

PRE-CAST CONCRETE PRODUCTS

# 175mm & 225mm PRESTRESSED CONCRETE FLOOR JOISTS



THE EXPERTS IN THE MANUFACTURE AND SUPPLY OF **PRE-CAST CONCRETE PRODUCTS**

# 175mm & 225mm PRESTRESSED CONCRETE FLOOR JOISTS

Prestressed concrete floor joist systems from Annandale are a development of concrete beam & block floors, which have been popular within the building industry for over 50 years.

The 175mm and 225mm deep joist sections provide the necessary choice to satisfy the requirements of architects, engineers, builders and developers on the full range of flooring applications. Annandale joists are suitable for both ground and upper floor situations and comply fully with Building Regulations requirements for sound, fire and suspended slab construction, when used with the relevant floor finish.

## Authority

Prestressed concrete floor joists from Annandale are manufactured to comply with BS 8110: Parts 1 and 2: 1997.

## Composition

Annandale joists are produced from C60 (60N/mm<sup>2</sup> at 28 days) concrete, using the materials below:

OPC in accordance with BS 12:1989 Aggregates in accordance with BS 882: 1983.

Prestressing is by means of 5mm indented steel wire to BS 5896: 1980, having a minimum tensile stress of 1670N/mm<sup>2</sup>.

## Manufacture

The joists are made by casting concrete around prestressed wires in long steel moulds. When the concrete has achieved sufficient strength, the prestressing wires are cut and the joists removed from the moulds.

Quality control checks are undertaken throughout the manufacturing process and also on the finished product.

## Appearance

The joists have a smooth outer surface for easier handling and are Portland stone (cement) grey in colour.

## Weight

The average weight for 175mm joists is 34kg/m; for 225mm joists it is 69kg/m. The dead weight of the finished grouted floor varies according to the distance between joist centres and the density of the infill blocks.

## Application Details

(fig 1&2)

## Ancillaries

A range of ancillary products is available from Annandale for use with their joists:

### ANNANDALE VENTILATOR (Fig 3&4)

A cranked plastic unit complete with coloured air brick to complement the external surface colour. Air brick colours - buff, terracotta or black.

### CEILING CLIPS (fig 5&6)

A one-piece clip designed for the easy fixing of 38 x 50mm ceiling battens to upper floors. Available for both 175mm and 225mm deep

joists. Use at the rate of approximately 6 clips per square metre of floor. (NB. Ceiling clips must be fitted before a slurry is applied.)

### FULL DEPTH BLOCKS (175mm only) (fig 7&8)

To eliminate the need for 'make up' brickwork around perimeter walls. Or, alternatively, can be used in conjunction with 175mm joist on upper floors to achieve a mass of 300kg/m<sup>2</sup>.

### CANTILEVERS

Special units are available where designs require the use of cantilevered joists, for example on balconies or projecting bay windows.

## Floor Finishes

All normal finishes can be used in conjunction with Annandale floors.

### CHIPBOARD ON POLYSTYRENE

Tongued and grooved 18mm thick chipboard, to BS 5669: Part 2: 1989, should be laid with staggered cross joints on SD/N grade expanded polystyrene board to BS 3837: Part 1: 1986. A 1200 gauge polythene vapour barrier must be laid between the polystyrene and the chipboard, and lapped up around the edges. The chipboard joints should be glued, leaving a 12mm expansion gap around the perimeter which is then covered by the skirting board. The thickness of polystyrene can be varied, depending on the 'U' value required.

### SCREED

A lightweight sand and cement screed, in accordance with BS 8204: Parts 1 and 2: 1987, with a minimum thickness of 50mm can be laid directly onto the grouted floor. Screeds of other thicknesses can be applied with prior approval from Annandale, for use over insulants, etc.

## Domestic Garages

Annandale floors used in garages are designed to carry a distributed load of 2.5kN/m<sup>2</sup> or a concentrated load of 9.0kN. Garages should be finished with a minimum 50mm thickness of 20N/mm<sup>2</sup> concrete topping, reinforced with A98 mesh. On double garages, it is generally necessary to reduce the span by providing a central support, e.g. a sleeper wall or a steel beam.

## Insulation

As the building industry moves rapidly towards the insulation of ground floors, it is widely recognised that neither timber nor in-situ concrete lend themselves readily to the inclusion of an insulating layer.

