - See ANSI/NFPA No. 409 - current standard, or enforcing authority for Canada.
2. Parking Structures - See ANSI/NFPA No. 88A-current standard. For Canada CAN/CGA-B149.1-M91.
3. Repair Garages - See ANSI/NFPA No. 88B-current standard. For Canada CAN/CGA-B149.1-M91.

AIRCRAFT HANGERS:

Heaters for use in aircraft hangers must be installed in accordance with ANSI/NFPA 409 (current standard) for the U.S. and the Enforcing Authority in Canada, with special consideration for the following:

1. Heaters (burner assemblies with out outside combustion air) in aircraft storage or service areas shall be installed at least ten feet (10') above the upper surface of wings or engine enclosures of the highest aircraft which may be housed in the hanger. This should be measured from the bottom of the heater to the wing or engine enclosure, whichever is highest from the floor.
2. In other sections of aircraft hangers, such as shops or offices communicating with airplane storage or servicing area, heaters shall be installed in accordance with their listings and mounted not less than eight feet (8') above the floor.
3. Heaters installed in aircraft hangers shall be located so as not to be subject to damage by aircraft, cranes, moveable scaffolding or other objects. Heaters shall be placed so they will be readily accessible for maintenance purposes.

PUBLIC GARAGES:

Heaters for use in public garages must be installed in accordance with ANSI/NFPA 88A (current standard) for parking structures and ANSI/NFPA 88B (current standard) for repair garages. In Canada see CAN/CGA B149.1-M91 Special consideration for the following should be given:

1. Heaters shall be installed in accordance with their listings and not be mounted less than eight feet (8') above the floor. Minimum clearances to combustibles must be maintained from vehicles parked below the heater.
2. When installed over hoists, clearance to combustible material must be maintained from upper most point of the hoist, or provide an insulating or reflective barrier on the hoist (consult representative or factory for guidance).
3. Clearance between the heater and its vent and adjacent combustible material (which is part of the building or its contents) shall be maintained to conform with National Fuel Gas Code, ANSI Z223.1 (current standard) NFPA No. 54.

ELECTRICAL GROUNDING:

The burner and vacuum exhaustor must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA 70 (current standard) and Canadian Electrical Codes CSA C22.2 No. M1988 and CAN/CSA C22.2 No. 0-1991. Also refer to the **ELECTRICAL WIRING SPECIFICATIONS** in the start up section of the Reflect-O-Ray® Engineering, Installation, Service and Parts Manual.

GAS INPUT LINES:

The method of pipe sizing must conform to the U.S. National Standards: ANSI Z223.1 (current standard) National Fuel Gas Code or CAN 1-B149.1- M91 Installation Code, and should be installed in accordance with all National and Local Codes and ordinances.

CLEARANCES AND ACCESSIBILITY:

Inlet air assemblies are to be installed with the air opening pointing toward the ground to protect against rain and snow. The inlet is provided with a bird screen. Adequate clearance must be provided around the inlet air assembly opening to provide an unobstructed entry for the combustion air. It is recommended that the combustion air be taken from outside the building whenever possible. Clearances must be sufficient to provide accessibility for servicing. The air inlets must be a minimum of six feet (6') from the exhaust port.

AGRICULTURAL INSTALLATIONS:

In agricultural installations **Reflect-O-Ray®** heating systems **must be installed as vented systems only.**

HAZARDOUS LOCATIONS:

Where there is the possibility of exposure to combustible airborne materials or vapor, consult the local Fire Marshal, the fire insurance carrier or other authorities for approval of the proposed installation. **Reflect-O-Ray® Alpha® heating systems DO NOT qualify for use in explosion proof installations.**

INSTALLER QUALIFICATIONS:

Only firms or individuals qualified to perform work in accordance with the applicable specifications should be engaged to install an **Reflect-O-Ray® Alpha®** system. Consult local Building Inspectors, Fire Marshals, or your local Combustion Research Corporation sales representative for guidance.

INSTALLER RESPONSIBILITY:

Reflect-O-Ray® Alpha® systems are installed on the basis of information given in a layout drawing. Together with these instructions and the cited codes and regulations comprise the information needed to complete the installation. Any non-standard equipment supplied by the installer must be in accordance with applicable national and local standards.

GENERAL CONSIDERATIONS:

When installing the **Reflect-O-Ray® Alpha®** system, take maximum advantage of the building upper structure, beams, Joists, purlins etc. from which to suspend the system. Mount units at minimum height for ease of installation and maintenance but of specified height to fully utilize the building.

The general lay out of the **Reflect-O-Ray® Alpha®** heating system has been established by the engineering drawing. The **Reflect-O-Ray® Alpha®** heaters are primarily used to heat localized areas that would include doors, loading docks and isolated work stations throughout the building.

CLEARANCE TO COMBUSTIBLES:

Reflect-O-Ray® Alpha® is a suspended system which requires that consideration be given to the factors that determine its stability, flexibility, safety, and satisfactory operation. Before installation, the contractor should inspect the building, along with the owner or engineer responsible for the building, on the use of the building -- particularly attention should be given to the intended use of floor space for storage and height of materials stored in the building to insure that there are no problems with clearances to combustibles. Particular care should be taken over doors and high objects such as busses, trucks, cranes, car lifts, etc. Wherever possible have fresh air openings to burners come through the side walls; wherever possible, have exhaust outlets discharge through the side walls. **REFER TO THE Reflect-O-Ray® OWNERS MANUAL FOR CLEARANCE TO COMBUSTIBLE LISTINGS.**

DO -

- { Maintain specified clearances to combustibles, and to heat-sensitive material, equipment and work stations.
- { Provide approved heat-radiation shielding or barriers if needed. Refer to the National Fuel Gas Code for guidance.
- { Provide access for general servicing and provide easy access for complete removal of burner and blower.
- { Familiarize yourself with local and national codes. Develop a planned installation procedure which will conserve material and labor on the job. Check to see that all material and equipment is on the job before starting installation. Be sure to accommodate thermal expansion of the hot tube.
- { Use the stainless steel gas connector provided ONLY as shown in the instructions.
- { Provide end clearance so tubing won't expand and touch a wall or a structural member.

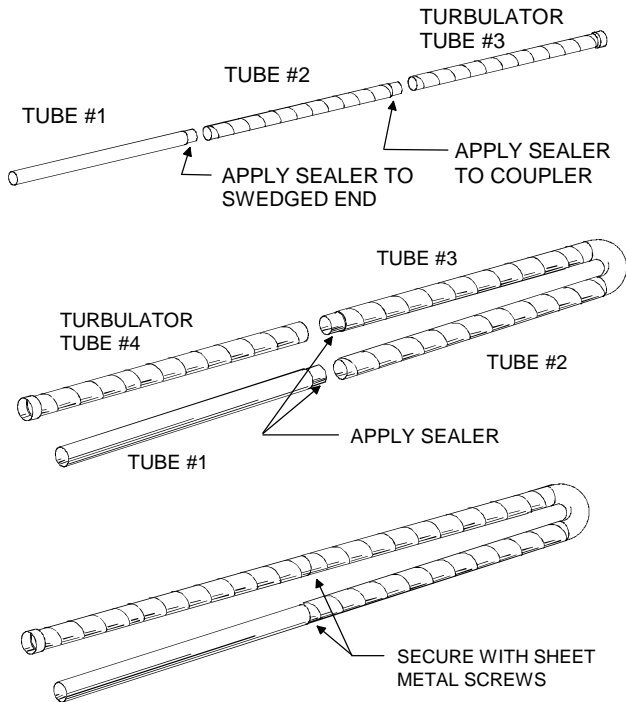
DON'T -

- { Finish a job without conducting a proper start up.
- { Leave an unfinished job without turning off power and closing gas valves.
- { Pressure test the gas line under high pressure without replacing the shutoff cocks with plugs. Failure to do so will result in damage to diaphragms and gaskets of regulators and valves. **NOTE: Controls have maximum 1/2 PSI rating.**
- { Forget to check bird screens on burner inlets and exhaust discharge.
- { Forget to leave this manual with customer and explain how this system works.

