INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS FOR INDEECO ELECTRIC DUCT HEATERS

GENERAL

This document is to be used for all duct heater installations unless the heater is used in a piece of equipment where the testing and evaluation of the end use equipment supersedes this document. In that case, it is the responsibility of the end use equipment manufacturer to have performed testing for the end use application.

APPLICATION INFORMATION

1. Follow the procedure given on the reverse side of this sheet to ýnd the minimum air velocity for safe operation. At least this minimum velocity must be provided at all points over the heater face area. Failure to meet this requirement may result in serious damage or nuisance thermal cutout tripping.

2. The maximum air inlet temperature for open coil heaters is 100° F, and for ýnned tubular heaters, 80Á F.

3. The heater must be located at least 48ò from any grills, registers, ýlters, abrupt duct size changes, humidiýers, air conditioning or air handling units, or any other change or obstructions in the duct which may result in nonuniform airþow. Duct elbows or turns must be located at least 4ô from the inlet of the heater and 2ô from the outlet of the heater. Sufýcient working space must be provided per paragraph 110-26 of the NEC.

4. These duct heaters are not intended for installation in series in the airstream; the heaters are designed for use only as a single unit within a duct with the exception of Series ZUA, XUA, ZUBA, XUBA TFZUA, TFLZUA, TFXUA ,TFLXUA, XRA, XRBA, ZRA, ZRBA, TFXRA AND TFZRA which are designed for stacked installation for use as a single unit within a duct. (See Fig. No. 3)

MECHANICAL INSTALLATION

1. Heater terminal outlet box should not be enclosed. Heaters with ventilated terminal box covers must be installed in a position where air passing out of the terminal box does not enter into conýned areas of the building structure (such as a space behind a false ceiling, a hollow space in a wall, etc.).

2. All heaters are suitable for installation with zero spacing between the duct and combustible surfaces.

3. The heater must be installed in the correct position as shown by the arrows marked on the terminal box.

4. Sufýcient clearance for convection cooling must be allowed for all heaters with built-in INDEECO Controls SCR Power Controllers. Provide at least 5 inches of free air space above and below cooling ýns extending from heater terminal box.

5. The air duct should be installed in accordance with the standards of the National Fire Protection Association for installation of air conditioning and ventilating systems of other than residence type (Pamphlet No. 90A) and residence type warm air heating and air conditioning systems (Pamphlet No. 90B).

6. For proper operation of heaters equipped with a built-in airþow switch, a minimum of .07ò WC of static pressure is required in the duct system and the velocity pickup tube for the airþow switch must be pointed in the proper direction. When the heater is installed on the downstream or positive pressure side of the air moving fan, the arrow on the mounting þange of the pickup tube must point in the same direction as the airþow. When the heater is installed on the upstream or negative pressure side of the air moving fan, the arrow must point in the direction opposite to the airþow. If incorrectly installed, remove the two screws holding the pickup tube in place, rotate 180Á and reinstall. See separate instruction sheet for installation of heaters supplied with a remote pickup tube.

FOR FLANGE TYPE HEATERS ONLY: (See Fig. No. 1)

7. Provide þanges on the duct to match the heater þanges, both on the entering and leaving air sides.

8. Attach the duct þanges to the heater þanges with bolts, sheet metal screws or slip and drive connectors when the heater has matching connectors for this purpose.

FOR SLIP-IN TYPE HEATERS ONLY: (See Fig. No. 2)

9. Cut a hole in the side of the duct to accommodate the body of the heater (excluding terminal box). This hole should be 1/8ò larger than the heater frame.

10. Slip the heater into the duct and attach the back of the terminal box to the duct with sheet metal screws.

FOR STACKED TYPE HEATERS ONLY: (See Fig. No. 3)

11. The heaters with catalog preýx ZUA, ZUBA, XUBA XUA, TFZUA, TFLZUA, TFXUA ,TFLXUA, XRA, XRBA, ZRA, ZRBA, TFXRA or TFZRA must be stacked as indicated in Fig. No. 3.

FOR HEATERS TO BE INSTALLED IN FIBER GLASS DUCTS:

12. Contact factory for special instructions. Note that the ýber glass duct material itself must be UL listed.

FOR HEATERS TO BE INSTALLED IN INTERIOR INSULATED DUCTS:

13. All slip-in type heaters are suitable for installation in ducts with up to 1ò of interior insulation as long as they have been sized for the dimensions inside the insulation. The heaters are not suitable for insulation depths of greater than 1ò unless a special construction has been ordered. Flange type heaters are only suitable for installation in insulated ducts if specially ordered for this application.

