Pipes passing through outside or unconditioned spaces must be insulated with the minimum insulation thickness specified in Table 502.11 (1). Thickness requirement of the pipe insulating material depends on thermal conductivity, thickness of pipe and operating temperature of the fluid passing through the pipes.

Ducts passing through outside or unconditioned spaces must be insulated with the minimum insulation thickness specified in Table 502.11 (2). Thickness requirement of the duct insulating material depends on thermal conductivity and operating temperature of the air passing through the ducts.

All materials used for insulation must be fire retardant and inhibit or resist the spread of fire. In the event of fire, the insulation material must not emit toxic fumes. In addition to this, Insulation materials must meet the requirements of *Regulation 701.01: Thermal and Acoustical Insulation Materials* or BS 5422, whichever is more stringent. BS 5422 standard also covers water vapour permanence, vapour barriers, thickness, temperature limitations and fire-retardant properties. Installation for all insulations must have suitable vapor barrier and protection from UV light.

To achieve the required compliance level, various types of insulations can be used. Each type of insulation material has its own insulation level that must be considered as part of selection. The type of insulation will also depend on the temperature of the air / fluid passing through the pipe or duct, pipe diameter and duct size, function of pipe and duct within the system and on thermal conductivity of the insulation material. Commonly used insulation materials include fibre glass, mineral wool, cellulose, polyurethane foam, polystyrene etc (fig. 502.11(1)).

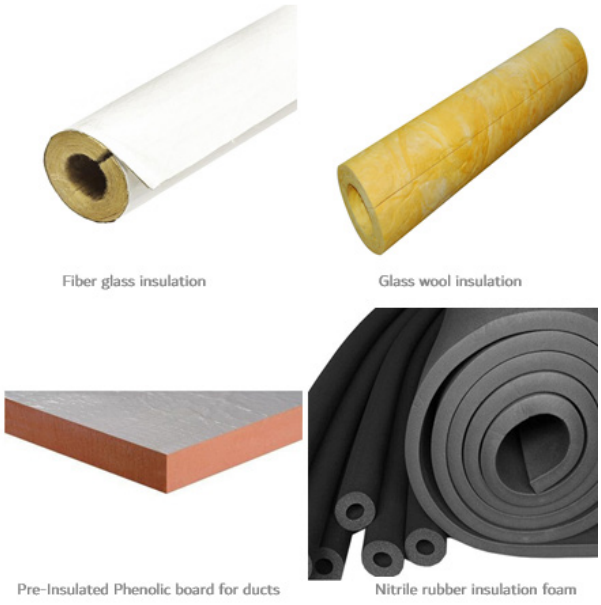

Fig. 502.11(1): Types of Insulation

In construction, contractor should follow manufacturer's instructions for installation of insulation. Improper installation strategies lead to heat / cold loss or gain, condensation, rusting, mold growth etc. Technical datasheet or test certificate confirming the thermal conductivity of the insulation material conforming all the requirements must be included as part of DM submission.