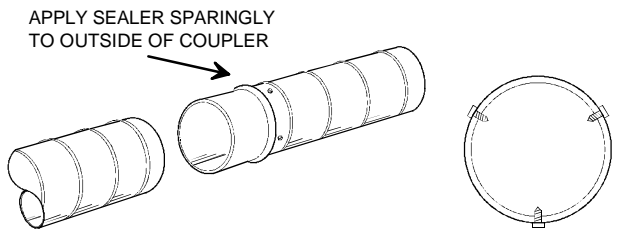
ASSEMBLY INSTRUCTIONS: TUBE & REFLECTOR

STRAIGHT & "U" TUBE ASSEMBLY:

1. Remove the Reflector(s), tubes and hanger from the shipping carton. Inspect for shortages and damages as well as correct gas service for burners.
2. Assemble the tubes as shown in the general illustrations below, making sure to apply sealer to the couplers before sliding the tubes together. **MAKE SURE THAT THE TUBE WITH THE INTERNAL TURBULATORS ARE ASSEMBLED IN TUBES AS SHOWN IN ILLUSTRATION ON THE FOLLOWING PAGES.**



3. Next secure joints with the self drilling and tapping screws provided (use three per joint).



4. Next install hangers supports by sliding them into place and position them as illustrated. **REFER TO THE Reflect-O-Ray® OWNERS MANUAL FOR PROPER LOCATION. NOTE:** Do not vary the location of the hangers anymore than +/- 4" from the recommendations.
5. Now slide the reflectors into place and overlap them approximately 1" to 2" and secure them together with the sheet metal screws provided.

NOTE: The assembled tubing and reflector assembly may be too long to conveniently install in one piece, therefore it is

recommended that the assembly be raised into position in two pieces. Apply sealer and secure the final joint when in position.

CUSTOMIZING SYSTEMS

A maximum of two 90° or four 45° elbows may be installed after the second tube. The tube couplers that have been factory installed will have to be removed to accommodate the installation of any elbows. Any additional elbows, tube and reflector are optional equipment. **DO NOT CUT OR SHORTEN THE TURBULATOR TUBE. DO NOT INSTALL OR JAM TURBULATORS IN ELBOWS OR "U" BENDS. CONSULT YOUR REPRESENTATIVE OR THE FACTORY FOR PROPER INSTALLATION & GUIDANCE.**

SUSPENSION

Combustion Research Corporation recommends that the radiant tube and reflectors and burner assemblies be hung by means of chain. **DO NOT STRETCH OR INSTALL CHAIN OTHER THAN IN A VERTICAL FASHION WHEN INITIALLY INSTALLED (BURNER NOT FIRING).**

If chain is not supplied by Combustion Research Corporation, furnish a chain with a minimum 90 lb. work load (trade size #3 or larger).

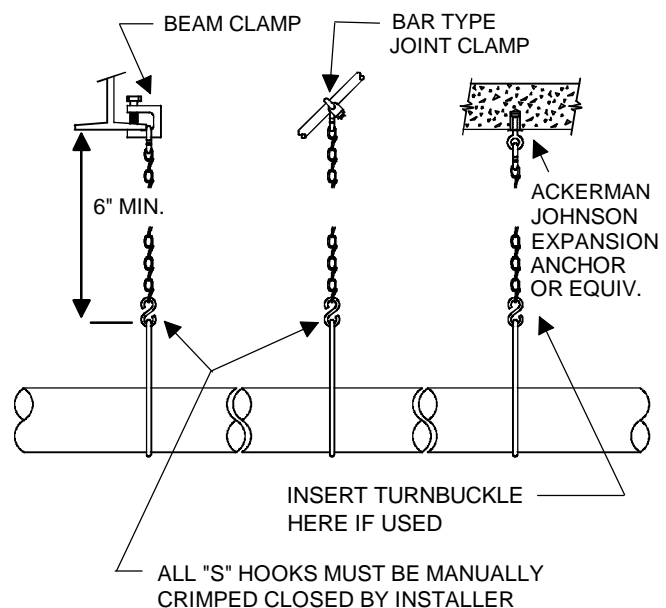
CAUTION: Infrared tube systems expand and contract upon each call for heat. Approximately 5/8" expansion for every ten feet (10') of lineal radiant tube can be expected.

Provisions must be made to limit lateral movement when systems are installed in site conditions where open doors may create a wind condition.

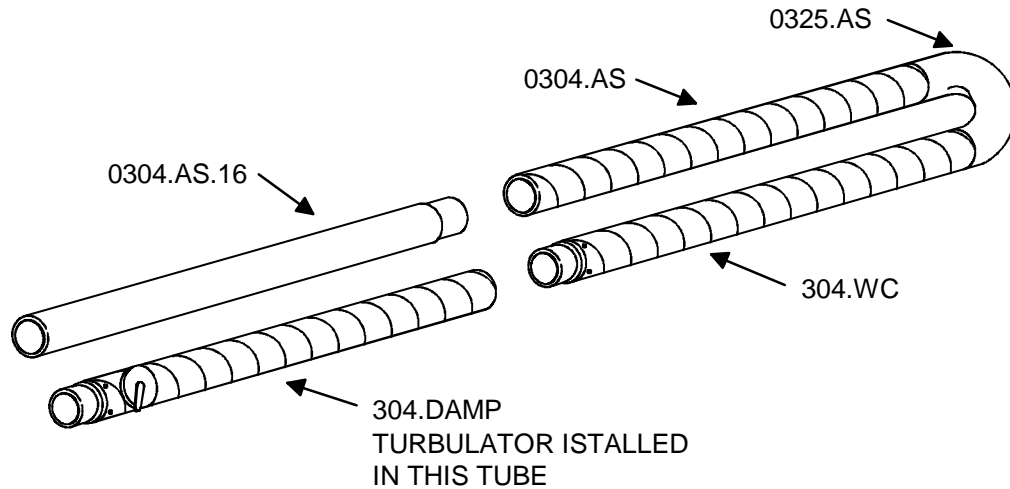
For fine adjustment turnbuckles may be used.

NOTES:

SECURE TURNBUCKLES SO THAT THEY WILL NOT UNWIND OR UN-SCREW. CRIMP "S" HOOKS CLOSED BEFORE LEAVING JOB.



