

PATENT SPECIFICATION

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DRAWINGS ATTACHED



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(54) THERMAL INSULATION SUSPENSION AND VAPOR SEALING SYSTEM

(71) We, JOHNS-MANVILLE CORPORATION, a corporation organized under the laws of the State of New York, United States of America, of 22 East 40th Street, New York 10016, State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The problem of water vapor condensation in thermal insulations and insulated structures, and the attendant loss in insulating capacity, rot and/or corrosion with extensive damage potential to the structure attributable to the presence of condensed water, is well appreciated in the building and construction industry. This problem has given rise to the common use of vapor barrier means together with insulating materials and building constructions. Often in typical building insulation products, the vapor barrier, such as a membrane or coating, is combined with or incorporated into the body of insulating material, thereby obviating the need for separate applications and leaving it only necessary to separately apply or form vapor seals at junctions such as at joints between the unit sections, or between the units and supporting components. The sealing between individual sections, or at joints, as where the composite insulation and barrier meet with supporting structures, generally entails additional components such as tape, adhesive sealants or coatings, sealing gaskets, and/or additional steps in the application of such materials, or at least the securing or sealing of the tabs or flaps integral with the composite insulation and barrier, all of which add cost and are time consuming.

The invention provides for a suspension and vapor sealing assembly system utilizing compressible thermal insulation panels, such as glass fiber panels, supporting from a channel member, in that the panel has a vapor barrier film adjacent a major surface thereof, and the channel member has two substantially parallel flanges to receive and support an edge of a panel, the flanges being

spaced apart a distance less than the thickness of the panel edge so that the edge is compressed when the panel is inserted between the flanges, and a projection extending along one flange of the channel member, said projection being arranged to contact the major surface of the panel having the vapor barrier film adjacent thereto.

It is a primary objective of this invention to provide means of suspending insulating panels including vapor barrier means in building constructions which additionally effect a vapor-proof seal between the junction of vapor barrier of the insulating panels and the suspending means without the requirement of any additional installation operations, application steps, materials, or components, etc.

Fig. 1 comprises a perspective view of a typical and preferred channel member and section of a compressible thermal insulation panel having a vapor barrier film adjacent one major surface thereof, for the suspension and vapor sealing system of this invention; and,

Fig. 2 comprises a second perspective view of the components of Fig. 1, wherein the compressible thermal insulation panel has been inserted into the supporting channel member and the vapor seal between the vapor barrier film of the insulating panel and the supporting channel member has been thereby effected.

Referring to the drawings, Fig. 1 illustrates both a suitable channel-type member 10, and a typical panel of insulation 11 with vapor barrier membrane, which in consort constitute the essentials of the combination of this invention. First concerning the channel member 10, as illustrated it is shown as a double support designed to carry an insulating panel on either side as is normally most expedient. However, it will become evident from the following details that the channel can be constructed as a single supporting unit, with the suspending means on only either side, rather than on both as shown. Nevertheless, channel member 10 includes a main, or back section 12 having

extending therefrom, usually at angles of about 90°, a pair of substantially parallel flanges 13 and 14, which are spaced apart from each other a distance less than the thickness of the designated compressible insulating panel 11 to be positioned therebetween for support. Preferably, one or both of the flanges 13 and 14 may be provided with a sloped portion which slopes in a direction away from the other flange to facilitate the insertion and compression of the edge of the insulating panel. In the drawing, flange 14 only is provided with a sloped portion designated by numeral 15. The portion 15 opens the distance between the flanges at their entrance to a width greater than the thickness of the insulating panel 11 whereby the panel 11 can be more easily positioned and forced between flanges 13 and 14 until it substantially abuts back section 12, as shown in Fig. 2, without the aid of a shoehorn-type wedge, etc., or difficulty, or damage to the panel edge. Also, it is preferred to have the upper or hidden flange sloped for easy reception at the panel rather than the lower or exposed flange to enhance the appearance of the assembly.

In the preferred embodiment shown, the sloped portion 15 of flange 14 continues upward and is provided with a lip 16 at the same level as the preferred "T" shaped hanger flange 17 at the end of back section 12 as an optional expedient to provide greater versatility in attaching the channel member 10 to structural means, roofing purlins or rafters, etc., but which is not basic to the present invention.

Running the length of lower flange 13 is projection 18, which, although it is shown adjacent to the end of the flange, can equally perform its essential sealing function, as will be apparent hereinafter, if located somewhat inwardly from the flange end, as for example at any position ranging from approximately the middle area of the flange to the outer end thereof, but of course also depending upon the length of the flange.

The complementing insulation which completes the essential combination of this invention and coacts with the aforementioned channel construction to effect the advantages thereof, comprises a section or panel of a generally flat body of insulation, shown as 11, which possesses the following features, namely (1) a panel thickness of a width greater than the distance of the span between flanges 13 and 14, (2) compressibility, (3) resiliency, and (4) a vapor barrier such as a fluid impermeable film, all of which are fulfilled by conventional plastic film-covered glass fiber insulating panels common to the construction industry and in particular the metal building field. For instance, as illustrated in Figs. 1 and 2, the

insulation 11 simply need be composed of a panel or relatively thin body of common resin-bonded glass fiber 19, having adhered to one face thereof a plastics sheet vapor barrier component, or other suitable vapor impermeable composition. To minimize the possibility of accidental separation of the vapor barrier 20 which is exposed on one of the two major surfaces of the panel, particularly during installation including forcing of the edge of the panel between the channel flanges, the plastics sheet or other barrier material may be applied so as to continue a short distance around the end edge of the panel.

