

HEAT INSULATOR ASSEMBLY FOR CURTAIN WALL

This invention relates to a heat insulator assembly for a curtain wall, particularly a curtain wall of the inclined type.

The conventional heat insulator for a curtain wall is not designed for application to a curtain wall of the inclined type. Any attempt to use such a heat insulator as the insulator for an inclined curtain wall will result in deformation of an intervening heat insulating material when a coupling bolt is firmly tightened to couple the insulator together. This makes it impossible to obtain a heat insulator having sufficient strength.

According to one aspect of the present invention there is provided a heat insulator assembly for an inclined curtain wall comprising a transom body having a plate inclined at a prescribed angle and interconnecting horizontal upper and lower base plates, and an outer member coupled to the inclined plate by a coupling bolt with a rigid heat insulating member being interposed between the outer member and the transom body, the bolt lying perpendicular to both the inclined plate and the outer member.

According to another aspect of the present invention there is provided a heat insulator assembly for an inclined curtain wall, comprising:

5 a transom body which includes a pair of upper and lower base plates extending horizontally, and an inclined plate interconnecting said base plates and extending at a predetermined angle of inclination with respect thereto;

10 an outer structural member disposed to lie in parallel with and spaced away from the inclined plate of said transom body;

a rigid heat insulting member interposed between said transom body and said outer structural member; and

15 a coupling bolt screwed perpendicularly through the inclined plate of said transom and said outer structural member for coupling said transom and said outer structural member together.

The invention will be described by way of examples with reference to the accompanying drawings, wherein:-

20 Fig. 1 is a side view of a building provided with inclined curtain walls;

Fig. 2 is an enlarged, longitudinal sectional view of portion A shown in Fig. 1;

Fig. 3 is a transverse sectional view illustrating a transom coupling portion; and

Fig. 4 is a sectional view showing another embodiment of a heat insulator.

5 Referring to the side view of Fig. 1 showing an inclined curtain wall H, numeral 1 denotes a transom, 2 an intermediate transom, and 3 a vertical mullion. The transom 1, intermediate transom 2 and vertical mullion 3 are arranged in the form of a lattice or grid, with side
10 vertical mullions 3', 3' being disposed at an incline along the inclined front and back surfaces of a building B'. The encircled portion A in Fig. 1 is shown in greater detail in the enlarged, longitudinal section of Fig. 2.

15 With reference to Fig. 2, numeral 4 designates a transom body, specifically a structural member on the inner side of the curtain wall. The transom body 4 comprises a pair of substantially parallel upper and lower base plates 5, 5 extending horizontally, and an inclined
20 plate 6 interconnecting the base plates 5, 5 and extending at a predetermined angle of inclination with respect thereto. An outer structural member 7 is disposed to lie in parallel with the inclined plate 6 with a clearance therebetween. A rigid heat insulating

member 8 is interposed between the transom body 4, serving as the inner structural member, and the outer structural member 7, and is arranged to meet these members at right angles. A coupling bolt 9 is passed through the outer structural member 7 in the vicinity of the insulating member 8 and is screwed into the transom body 4, leaving a space between the transom body and the outer structural member. Tightening the coupling bolt 9 couples the transom body 4 and outer structural member 7 together through the intermediary of the heat insulating member 8. Note that the coupling bolt 9 is screwed into place and tightened while maintaining a parallel relationship with respect to the heat insulating member 8. In other words, when screwed in place, the coupling bolt lies perpendicular to both the outer structural member 7 and the inclined plate 6 of the transom body 4.

Double glass panes B, shown in Fig. 2 are fixedly embraced by the outer structural member 7 and the base end of the base plate 5 via gaskets 10, 10. The bottom surfaces of the double glass panes B are supported by a glass pane supporting fitting 11.

A lower heat insulator structure C' is connected to the upper heat insulator C of Fig. 2 and is capable of being displaced relative thereto. More specifically, the lower base plate 5 of the upper heat insulator structure

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- C is provided with extension pieces 12, 12 projecting from both ends thereof and forming a cavity 13. The lower heat insulator structure C' has its upper base plate 5 fitted into the cavity 13 through the intermediary of hermetic sealing members 14, 14, whereby the lower heat insulator structure C' is connected to the upper heat insulator structure C so as to be horizontally displaceable relative thereto. In the connected state, a space 15 is formed between the lower base plate 5 of the upper insulator structure C and the upper base plate 5 of the lower insulator structure C'. The space 15 maintains the hermetic seal, offsets mechanical error and absorbs thermal expansion and contraction.
- 15 A fibrous heat insulating material 16 such as glass wool or rock wool is packed between the inclined plate 6 of the transom body 4 and the outer structural member 7 to improve the heat insulating property of the heat insulator assembly.
- 20 An outer batten 17 is attached across the outer structural members 7, 7 of the respective upper and lower insulator structures C, C' through the intermediary of a sealing member 14 to cover the joint and, hence, maintain both air and water tightness.
- 25 The transom 1 is constructed by fitting covers 18, 18