ELECTRICAL INSTALLATION

14. Follow the wiring diagram on the inside of the terminal box.

15. Supply connections must be made with copper wiring rated for 75Á C minimum. Use aluminum wire only when speciýcally called for on accompanying wiring diagram.

16. If supply connections are for 250 volts or greater, all wiring must be insulated for 600 volts.

17. When making line connections to heater element terminals FOR FINNED TUBULAR DUCT HEATERS ONLY, apply a 1/4ò wrench to þat section of terminal immediately below threads. Otherwise damage to terminal may result.

18. Supply conductors for heaters rated less than 50 KW, must be sized at 125% of rated load. On heaters rated 50 KW and more, the supply conductors may be sized at 100% of rated load, if indicated on the wiring diagram. The line current for either a single or three phase load is calculated as follows:

$$\text{Single Phase Line Current} = \frac{\text{KW x 1000}}{\text{Voltage}}$$

$$\text{Three Phase Line Current} = \frac{\text{KW x 1000}}{\text{Voltage x 1.73}}$$

19. The following table shows the maximum current for 75 °C. Copper wire with not more than 3 conductors in a raceway. It is based on the National Electrical CodeTable 310-16. The amperages shown are for 125% and 100% wire sizing. If there are more than 3 conductors in a raceway, derate these amperages per Table 310-15(B)(2)(a).

AMPS		WIRE SIZE	AMPS		WIRE SIZE	AMPS		WIRE SIZE
125%	100%	AWG/MCM	125%	100%	AWG/MCM	125%	100%	AWG/MCM
12		14	80	100	3	184	230	4/0
16		12	92	115	2	204	255	250
24		10	104	130	1	228	285	300
40		8	120	150	0	248	310	350
52	65	6	140	175	2/0	268	335	400
68	85	4	160	200	3/0	304	380	500

20. When connecting heaters with more than one stage, wire stage No. 1 so that it is the ýrst stage on and the last stage off. Heaters with built-in PE switches must follow this rule also. The stage number will be indicated on the front of each PE switch.

21. The heater must be wired so that it cannot operate unless air is þowing over it. This can be accomplished by using a built-in airþow switch, a built-in fan relay or any of several other methods. See the accompanying wiring diagram for the method used with this heater and provide appropriate interlock wiring as illustrated.

22. National Electrical Code and Underwriters Laboratories require the heater manufacturer to supply 1) over-current protection where heater total current exceeds 48 amperes and 2) any contactors required for proper functioning of temperature limiting controls. Where these devices are not included in the heater terminal box of a UL listed heater, they are supplied in a remote UL listed panel board shown on the wiring diagram.

23. If not supplied as part of this heater, install a line disconnect switch or main circuit breaker in accordance with the National Electrical Code. Depending upon the heaterõs location and accessibility, a built-in disconnect switch may meet this requirement.

24. All electrical connections in the heater, including both ýeld and factory made connections, should be checked for tightness before operating the heater. In addition, after a short period of operation, all connections should again be checked for tightness.

25. If heater is wired to a heating-cooling thermostat, use a thermostat with isolating circuits to prevent possible interconnection of Class 2 outputs.

26a. If the area inside of the sheet metal directly surrounding the heating element section is more than 1ò smaller in length and/or width than the duct in which the duct heater is installed, the KW per square foot of duct area should be calculated as the heater nameplate KW divided by the area inside the sheet metal enclosure directly around the heating elements.

26b. If the heating elements are divided into several sections with uncoiled resistance wire between two or more coiled sections, maximum KW per sq. ft. should be calculated as follows:

$$\frac{\text{Heater nameplate KW}}{\text{Number of heated sections x area of one heated section}}$$

INSTALLATION DRAWINGS

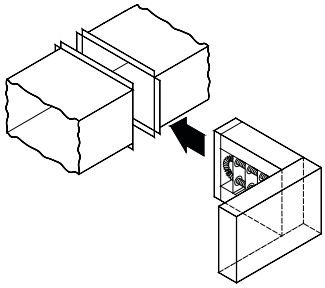

Fig. 1 – Installation drawing of þanged heater.