"U" TUBE SYSTEMS - SINGLE BURNER APPLICATIONS

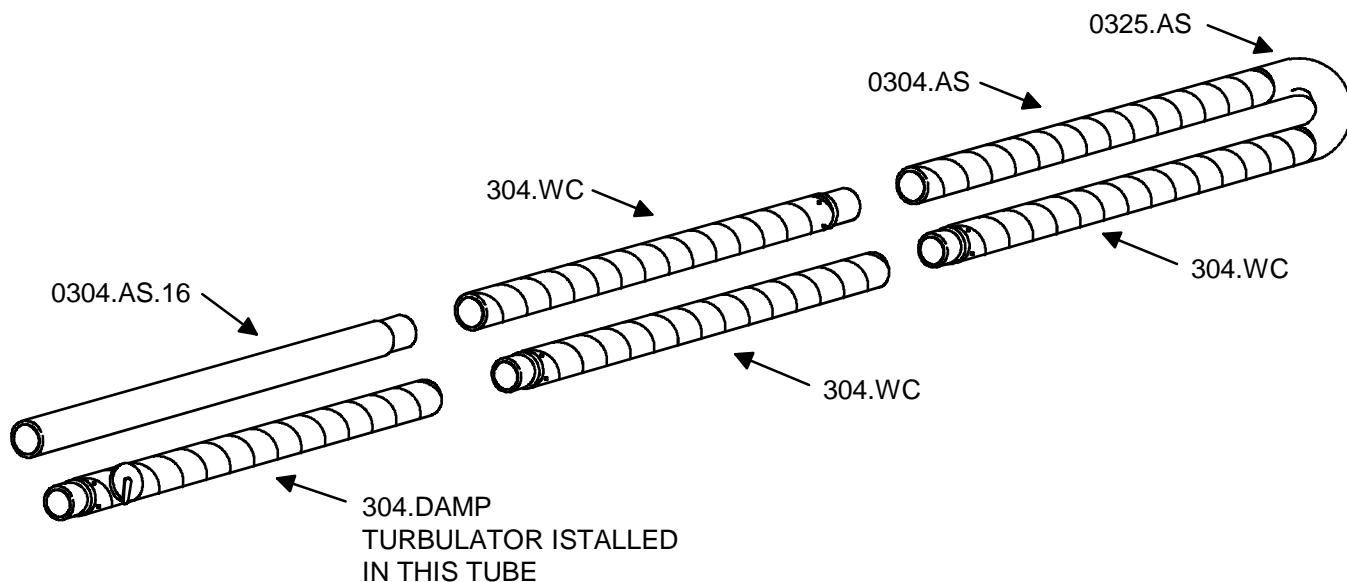


PACKING LIST FOR 20 "U" SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL.075.N.U (75,000 Btu/hr Natural Gas System), 0AL.075.P.U (75,000 Btu/hr Propane System), 0AL.105.N.U (105,000 Btu/hr Natural Gas System), 0AL.105.P.U (105,000 Btu/hr Propane System). The tube and reflector packing box is labeled "SUB.TU.A40.U".

PART NO.	QTY.	DESCRIPTION
0304.AS.16	1	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
0304.AS	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG
304.DAMP	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH DAMPER
304.WC	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	1	TURBULATOR - INSTALLED IN 304.DAMP TUBE (NOT SHOWN)
0325.AS	1	U BEND FITTING - PRE- ASSEMBLED IN TUBES 0304.AS & 304.WC
0812.00	2	PANEL REFLECTOR (NOT SHOWN)
0812.02	5	PANEL HANGER & RADIANT TUBE SUPPORT (NOT SHOWN)
0812.04	1	REFLECTOR END CAP (NOT SHOWN)
812.05	1	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.OM	1	SCREW & SEALER PAC (NOT SHOWN)

"U" TUBE SYSTEMS - SINGLE BURNER APPLICATIONS

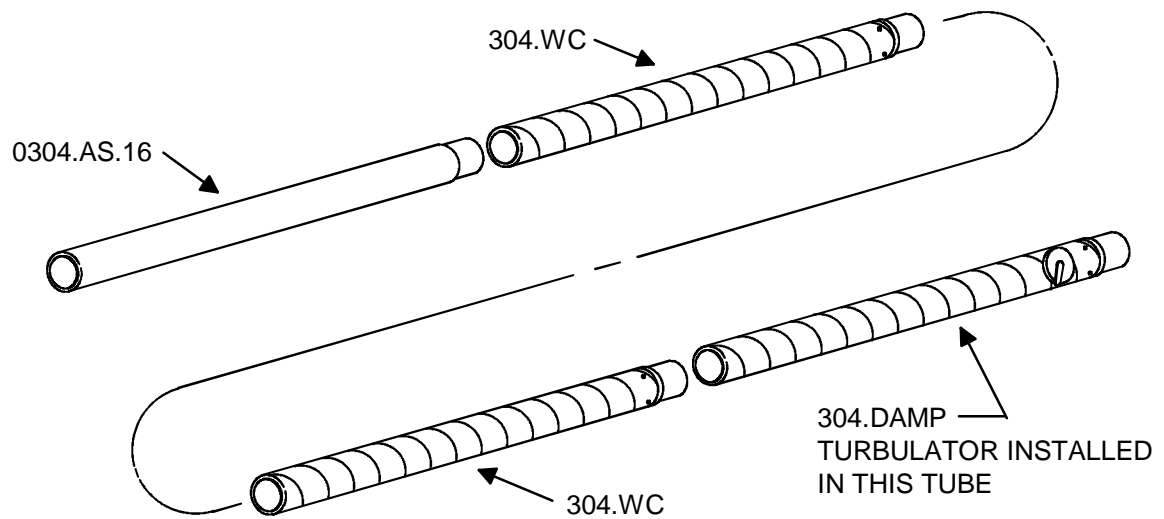


PACKING LIST FOR 30' "U" SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL.130.N.U (130,000 Btu/hr Natural Gas System) & 0AL.120.P.U (120,000 Btu/hr Propane System). The tube and reflector packing boxes are labeled "SUB.TU.A40.U" & "SUB.TU.0AL.U".

