

A DUCT ASSEMBLY AND A SEAL THEREFOR

This invention relates to a duct assembly and a seal therefor.

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Ducts for transferring conditioned air between air conditioning plant and an air conditioned space have in the past been manufacturing from galvanized steel sheet which is then lagged with insulating material to prevent heat transfer and condensation.

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It is a disadvantage of such known duct systems that they are expensive to manufacture and assemble.

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The manufacture of ducts from a phenolic foam laminate has recently been proposed, such a laminate being manufactured under the trade mark DUCTBOARD by Kooltherm Insulation Products Limited. Such a material comprises a rigid foam phenolic core on both sides of which a layer of aluminium foil face is attached. The laminate material may easily be fashioned into all manner of duct shapes which may then be connected together to form a ducting system.

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It is an advantage of ducts formed using such a laminate that they have sufficient structural rigidity and insulation properties to replace both the steel ducting and surrounding insulating layer of the prior art. However, the ducts do require to be connected together by non-

integral means which may comprise the insulation quality of the ducting system as a whole.

According to the invention in the first aspect there is provided a duct seal comprising first and second seal members connectable together and to respective duct sections, the seal members having an inwardly extending lip of a width less than that of the duct walls whereby when assembled a recess is formed between the ends of the seal members and the inner duct wall and a heat insulating material arranged to be disposed in the recess.

Laminate duct sections assembled with the duct seals according to the invention have the advantages of providing a high strength joint and seal while at the same time providing good heat insulation property due to the dimensions of the sealed members and the addition of a layer of insulating material. Preferably, the layer of insulating material fills the recess to lie flush with the duct wall so that resistance of the joint to air flow is reduced to a minimum.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is an exploded perspective view of the components of a duct seal according to an embodiment of the invention.

Figure 2 is a schematic cross sectional view of the seal when assembled.

With reference to the figures, two duct sections 100, 102 are shown each formed from a phenolic foam laminate manufactured by Kooltherm Industrial Products Limited under the trade mark DUCTBOARD. The laminate comprises a rigid foam phenolic core 104 which is provided on each face with a 20 micron embossed clear-lacquered aluminium film layer 106, 108. The board is provided in sheet sections which are formed into rectangular shaped ducts as shown in figure 1 by machining V-shaped grooves at three corners and then applying adhesive and folding to form the duct shape, gluing the free ends together at joint 116 and applying an additional layer of aluminium foil 118 to secure the joint.

In order to provide a smooth duct profile and provide additional heat transfer insulation, a bead 120 of jet-melted adhesive (TC3764Q manufactured by 3M) is applied at each inner edge using a jet gun (not shown).

To join two duct sections together, a flanged seal is used. The seal comprises two seal members formed from four separate galvanized steel sections 130, 132, 134, 136, one for each side of the duct. Although galvanized steel is preferred, the sections may be formed from other e.g. non-metallic materials. The sections are bolted together onto the duct 100/102 in a slight interference fit so as to be

rigidly held thereon. A self-adhesive fire resistant gasket such as NMC insulating gasket tape manufactured by NMC-Kenmore (UK) Limited 40 is then applied to the face of one flange and the external edges of the flanges are sealed with jet-melted adhesive layer 142. The adhesive is preferably TC3764Q manufactured by 3M.

To connect the duct sections together, the flanges are mated one against the other and nuts and bolts are used to connect the sections through openings 160. For a more solid design, necessary where the side length is over 300 mm clips 170 are also used to provide reinforcement.

With reference to figure 2, a cross section through one of the walls of the duct is shown, when the seal is assembled. Flange 130 include longitudinal flange portions 170 and transverse flange portions 172. The transverse flange portions 172 extend inwardly but terminate slightly before the inner duct wall 180 to form a recess 182. The recess is at least partially filled with the jet-melted adhesive, suitably in the form of two beads 184 thereof to form a heat-insulating layer between flanges 172 and the duct passage which hardens to form a solid heat-insulating layer.

The seal has the advantage of providing substantial rigidity while at the same time not compromising the heat transfer efficiency of the joint. In particular, formation of the recess firstly allows a heat insulating material to

cover the free surface of the flanges 172, so that no direct heat conduction path is provided to the surroundings so a "cold bridge" and consequent condensation problems are eliminated and secondly to provide no impediment to air flow through the duct; in this respect, the adhesive layer preferably fills the recess to lie flush with the inner duct wall.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

CLAIMS

1. A duct seal comprising first and second seal members connectable together and to respective duct sections, the seal members having an inwardly extending flange of a width less than that of the duct walls whereby, when assembled, a recess is formed between the end of the seal members and the duct inner wall; and a heat insulating material arranged to be disposed in the recess.
2. A duct seal as claimed in claim 1 further comprising a gasket member disposed between the seal members.
3. A duct seal as claimed in claim 1 or claim 2 wherein the heat insulating material comprises a jet-melted adhesive.
4. A duct seal as claimed in any one of the preceding claims wherein the seal members are formed from metal.
5. A duct seal as claimed in claim 4 wherein the members are formed from galvanized steel.
6. A duct seal as claimed in any one of the preceding claims wherein the heat insulating material fills the recess.



7. A duct seal as claimed in any one of claims 1 to 5 wherein the heat insulating layer at least covers the free end of each flange.
- 5 8. A duct assembly comprising first and second duct sections and first and second seal members connectable together and to respective duct sections, the seal members each having an inwardly extending flange of a width less than that of the duct walls whereby when
10 assembled a recess is formed between the ends of the seal members and the duct inner wall; and a heat insulating material disposed in the recess.
9. A duct assembly as claimed in claim 8 wherein the duct
15 sections are formed from a phenolic foam laminate.
10. A duct seal substantially as hereinbefore described with reference to the accompanying drawings.
- 20 11. A duct assembly substantially as hereinbefore described with reference to the accompanying drawings.

