

Fire Resisting Floors and Ceilings

Increasing the Fire Resistance of Existing Timber Floors

Introduction

This section explains how the fire resistance of existing floors can be increased to a period of up to sixty minutes. There are three sections; the first, including Table 1 of the Appendix, deals with protection applied to under side of the existing ceiling. The second, with Table 2, gives details of protection which may be applied between joists or over the floor boarding. The third section, together with Table 3, deals with the problem of improving fire resistance when it is desired to leave the joists exposed to view below.

Floors which are improved as described in this note should give a satisfactory standard of performance but the precise improvement depends on the details of construction and the condition of the existing floor.

These recommendations are based on guidance that referred specifically to asbestos insulation board. However, the new generation of non-asbestos insulation boards have shown such a close correlation of performance that the recommendations can be taken to apply to non-asbestos fire resisting insulation boards.

Adding Protection to the Underside of the Existing Ceiling

Table 1 shows the additional protection required for some typical existing ceiling construction to upgrade the fire resistance to either a modified thirty minutes, full thirty minutes or sixty minutes. The table is in two parts, the first dealing with floors which have tight fitting tongued and grooved boarding, the second with floors with square edge boarding. These recommendations only apply when the floor joists are a minimum of 37 mm wide and spaced at not more than 400 mm centres.

Achieving sixty minute fire resistance to an existing timber floor with a lath and plaster ceiling is a problem often aggravated by the poor condition of the ceiling. No specific fire resistance tests are available nowadays since horse hair reinforced plaster cannot be obtained to reproduce the existing construction.

In such cases one recommended method is to underdraw the ceiling with wire netting to support the loose areas of the existing ceiling and secure 12 mm thick non-asbestos fire resisting insulation board to the whole area of the ceiling, fixed in accordance with the manufacturer's specification.

Protection Applied from Above

When the fire resistance of a floor must be increased in situations where it is desired to retain an existing ornate ceiling or where access cannot be gained to the storey below. Table 2 shows details of constructions which may be used. These involve either filling between the joists after lifting the floor boards to gain access, or applying an additional floor finish above the existing boarding, or both. In both methods of joist infill it is essential that such protection is in intimate contact with the joists in order to protect them from burning for as long as possible and that the existing ceiling is in a sound condition. The joist width and spacing should be as above.

Protection Leaving Joists Exposed Below

In order to leave the joists exposed, the recommended protections involve either adding to the floor above or placing protection between the joists to form an interrupted ceiling or both. Joists should be of a size which will enable them to retain structural stability even after some charring of the timber has occurred. The joist spacing should be as above and ceiling battens should be of a minimum 25 mm x 25 mm.

Fixing

Adequate fixing of the additional protection is of paramount importance. When fixing below an existing ceiling, nails or screws must penetrate new work and old and be driving into the joists to a depth which will ensure that the ceiling remains in place during the intended period protection.

Nailing must be carefully done to minimise damage to the existing ceiling but it must be accepted that some damage will be done, especially to old lath and plaster ceilings, thus the new work, including fixings, will be supporting some of the weight of the existing ceiling. The lengths of nails and screws should be determined from the combined thickness of existing and new ceiling.

Nails and plasterboard should be galvanised and be clout headed where boards are to be plastered. Metal lathing should be fixed at 100 mm centres with galvanised clout headed nails.

Table 1

Additional Ceiling Protection
Floors with Tight Fitting Tongued and Grooved Boarding 21mm Thick

Period of Fire Resistance	Existing Ceiling Construction	Examples of Additional Protection to be Fixed Below Existing Ceiling
Modified thirty minutes	13mm fibre insulation board with 5mm gypsum plaster finish	none, subject to the ceiling being in a reasonable condition
Thirty minutes	13mm fibre insulation board 5mm gypsum plaster finish	9.5mm plasterboard Other non-asbestos fire resisting insulation board fixed, and of a thickness, in accordance with the manufacturers specifications
Sixty Minutes	Timber lath and 16mm plaster	9.5mm plasterboard with 9mm vermiculite gypsum plaster finish.
	9.5mm plasterboard with skim coat	13mm vermiculite or perlite gypsum plaster on metal lath
		Other non-asbestos fire resisting insulation board fixed, and of a thickness in accordance with the manufacturer's specifications
	9.5mm plasterboard with skim coat	9.5mm plasterboard with 9mm vermiculite gypsum plaster finish
		9mm vermiculite or perlite gypsum plaster on metal lath
		Other non-asbestos fire resisting insulation board fixed, and of a thickness, in accordance with the manufacturer's specifications

Table 2

Protection Applied From Above

Period of Fire Resistance	Existing Construction		Examples of Additional Protection (see key below)
Thirty minutes	Floor Boarding	Ceiling	1
	None	9.5mm plasterboard and skim coat	
	Square edged	16mm plaster on wood lath	2
Fifty minutes	21mm tight fitting tongue and groove	16mm plaster on wood lath	3
	Square edged	16mm plaster on wood lath	2 and 3
Sixty minutes	Timber floor construction 200mm deep	Lath and plaster or conventional construction, <u>NOT</u> plasterboard or similar paper faced boards	Cavity infill using foamed perlite. See 4 below

Additional Protection

1. Not less than 25mm of mineral wool laid between the joists, supported by wire netting placed immediately over the ceiling; the netting to be well turned up and stapled to the joist sides. New floor boarding to be 21mm tight fitting tongued and grooved.
2. Not less than 5mm medium or high density hardboard, or plywood, nailed at not less than 150mm centres to the existing floor to break joint.
3. Not less than 19mm of lightweight plaster trowelled between joists on to expanded metal lathing, which has previously been well turned up and stapled to the joist sides. To prevent staining the existing ceiling polythene sheet can be placed below the expanded metal.

Note:

In methods 1 and 2 the nails or staples should penetrate into the joist sides to a minimum depth of 19mm.

4. Ceiling cavity to be infilled with foamed perlite in accordance with manufacturers specification.

Table 3**Protection Allowing Joists to Remain Exposed Below**

Period of Fire Resistance	Construction to Provide Fire Resistance	
Modified thirty minutes	Protection between joists	Floor Boarding etc
	9.5mm plasterboard or other non-asbestos fire resisting insulation board fixed, and of a thickness, in accordance with the manufacturers specification	21mm close fitting tongue and groove boarding
		18mm wood chipboard or plywood with tongued joints
	12.5mm plasterboard or other non-asbestos fire resisting insulation board fixed, and of a thickness, in accordance with manufacturers specification	15mm close fitting tongue and groove boarding
Thirty minutes	12.5mm plasterboard or other non-asbestos fire resisting insulation board fixed, and of a thickness, in accordance with manufacturers specification	21mm close fitting tongue and groove boarding
		18mm wood chipboard or plywood with tongued joints
	12.5mm plasterboard with 5mm gypsum plaster skim coat	15mm close fitting tongue and groove boarding
	12.5mm plasterboard or other non-asbestos fire resisting insulation board fixed, and of a thickness, in accordance with the manufacturers specification	Square edged boarding with not less than 5mm medium or high density hardboard or plywood nailed at not less than 150mm centres to the existing floor to break joint