As is now more clearly apparent, to mount the insulating panel 11 in the supporting means comprising channel member 10, the edge of the panel section is simply forced into position intermediate flanges 13 and 14 of the channel with the major surface having the vapor barrier adjacent thereto positioned against flange 13 carrying projection 18, which action partially compresses the edge of the panel as shown in Fig. 2, providing a positive grip. Commensurate therewith projection 18 further presses into the panel at a location of approximately intermediate the junction of the panel and the supporting channel, and in the area of the vapor barrier of the insulating panel, thereby effecting a vapor seal between the insulating component and the supporting means without added steps or means.

It will be readily appreciated that channel member 10 can be designed and constructed as either a double supporting component as illustrated or a single unit, and in the latter case two such single units can be employed back to back to function as a double unit. The channel members 10 should be designed so that the flanges 13 and 14 are spaced from each other a distance less than the thickness of the insulating panel. Otherwise the channel member, particularly as to its mounting means, can be designed to best meet the given conditions of any insulation. For example, the channel member can be provided with a "T" hanger flange 17 and/or lips 16 on the terminal end of upper flange 15 to provide optional hanging systems.

Concerning the composite insulation and vapor barrier component, preferably, and in keeping with currently widely used products, the insulating material comprises a conventional resin-bonded glass fiber body of relatively low density such as 1—20 lbs/ft³ and typically, of about 1.5 lbs/ft³. Other materials nevertheless will serve, such as other fibrous compositions, including mineral wool, organic fibers, asbestos, either with or without binders, depending of course upon their integrity due to intertwining, and resin or elastic foam insulations, etc., the primary

requisite being that the material is amenable to slight compression without significant danger of breakage and is somewhat resilient so as to resist the compression to provide a tight-sealing fit with the channel means. As such, these materials which are normally compressible, are more often than not relatively fluid permeable, necessitating the inclusion therewith of a fluid-impermeable body as a vapor barrier, which may consist of any fluid-impermeable membrane or flexible coating material, such as a sheet of plastics film, meal foil, continuous elastic or other coatings, etc. Obviously it is preferable, due to convenience of fabrication and often for appearances, to apply the vapor barrier component to one of the major surfaces of the insulating body. However, because some manufacturing processes comprise formation of insulation products through multiple laminations of several thin layers, the vapor barrier such as a plastics sheet or metal foil may be incorporated internally within the insulating body, as between the bulk of the laminated body and one or two surface laminae provided it is in adjacent proximity to the major surface to be placed in contact with the projection of the channel member, and the degrees of compression applied by the flanges hereof is sufficient to effect the necessary vapor seal. The degree of compressibility to effect a positive vapor seal will, of course depend primarily upon the density, or in other words the degree of porosity of the material of the insulating panel.

Also, depending primarily upon the given insulation and temperature conditions encountered therein, and of course in keeping with the established concepts regarding thermal insulation, the vapor barrier may face either direction that is either inwardly or outwardly in relation to the building or chamber insulated therewith, it only being essential that the projection located on the flange be adjacent to the vapor barrier component of the insulation. Accordingly, to provide greater versatility a projection can be located on both flanges to more easily enable installation with the vapor barrier facing in either direction. However, due to normal atmospheric temperature and humidity conditions, barring some uncommon consideration, the vapor barrier should face inwardly or be directed toward the warm side of the insulated structural chamber to provide the most effective resistance against condensation damage.

In any case, as should be apparent from the foregoing, that the effect of the combined components of the channel 10 with the insulating panel 11 constructed according to the precepts of this invention, acting in concert, is to by themselves produce a positive vapor seal between the supporting means and the insulation.

WHAT WE CLAIM IS:—

1. A suspension and vapor sealing assembly system utilizing compressible thermal insulation panels, such as glass fiber panels, supported from a channel member wherein the panel has a vapor barrier film adjacent a major surface thereof, and the channel member has two substantially parallel flanges to receive and support an edge of a panel, the flanges being spaced apart a distance less than the thickness of the panel edge so that the edge is compressed when the panel is inserted between the flanges, and a projection extending along one flange of the channel member, said projection being arranged to contact the major surface of the panel having the vapor barrier film adjacent thereto so as to form a vapor barrier seal.
2. A suspension and vapor sealing assembly system as recited in Claim 1, wherein the projection is a bead extending along a flange.
3. A suspension and vapor sealing assembly system as recited in any of Claims 1 and 2, wherein the vapor barrier is a plastics film adhered to a surface of the panel.
4. A suspension and vapor sealing assembly system as recited in any of Claims 1—3, wherein one of the flanges is sloped at its edge away from the opposite flange so as to facilitate entry of the panel edge.
5. A suspension and vapor sealing assembly system as recited in any of Claims 1—4, wherein the insulation panel is a glass fiber panel of a density between 1—20 lbs/ft³.
6. A suspension and vapor sealing assembly system as herein described with reference to the specification and the accompanying drawings.

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2. A suspension and vapor sealing assembly system as recited in Claim 1, wherein the projection is a bead extending along a flange.

3. A suspension and vapor sealing assembly system as recited in any of Claims 1 and 2, wherein the vapor barrier is a plastics film adhered to a surface of the panel.

4. A suspension and vapor sealing assembly system as recited in any of Claims 1—3, wherein one of the flanges is sloped at its edge away from the opposite flange so as to facilitate entry of the panel edge.

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