PART NO.	QTY.	DESCRIPTION
0304.AS.16	1	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
0304.AS	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG
304.DAMP	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH DAMPER
304.WC	3	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	1	TURBULATOR - INSTALLED IN 304.DAMP TUBE (NOT SHOWN)
0325.AS	1	U BEND FITTING - PRE- ASSEMBLED IN TUBES 0304.AS & 304.WC
0812.00	2	PANEL REFLECTOR (NOT SHOWN)
0812.02	7	PANEL HANGER & RADIANT TUBE SUPPORT (NOT SHOWN)
0812.04	1	REFLECTOR END CAP (NOT SHOWN)
812.05	1	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.OM	1	SCREW & SEALER PAC (NOT SHOWN)

STRAIGHT TUBE SYSTEMS - SINGLE BURNER APPLICATIONS

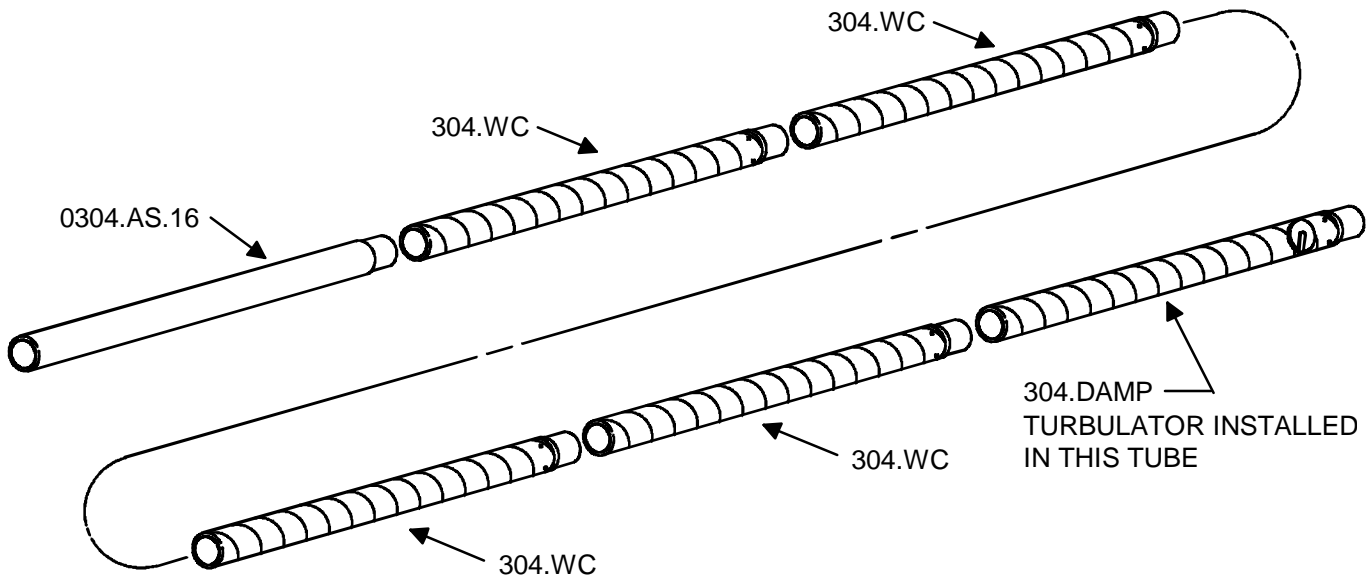


PACKING LIST FOR 40' LONG - STRAIGHT SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL.075.N.S (75,000 Btu/hr Natural Gas System), 0AL.075.P.S (75,000 Btu/hr Propane Gas System), 0AL.105.N.S (105,000 Btu/hr Natural Gas System) & 0AL.105.P.S (105,000 Btu/hr Propane Gas System). The tube and reflector packing box is labeled "SUB.TU.0AL.4".

PART NO.	QTY.	DESCRIPTION
0304.AS.16	1	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
304.DAMP	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH DAMPER
304.WC	2	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	1	TURBULATOR - INSTALLED IN 304.DAMP TUBE (NOT SHOWN)
0360.00	4	REFLECTOR (NOT SHOWN)
0361.00	6	REFLECTOR & RADIANT TUBE HANGER (NOT SHOWN)
0362.00	3	INTERMEDIATE REFLECTOR SUPPORT (NOT SHOWN)
0342.WH	1	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.OM	1	SCREW & SEALER PAC (NOT SHOWN)

STRAIGHT TUBE SYSTEMS - SINGLE BURNER APPLICATIONS

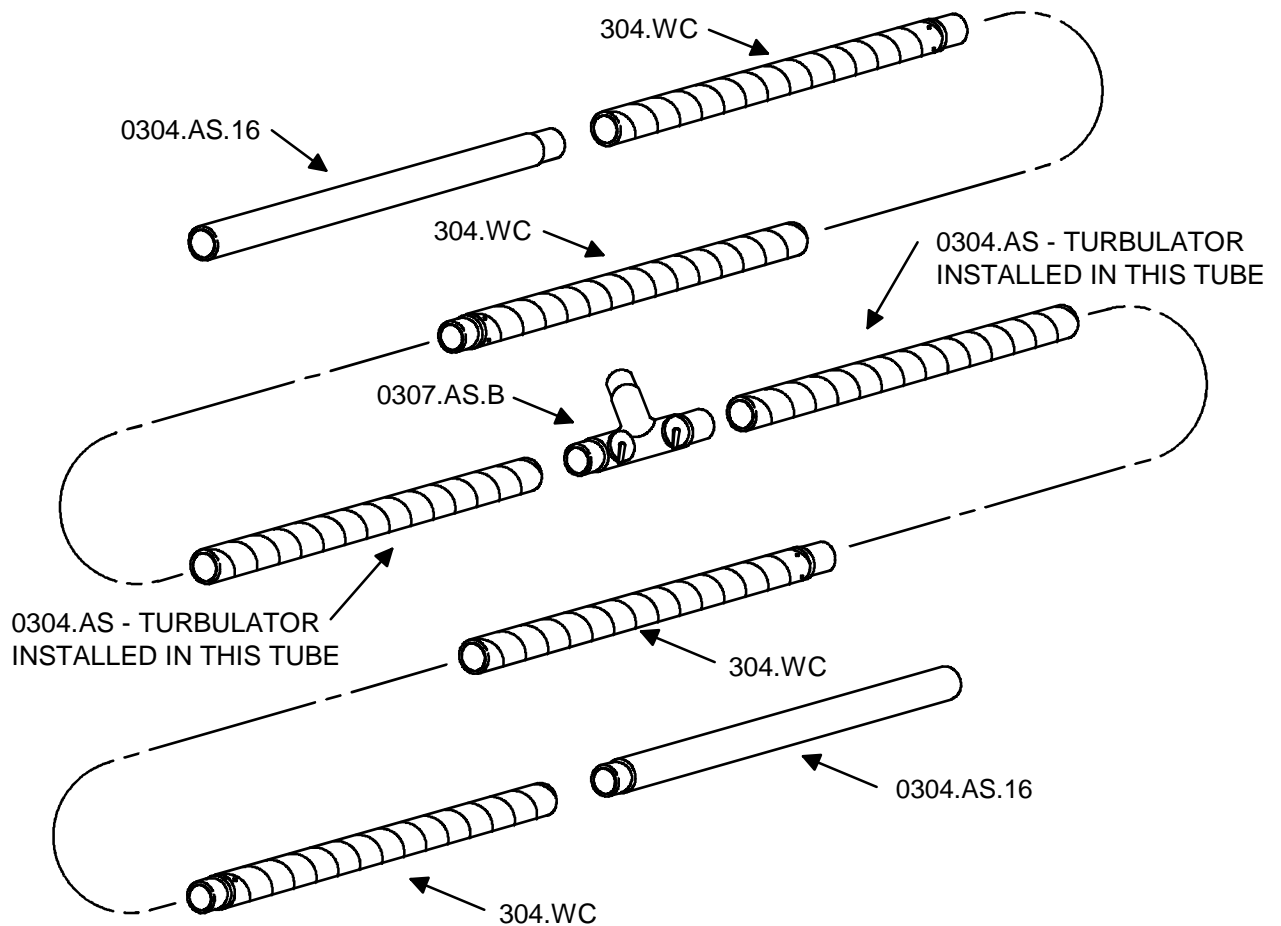


PACKING LIST FOR 60' LONG - STRAIGHT SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL.130.N.S (130,000 Btu/hr Natural Gas System) & 0AL.120.P.S (120,000 Btu/hr Propane System). The tube and reflector packing boxes are labeled "SUB.TU.A40.S" & "SUB.TU.0AL.2".

