



## Roofing Over Steel Decks

Roofing contractors, expected to supply a roof membrane of reasonable trouble free life, suggest that the steel deck construction industry in its competitiveness has passed the point of safety as far as the roof membrane is concerned. It is further suggested that too many specifications evade the issue by indefinite wording such as "should" rather than "shall". Thus the roofing contractor, who is not a designer, is forced into the position of either antagonizing everyone by his disapproval of a deck or of roofing over it knowing from practical experience that the owner may not get what he has a right to expect, a trouble free roof assembly.

Too often, steel decks are unduly flexible. Gauge of metal, profile, span, application, either singly or in combination can be responsible for this condition. Flexibility introduces all the problems associated with deflection and wind effects. A cold roof membrane is not as flexible as a steel deck. Why, therefore, does current design criteria intimate that a cold bituminous membrane is more flexible than a plaster ceiling for which the maximum deflection is limited to 1/360th of the span. The relative consequences of a roofing membrane fracture as against a plaster crack are obvious.

Unless mechanical fastening is used throughout the roof area there are only two methods of adhering the roofing assembly to the steel deck - hot applied or cold applied adhesives. To be effective both require a reasonable area of interface contact and stability. The minimum design requirements of some deck materials such as concrete provide more than an adequate base for the roofing assembly. Conversely, the minimum design requirements of most steel deck installations provide an inadequate base for the roofing assembly. Too many of today's steel decks are dangerously flexible and, due to dishing of the ribs, provide for less than adequate adhesive contact.

Flexibility of the deck will destroy adhesion. Hot applied adhesives harden when cold thus even minimal roof membrane construction traffic over a flexible deck may adversely affect the bond. Cold applied adhesives require a varying curing period during which adhesion increases if the assembly is undisturbed. Again normal roof membrane construction traffic over a flexible deck disturbs the bond probably several times during the curing. The final bond will definitely be reduced and will in many cases be almost non-existent. The aforementioned effects are most acute during cold weather construction.

One of the least acceptable steel decks on the market is the type known as 8" o.c. This deck is used under the mistaken concept that it is reducing the cost of construction. Actually, while the installed deck cost may be slightly less than the 6" o.c. profile, insurance underwriting requirements call for up to 50% more adhesive, negating the slight saving.

Also the mechanized roofing contractor knows that the 8: o.c. deck is easily harmed by construction traffic so he must increase his application cost to compensate for reduced loading of his equipment. In

effect the money the owner is paying for additional adhesive and roofing labour should be put into a deck of higher quality.

To aggravate the problem, light flexible decks in service may develop pronounced vibrations as wind velocity fluctuations cause corresponding changes in uplift. When this occurs there can be a progressive degradation of the fastening or bond between roof assembly and deck. Many members of CRCA across Canada believe there are roofs over steel decks which are probably held in place by the weight of the roof assembly.

No mention has yet been made of the increasing trend toward the installation of mechanical equipment on the roof. Such installations mean traffic over the roof surface.

The maintenance of servicing necessitates further traffic. Much of this is in the winter when the roof membrane is most brittle. Under such conditions there is some destruction of the adhesion to the deck as well as damage to the roof membrane itself.

Finally there is the question of mechanical fastening of the insulation to the steel deck. Regardless of the type of vapour barrier specified, of what use is it after it has been punched full of holes? For what purpose is mechanical fastening believed required? If because of inadequate bond due primarily to the flexibility of the deck, then the deck is too flexible for the roof membrane.

The Canadian Roofing Contractors' Association suggests that the Canadian construction industry in general is not protecting the interests of the owner insofar as the present use of steel decks is concerned. There is too great a tendency to design to the requirements of the steel rather than to the requirements of the roof. Too many of the industry seem to have forgotten that the steel is there to carry the roof.