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2.1 STRUCTURAL DECKS

INTRODUCTION

The structural deck provides the primary support for the roofing system. It must resist dead loads, live loads and wind loads as specified in BS 6399 Parts 2 and 3. It may also provide a suitable fall for roof surface drainage and in some cases, such as woodwool, will provide a degree of thermal insulation.

Although most roof decks are durable in terms of life and performance, some decks are moisture sensitive and the deck must be selected to take into account the humidity conditions over which it must perform.

IN SITU CONCRETE DECKS

The finished surface of concrete should be free of ridges and hollows. To achieve this surfacing and to provide adequate falls it is usual to apply a screed. The most acceptable surface of slab to receive the subsequent roofing components is provided by a wood float finish.

Construction water should be drained by forming temporary drainage tubes through the slab.

PRECAST CONCRETE DECKS

A variety of precast deck units are available in dense or lightweight concrete and these should be used and fixed in accordance with manufacturers' instructions.

Most precast lightweight deck units are of autoclaved aerated concrete, produced in relatively narrow widths of 600mm. The joints between the units should be filled with a sand and cement mortar.

If possible, the falls required for roof drainage should be incorporated in the supporting structure. Where the structure cannot provide the falls, a screed can be applied and construction water should be drained by leaving the deck joints open or by forming temporary drainage holes through the deck.

TIMBER BOARDED DECKS

Timber is a traditional material for roof construction, but nowadays is generally limited to small scale residential or commercial work with short spans supported on timber joists. The use of timber boarding for the structural deck has largely been replaced in recent years by particleboard, or plywood.

Timber boards should be well seasoned and not less than 19mm nominal thickness. Tongued and grooved boarding is always to be recommended with boards closely clamped together, securely nailed, and with all nail heads punched down. Plain edge boards should not be used because of warping and shrinkage.

PLYWOOD DECKS

Plywoods are classified according to the performance of the bonding between the ply layers when subjected to various British Standards tests. For structural deck applications, plywood should be glued with exterior grade type WBP bonded in accordance with BS 6566:Part 8:1985.

Boards must be well nailed to timber joists and noggins, with nail heads punched down below the deck surface. A joint opening of 1mm per metre of panel size should be allowed.

PARTICLEBOARD DECKS

Particleboard is a general name for several boards derived from wood particles or flakes, and is used for flat roofing as follows:

WOOD CHIPBOARD

Should conform to BS 5669:Part 2:1989 types C3, C4 or C5. Wood chipboard is vulnerable to dampness, which can cause swelling, sagging and eventual rotting. All grades are available with a factory applied bitumen felt. It is recommended that this prefelted board is always chosen if chipboard is to be used on a flat roof. The joints should be taped the same day as the boards are fixed, to give a temporary waterproofing to protect the chipboard before application of the waterproofing.

Chipboard is not suitable for use over conditions of relative humidity which are at all above normal.

Board joints should be left open for 2mm per metre of board length and board width, to allow for dimensional movement with changing moisture content. A 10mm gap should be left at edges and abutments.

ORIENTED STRAND BOARD (OSB)

Oriented strand board is more stable in moist conditions than chipboard, but should be kept dry before application of the waterproofing. It is not suitable for high humidity conditions.

OSB should conform to BS 5669:Part 3:1992 type F1 or F2.

Joints should be left open for 2mm per metre of board, and 10mm at roof edges and abutments.

CEMENT BONDED PARTICLEBOARD

Should conform to BS 5669:Part 4:1989. Cement bonded board is strong, high density and more resistant to moisture than other particleboards. It should be installed with joints open for 2mm per metre of board and 10mm at roof edges and abutments.

WOODWOOL DECKS

Woodwool is an open textured board composed of wood fibre bound together with Portland cement.

Slabs are produced in 600mm widths, in a variety of thicknesses and surface finishes. Plain edge units are available for use over short spans and channel reinforced slabs for spans up to 4 metres.

When channel reinforced slabs are used, there is a possibility of cold bridging and condensation along the channel edge. Slabs are available with a thermal break formed by setting the metal channel reinforcement within the thickness of the slab or forming a rebated edge to accept an infill strip of insulation.

Woodwool slabs for roof decking should be type SB to BS 1105:1981. Type SB has a minimum nominal thickness of 50mm and sufficient strength to be used without attracting the requirements of Regulation 36(1) of the Construction (Working Places) Regulations, 1966. These regulations apply to working surfaces which are not considered to provide a safe working platform and restrict the use of woodwool to type SB slabs.

Type SB slabs are supplied with a plain finish, pre-screeded finish or a pre-felted finish. Where a plain finish slab is used a sand and cement screed or slurry should be applied to give a suitable surface for application of the waterproofing.

Taping the joints of the woodwool will prevent subsequent applications of hot bitumen penetrating the joints, and in the case of pre-felted slabs will complete a temporary waterproof covering. On no account, however, should the pre-felted finish be considered as part of the final waterproofing specification.

METAL DECKING

Metal decking consists of profiled sheets of aluminium or galvanised steel. There is a wide range of metal profiles and thicknesses for various load-span relationships, usually over steel supporting structures. Stiffeners may be incorporated in the flanges or webs to improve the efficiency of the profile.



Unstiffened profile



Profile with flange stiffeners



Profile with flange and web stiffeners

The load bearing performance of metal decks should be calculated in accordance with BS 5950:Part 6:1995 Code of practice for design of light gauge profiled steel sheeting.

The Metal Roof Deck Association commissioned the publication of 'Steel Diaphragm Roof Decks' which gives design guidance for the use of metal decking as a diaphragm to provide bracing against wind loads.

Metal decking is usually fixed by specialist contractors as part of a single responsibility roofing operation comprising deck, thermal insulation and waterproofing. The minimum recommended thickness of metal is 0.7mm for galvanised steel and 0.9mm for aluminium. Profiled sheets will be subject to some localised deformation and denting by construction traffic. If the profiled deck is to serve as an exposed soffit where, for aesthetic reasons, localised marking is not acceptable, an increased thickness of metal should be specified. If mechanical fixing of insulation is required, it should be remembered that the fixings will be visible from below.

Profiles are available with a wide range of finishes to the exposed soffit to meet aesthetic requirements and provide protection to the metal. Plain galvanised steel is suitable for use in a dry environment and where blemishes and stains are acceptable. A variety of colour coatings can be factory applied to give a more durable, decorative and protective finish.

For high humidity conditions, aluminium decks are normally recommended provided the design allows sufficient insulation and ventilation to prevent surface condensation on the aluminium. If steel decks are to be used an additional protective coating on both sides of the deck should be specified in accordance with manufacturers recommendations.