PART NO.	QTY.	DESCRIPTION
0304.AS.16	1	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
304.DAMP	1	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH DAMPER
304.WC	4	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	1	TURBULATOR - INSTALLED IN 304.DAMP TUBE (NOT SHOWN)
0360.00	6	REFLECTOR (NOT SHOWN)
0361.00	8	REFLECTOR & RADIANT TUBE HANGER (NOT SHOWN)
0362.00	5	INTERMEDIATE REFLECTOR SUPPORT (NOT SHOWN)
0342.WH	1	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.OM	1	SCREW & SEALER PAC (NOT SHOWN)

STRAIGHT TUBE SYSTEMS - TWO BURNER APPLICATIONS

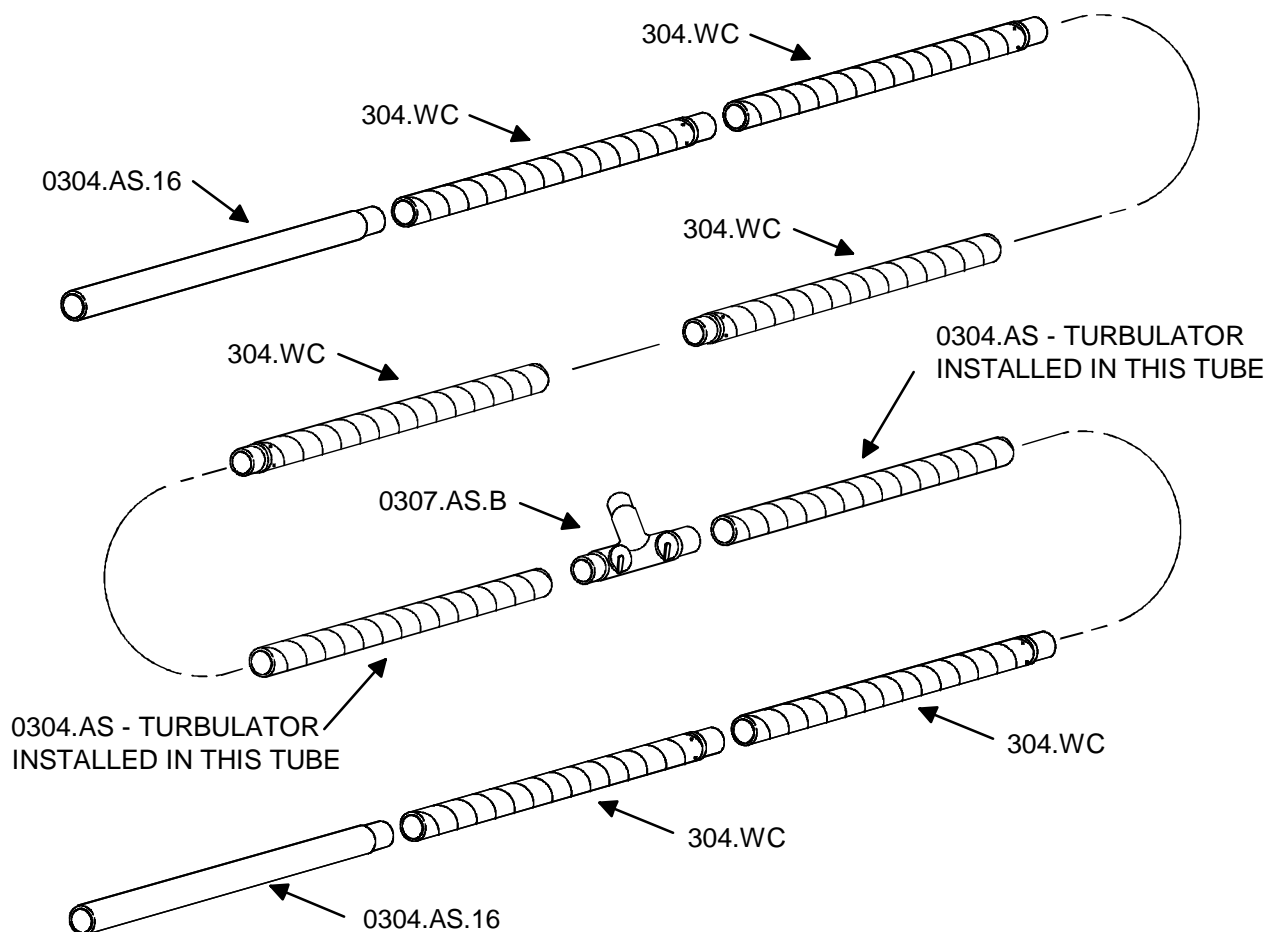


PACKING LIST FOR 80' LONG - TWO BURNER TUBE & REFLECTOR SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL.150.N (150,000 Btu/hr System), 0AL.150.P (150,000 Btu/hr System), 0AL.180.N (180,000 Btu/hr System), 0AL.210.N (210,000 Btu/hr System) & 0AL.210.P (210,000 Btu/hr System). The tube & reflector packing boxes is labeled "SUB.TU.0AL".

PART NO.	QTY.	DESCRIPTION
0304.AS.16	2	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
0304.AS	2	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG
304.WC	4	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	2	TURBULATOR - INSTALLED IN 0304.AS TUBE (NOT SHOWN)
0360.00	8	REFLECTOR (NOT SHOWN)
0361.00	12	REFLECTOR & RADIANT TUBE HANGER (NOT SHOWN)
0362.00	6	INTERMEDIATE REFLECTOR SUPPORT (NOT SHOWN)
0342.WH	2	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.AS	1	SCREW & SEALER PAC (NOT SHOWN)
0307.AS.B	1	TEE WITH DAMPERS INLINE

STRAIGHT TUBE SYSTEMS - TWO BURNER APPLICATIONS



NOTE: Connect the lower Btu/Hr input burner (105,000 Btu/hr) to the shorter length of radiant tube (40' side).