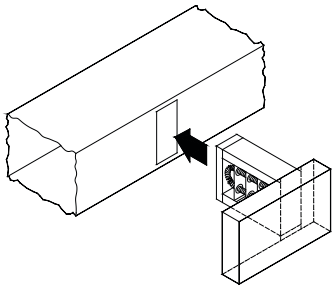

Fig. 2 – Installation drawing of slip-in heater.

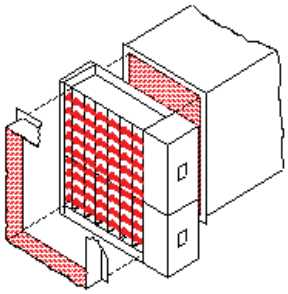

Fig. 3 ï Installation drawing of two stacked sections in a duct.

AIR FLOW REQUIREMENTS

Calculate KW per square foot of duct area as: $\frac{\text{heater namplate KW}}{\text{duct area (Sq.Ft.)}}$ (see #26)

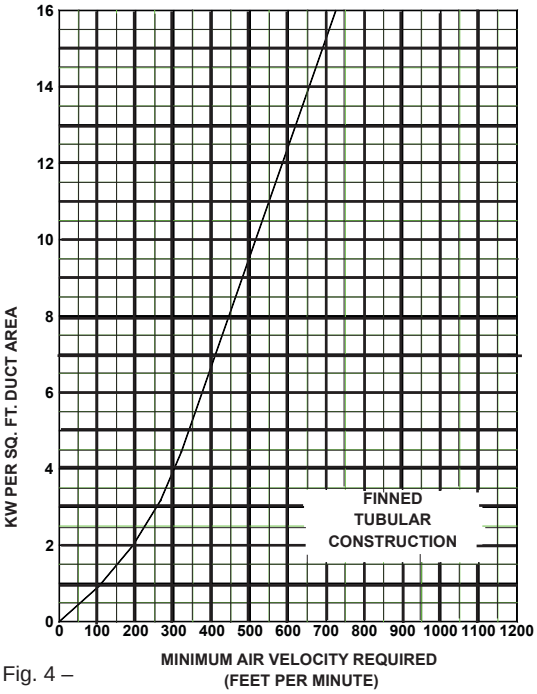

Fig. 4 –

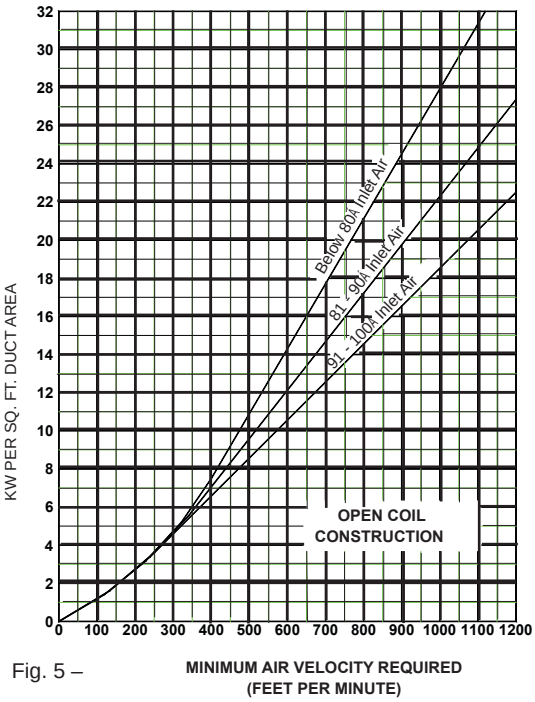

Fig. 5 –

OPERATION & MAINTENANCE
NOTICE: ALL SOURCES OF SUPPLY MUST BE DISCONNECTED BEFORE WORKING ON THIS EQUIPMENT

To operate this heater make sure all associated control equipment is on, energize main supply disconnect and set controlling thermostat above ambient temperature. This heater is equipped with automatic and manual reset temperature limiting controls. If it fails to operate, make sure manual resets are operative by pushing reset buttons.

The only routine maintenance required is to check all electrical connections, including ýeld and factory made connections, for tightness at least once each year or operating season. In addition, any ýlters in the airstream must be kept clean so that adequate airþow is maintained.

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