

There are many types of equipment which are available to use as sources of heat. The type selected will depend upon availability of equipment, fuel source and economics, size of project and severity of expected weather. In the past, salamanders have been widely used as a source of heat on scaffolds and, in some cases, in enclosures. However, for projects where complete enclosure of the work area is provided, oil-burning or gas-burning space heaters with electric blowers are recommended. In some cases, contractors have employed groups of infrared lamps for heating walls. They have the added advantage of not requiring attention during the curing period. A method which recently has been employed is the use of commercial electric blankets that cover the walls during the curing period. These also have the advantage of requiring no attention after being put in place and secured. Walls should not be heated on one side with no protection on the other. If enclosures are used, they should be arranged to allow a circulation of warm air on both sides of the wall.

When a building is enclosed and only partitions and inside walls are being constructed, the manner of protection is reduced to the closing of doors and window openings, stairwells and elevator shafts. After taking these precautions, a few carefully placed heaters should produce the required temporary heat.

Contractors have used several different methods for complete enclosure of buildings. For small structures such as houses, large tents have been used. Some contractors have enclosed complete job sites with inflatable lightweight plastic enclosures. These are raised into place and secured by a flow of warm air which not only protects the masonry from freezing, but provides optimum working conditions for the masons as well.

Some sites have been completely enclosed with temporary wood structures covered with plastic sheets and tarpaulins or insulating sheathing.

A technique which appears to be gaining wide acceptance is the use of temporary shelters built of prefabricated panels which are covered with polyethylene plastic sheets. Often these sheets are of reinforced polyethylene to increase the life of the panel. The transparency of the plastic permits solar radiation to contribute materially to the heating of the enclosed space.

Partial enclosures are often used on structural frame buildings and consist of enclosed swinging scaffolds which may be moved from floor to floor.

Scaffolds on the outside of low-rise, loadbearing buildings are desirable. They provide a frame for enclosing the work. However, for the construction of tall loadbearing buildings, where overhand bricklaying is most often employed, special outriggers and tarpaulin or plastic covers may be used for protection.

The December 19, 1963 issue of *Engineering News-Record* contains an article, "In Winter: Under-Cover Construction Speeds Projects", by Robert F. Legget, Director of the Division of Building Research, National Research Council of Canada, in which the author describes "new techniques" used by contractors for winter construction in Canada. He indicates that the adoption of these techniques, together with a national educational campaign, has resulted in a steady advance in the amount of winter construction in Canada.

Dr. Legget states that cost figures show the slight extra cost for cold weather construction is more than offset by the time saved and reduced interest on capital. A survey by the Canadian Construction Association of over 100 contractors showed average extra cost of winter construction ranging from about $\frac{3}{4}$ to $1\frac{1}{2}$ per cent, "but the extra revenue from earlier completion far more than offset the extra cost."

SPECIAL PRECAUTIONS

There are two reasons why masonry should never be placed on a snow or ice-covered base or bed. There is danger of movement when the base thaws. Bond cannot be developed between the mortar bed and frozen supporting surfaces.

If the walls are properly covered whenever work is halted, there should be no necessity for ice or snow removal from walls. However, in the event that the covering is displaced, the bed may be thawed with live steam or portable blowtorch, carefully applied. The heat should be sustained long enough to thoroughly dry out the masonry. If it is frozen or damaged, defective parts should be replaced before starting new work.

GUIDE SPECIFICATIONS

When planning protection, consideration must be given to the temperature trend (increasing or decreasing) as well as the outside air temperature. Protection which is adequate in mid-afternoon may not be sufficient during the colder predawn hours of the following morning.

Recommendations helpful to the specifications writer follow.