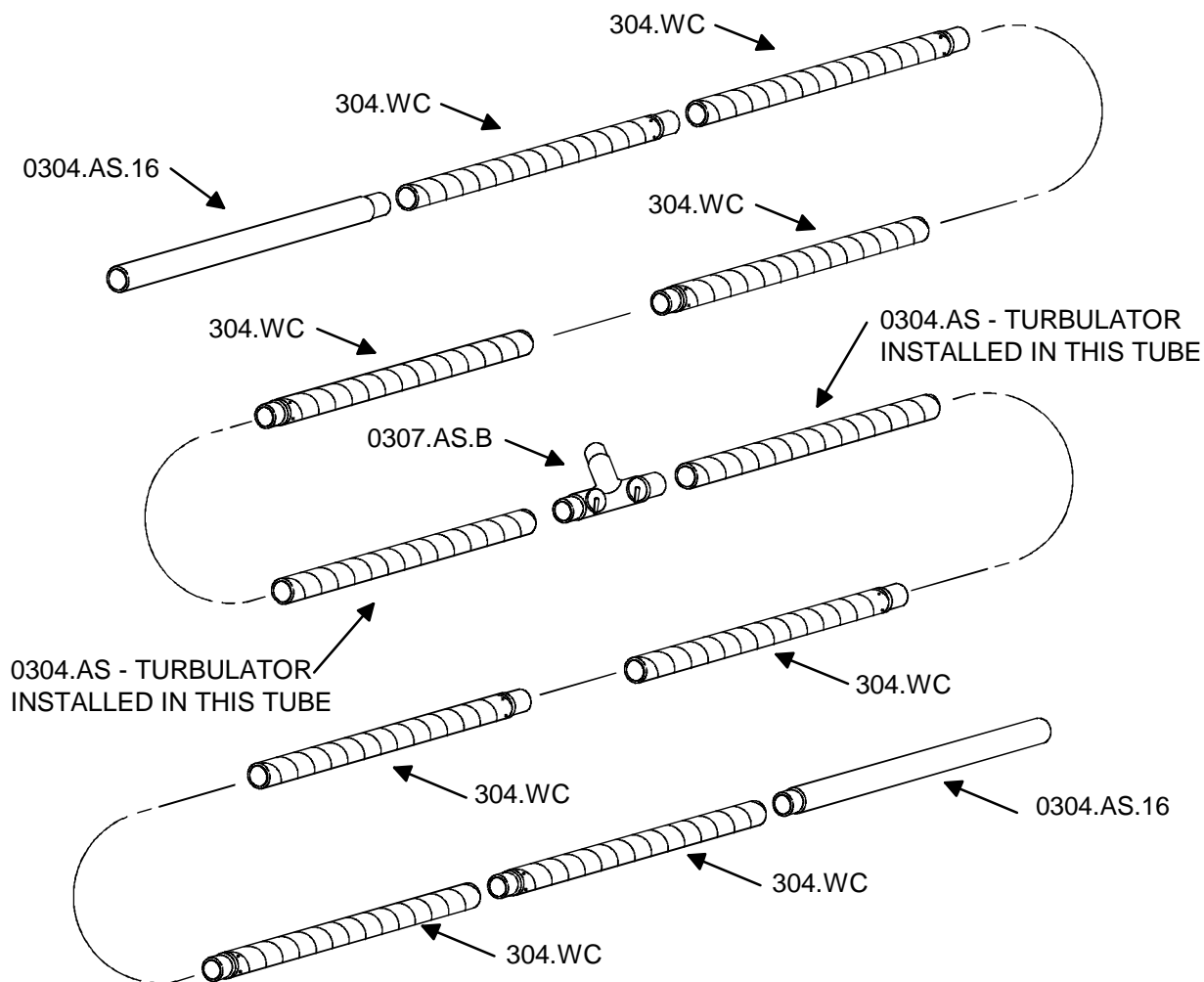
PACKING LIST FOR 100' LONG - TWO BURNER TUBE & REFLECTOR SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL.235.N (235,000 Btu/hr System) & 0AL.225.P (225,000 Btu/hr System). The packing boxes are labeled: Qty. 1 - "SUB.TU.0AL" & Qty.

1 - "SUB.TU.0AL.2"

PART NO.	QTY.	DESCRIPTION
0304.AS.16	2	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
0304.AS	2	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG
304.WC	6	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	2	TURBULATOR - INSTALLED IN 0304.AS TUBE (NOT SHOWN)
0360.00	10	REFLECTOR (NOT SHOWN)
0361.00	14	REFLECTOR & RADIANT TUBE HANGER (NOT SHOWN)
0362.00	8	INTERMEDIATE REFLECTOR SUPPORT (NOT SHOWN)
0342.WH	2	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.AS	1	SCREW & SEALER PAC (NOT SHOWN)
0307.AS.B	1	TEE WITH DAMPERS INLINE

STRAIGHT TUBE SYSTEMS - TWO BURNER APPLICATIONS



PACKING LIST FOR 120' LONG - TWO BURNER TUBE & REFLECTOR SYSTEM

The following tube and reflector components are supplied with system Part Numbers 0AL260.N (260,000 Btu/hr System), 0AL.240.P (240,000 Btu/hr System). The packing boxes are labeled: Qty. 1 - "SUB.TU.0AL" & Qty. 2 - "SUB.TU.0AL.3"

PART NO.	QTY.	DESCRIPTION
0304.AS.16	2	RADIANT TUBE - 16 Ga. ALUMINIZED STEEL 10FT. LONG
0304.AS	2	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG
304.WC	8	RADIANT TUBE - SPIRAL ALUMINIZED STEEL 9'9" LONG WITH COUPLER
6013.175	2	TURBULATOR - INSTALLED IN 0304.AS TUBE (NOT SHOWN)
0360.00	12	REFLECTOR (NOT SHOWN)
0361.00	16	REFLECTOR & RADIANT TUBE HANGER (NOT SHOWN)
0362.00	10	INTERMEDIATE REFLECTOR SUPPORT (NOT SHOWN)
0342.WH	2	REFLECTOR END CAP WITH HOLES (NOT SHOWN)
0315.AS	1	SCREW & SEALER PAC (NOT SHOWN)
0307.AS.B	1	TEE WITH DAMPERS INLINE

EXHAUST METHODS

VACUUM EXHAUSTERS - VENTING ARRANGEMENTS

The layout drawing shows the general location of the vacuum exhauster. Specific exhauster location and discharge details must meet the following criteria:

- ▼ Make sure that the venting method selected is in compliance with any local codes.
- ▼ Heater may be vented to the outdoors vertically or horizontally. The vent piping shall be adequately supported to prevent sagging.
- ▼ Horizontal discharge is preferred through side walls. The footage of horizontal vent pipe must be calculated into the maximum system footage.
- ▼ When the vent pipe passes through areas where the ambient temperature is likely to induce condensation of the flue gases, the vent pipe shall be insulated.
- ▼ If the heater is to be vented horizontally:
 - a. Vent must terminate at least 3 feet (**0.9m**) above any forced air inlet located within 10 feet (**3.1m**).
 - b. Vent shall terminate at least 4 feet (**1.2m**) below, 4 feet (**1.2m**) horizontally from, 1 foot (**30cm**) above any door, window or gravity air inlet into any building.
 - c. The bottom of the vent terminal shall be located at least 12 inches (**30cm**) above grade and at least 6 inches (**15cm**) above anticipated snow depth.
 - d. Distances from adjacent public walkways, adjacent buildings openable windows and building openings, are to be consistent with the National Fuel Gas Code, ANSI Z22.3.1/NFPA 54.
- ▼ Vent opening must be beyond any combustible overhang.
- ▼

Any portion of the flue pipe that passes through combustible material of the building must have a minimum 1" clearance.
- ▼ If condensation within the flue becomes a problem, the flue should be shortened or insulated.
- ▼ Building materials should be protected from degradation by flue gas products.