onto the respective base plates 5, 5 situated on the
 outer sides of the upper and lower insulator structures
 C, C'. The ends of the covers 18, 18 are supported by
 cover supporting rods 19. 19 provided astride adjacent
 5 vertical mullions 3, 3. The transom body 4 is coupled
 to and supported by a vertical mullion body 21,
 described later, through a transom coupling block 20 by
 means of coupling bolts 22. Upper and lower mullions 3,
 3 are connected by a sleeve 23 so as to be relatively
 10 displaceable.

Fig. 4 illustrates a modification of the arrangement for
 coupling the inclined plate 6 and outer structural
 member 7 in the heat insulator structure C. If the
 coupling bolt 9 is passed through the outer structural
 15 member 7 and is screwed into the inclined plate 6 in
 such fashion as to lie perpendicular to both elements,
 as shown in Fig. 4, then the heat insulating member 8
 interposed between the inclined plate 6 and outer
 structural member 7 may have the configuration of a
 20 parallelogram when viewed from the side thereof, and the
 coupling bolt 9 may be passed through the heat
 insulating member 8 if desired.

Reference will now be had to the transverse sectional
 view of Fig. 3 illustrating the portion where the
 25 transoms 1, 1 are coupled together. As shown, a

vertical mullion body 24 and an outer structural member 25 are coupled together with a heat insulating member D interposed therebetween, with double glass panes B, B being disposed on both sides of the insulating member

5 D. Specifically, double glass panes B are fixedly secured, through the gaskets 10, 10, in a channel formed by the outer structural member 25, the insulating member D, and an attachment 26 fitted in the vertical mullion body 24.

10 As described earlier, the transom bodies 4, 4 constructing the transom 1 are coupled by the coupling bolts 22 to both sides of the vertical mullion body 24 through the transom coupling blocks 20, 20, whereby the transom bodies 4, 4 are supported by the vertical

15 mullion body 24. Each of the covers 18, 18 extends between the corresponding transom body 4 and the cover supporting rod 19 bridging the end portions of adjacent mullion bodies 24.

As shown in Fig. 3, the vertical mullion body 21

20 constructing the vertical mullion 3 has a rectangular cross-section and is formed to include a heat transfer medium flow passage 27 at substantially the central portion thereof as seen in the drawing. The outer side of the outer structural member 25 coupled to the

25 vertical mullion body 21 is covered by a vertical

mullion cover 28. The upper and lower vertical mullion bodies 24, 24 are interconnected for vertical movement via the sleeve 23 by sleeve fixing bolts 29.

Owing to its construction, the above-described and
5 illustrated heat insulator assembly for an inclined curtain wall has the following advantages:

(1) an inclined curtain wall employing the heat insulator assembly exhibits the high heat insulating performance that is required of such walls.

10 (2) Coupling bolts can be tightened securely without causing deformation of the heat insulating material, thereby providing a heat insulator assembly having excellent mechanical strength.



Claims:

1. A heat insulator assembly for an inclined curtain wall, comprising:

a transom body which includes a pair of upper and lower base plates extending horizontally, and an
5 inclined plate interconnecting said base plates and extending at a predetermined angle of inclination with respect thereto;

an outer structural member disposed to lie in parallel with and spaced away from the inclined plate of
10 said transom body;

a rigid heat insulating member interposed between said transom body and said outer structural member; and

a coupling bolt screwed perpendicularly through the inclined plate of said transom and said outer structural
15 member for coupling said transom and said outer structural member together.

2. A heat insulator assembly according to Claim 1, wherein said transom body includes an upper, inner insulator structure and a lower, inner insulator
20 structure, said upper, inner insulator structure has a pair of extensions projecting from both ends of the lower base plate, said extensions forming a cavity between them, and said lower, inner insulator structure has its upper base plate fitted into the cavity of said

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upper, inner insulator structure through the
intermediary of hermetic sealing members, whereby said
lower, inner heat insulator structure is connected to
said upper, inner heat insulator structure so as to be
5 horizontally displaceable relative thereto.

3. A heat insulator assembly according to Claim 2,
wherein said upper, inner insulator structure and said
lower, inner insulator structure are coupled to
respective individual outer structural members, both of
10 said outer structural members being interconnected air-
and water-tightly through a sealing member by an outer
batten bridging both of said outer structural members.