The exhauster impellers and motors are precision balanced and bench tested as a complete assembly for vibration and noise. It is important that care be used when handling the exhauster to insure that it is not put out of balance by dropping or careless handling.

Install the vibration isolating stainless steel flex (PN 0334.SS) between the last radiant tube and the vacuum exhauster. The stainless steel exhaust flex is to be installed in a straight line, and must not have any kinks or vertical stress.

OPERATION

1. Before connecting the motor to the electric supply, check the electrical characteristics as indicated on the motor nameplate to insure proper voltage, phase and rotation.
2. After electrical connections are completed, momentarily apply power, just enough to start the vacuum exhauster unit. Make sure that the rotation of the wheel is correct as indicated by directional arrows on the unit. If proper rotation, apply full electrical power.
3. With the complete system in full operation and all ducts attached, measure current input to the motor and compare with the nameplate rating to determine if the motor is operating under safe load conditions.

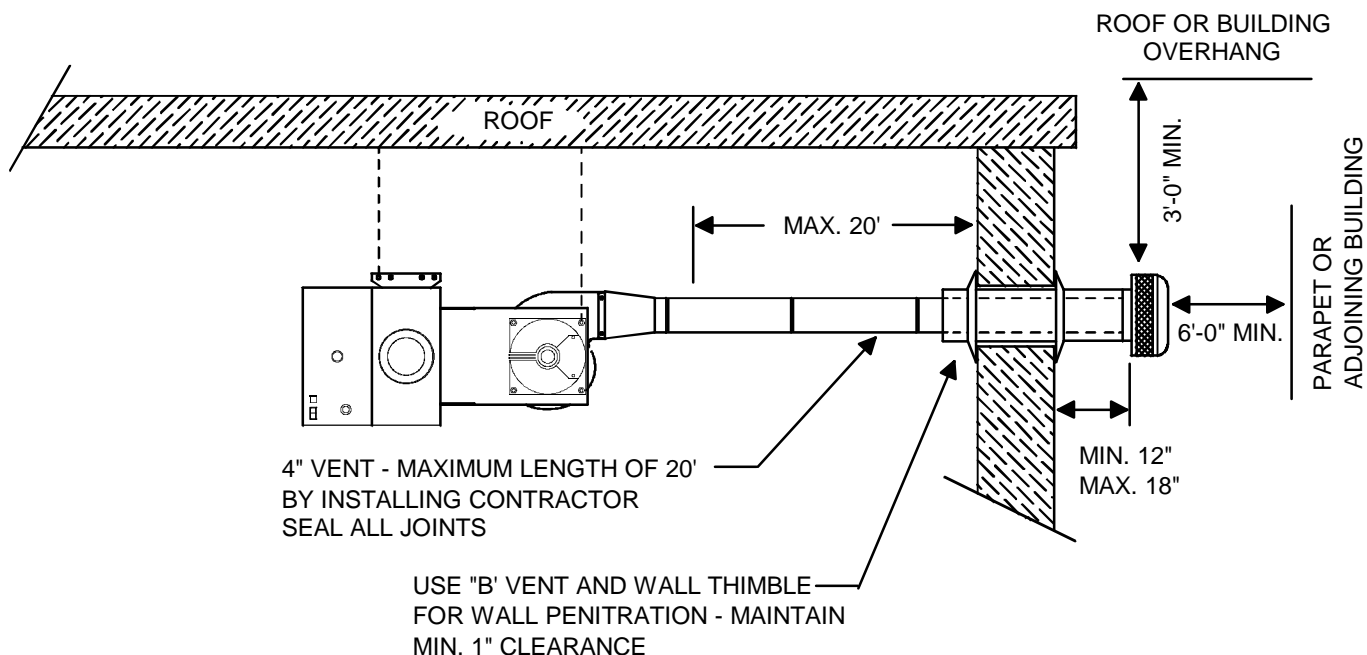
GENERAL SAFETY INFORMATION

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
2. Vacuum exhauster must be securely and adequately grounded. This can be accomplished by wiring with a grounded, metal-clad raceway system, by using a separate ground wire connected to the bare metal of blower frame, or other suitable means.
3. Always disconnect power source before working on or near a motor or its connected load. If the power disconnect point is out of sight, lock it in the open position and tag to prevent unexpected application of power.
4. Be careful when touching the exterior of an operating motor - it may be hot enough to be painful or cause injury.
5. Protect the power cable from coming in contact with sharp objects. Do not kink power cable and never allow the cable to come in contact with oil, grease, hot surfaces, or chemicals.
6. Make certain that the power source conforms to the requirements of your equipment.
7. When cleaning electrical or electronic equipment, always use an approved cleaning agent such as dry cleaning solvent.
8. Not recommended as an explosion proof blower. Do not use where explosive fumes or gases are present

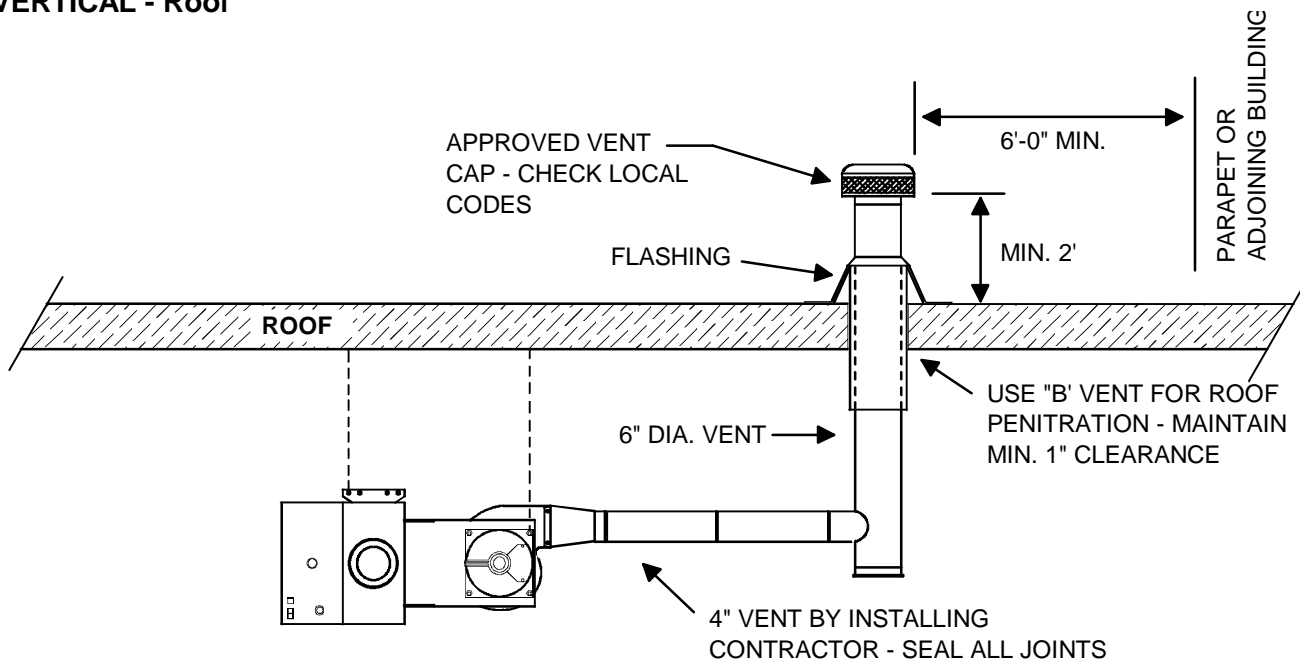
EXHAUST METHODS - "U" TUBE SYSTEMS

"U" TUBE SYSTEMS

HORIZONTAL - Side Wall

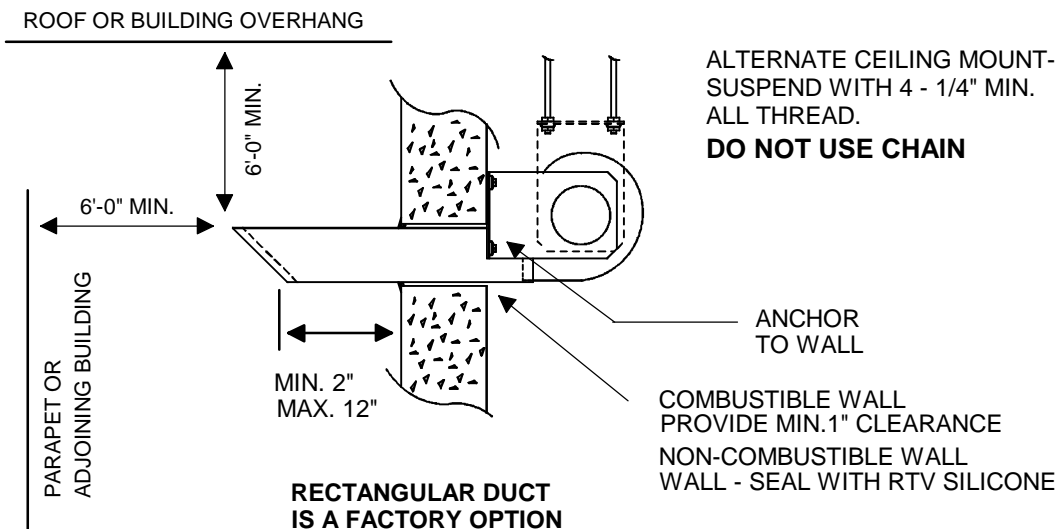
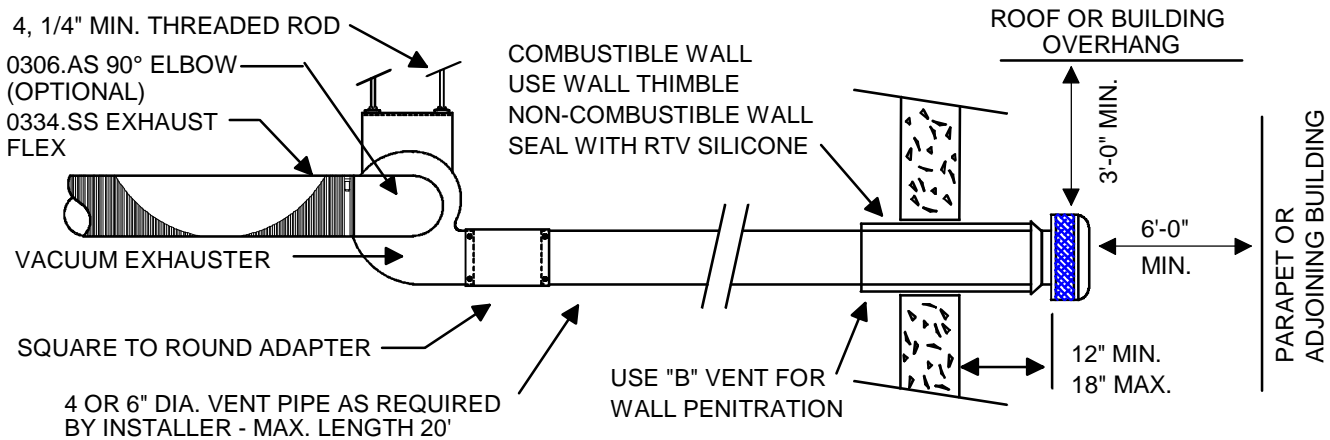
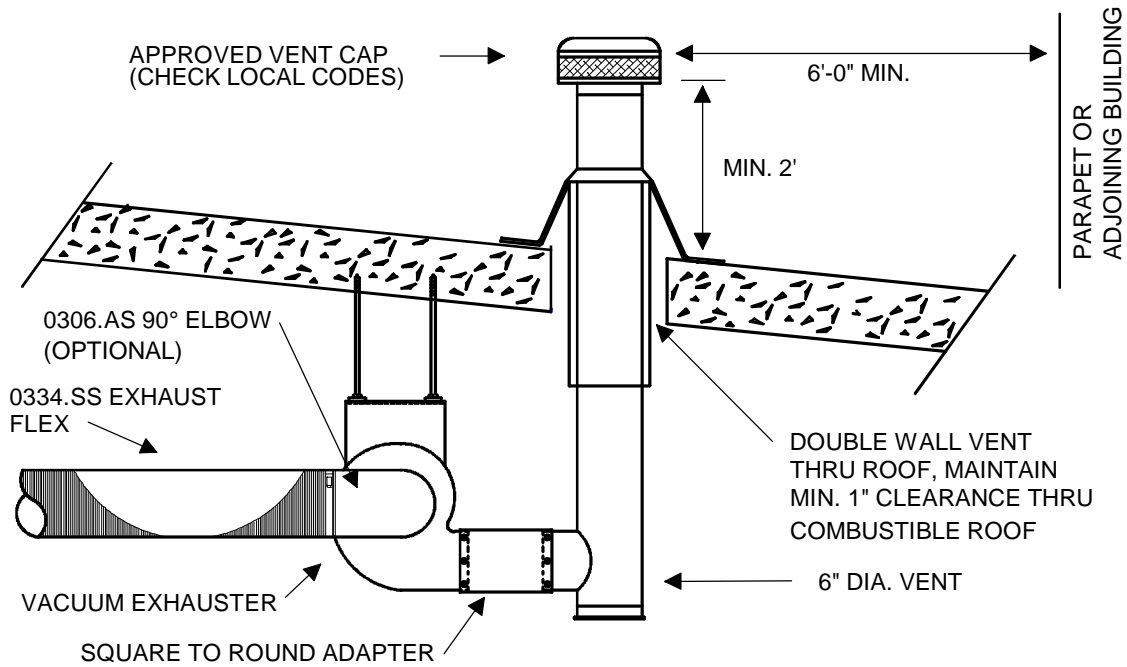


VERTICAL - Roof



NOTE: VENT PIPING SHOULD NOT EXCEED A MAX. COMBINED LENGTH OF 20'

EXHAUST METHODS - STRAIGHT TUBE SYSTEMS





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