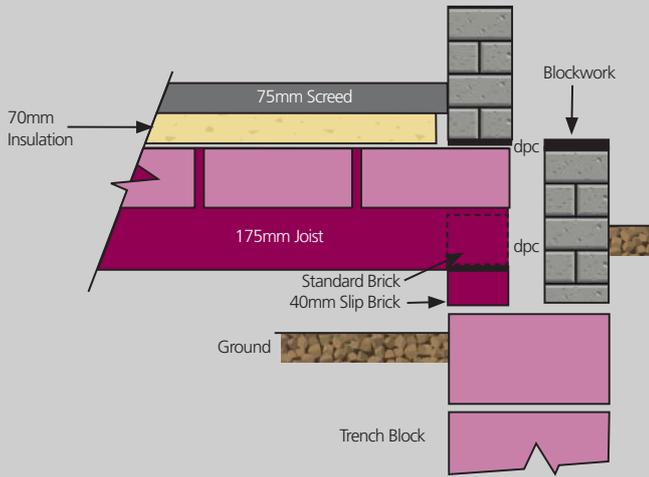


Fig 1. TYPICAL SECTION 175mm DEEP JOIST

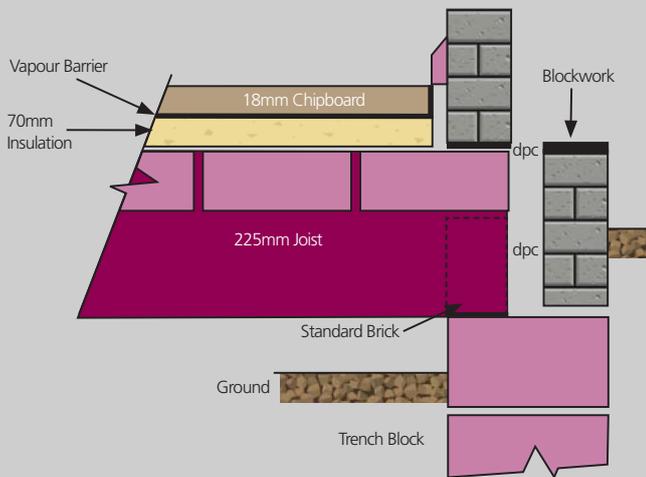


Fig 2. TYPICAL SECTION 225mm DEEP JOIST

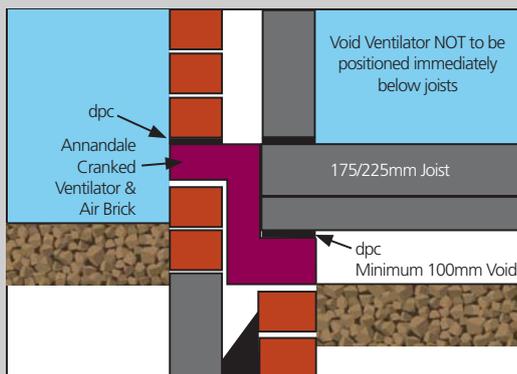


Fig 3.

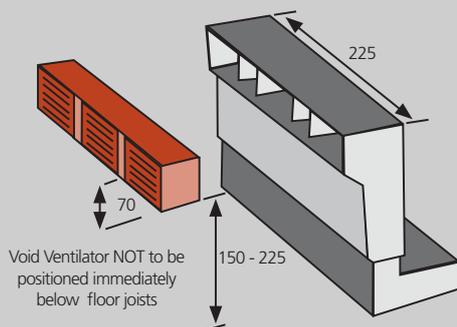


Fig 4.

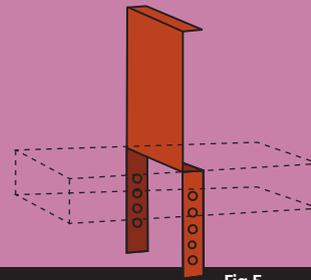


Fig 5.

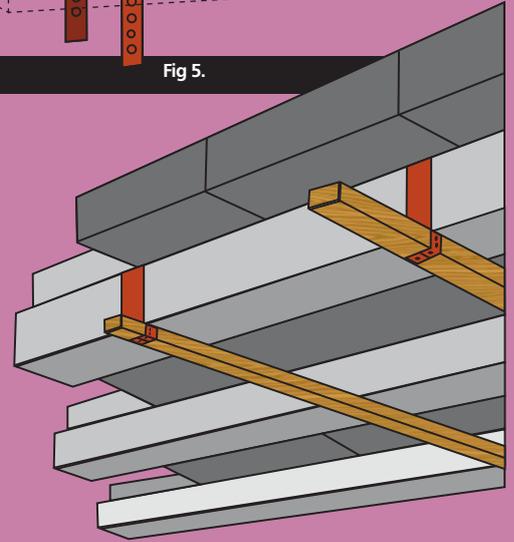


Fig 6.

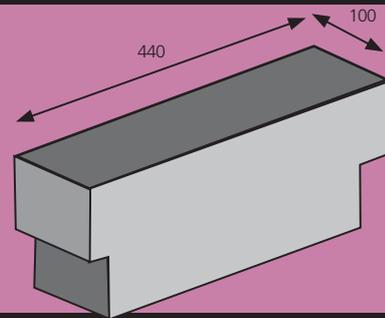


Fig 7.

Infill blocks butted to rear or closure block

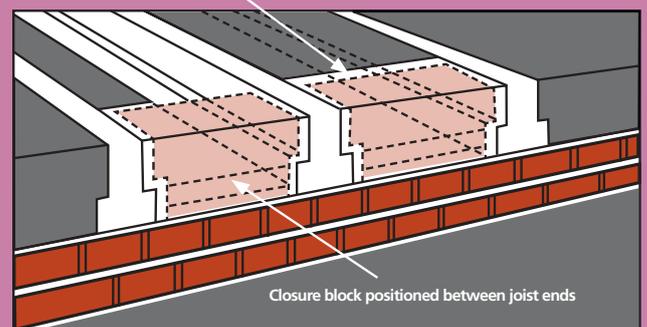


Fig 8.

### Floor mass

Used in conjunction with a 2000kg/m<sup>3</sup> density infill block, the combined weight of joists, blocks and grout is as follows:-

175mm JOISTS		225mm JOISTS	
Joist Centres mm	Floor Mass kg/m <sup>2</sup>	Joist Centres mm	Floor Mass kg/m <sup>2</sup>
S500	246	S540	307
S381	261	S427	332
S275	282	S315	376

The weight of floor and ceiling finishes should be added to the above to arrive at the overall total mass of individual floors.

Fig 9.

With the continuing drive to make buildings more energy efficient, the need for alternatives to traditional methods becomes more and more apparent, and the merit in using the Annandale system, which has been designed specifically to receive dry insulated floor finishes, becomes more and more pronounced.

### Thermal Characteristics

Please see the attached sheet for U-value information, or contact Annandale for further information.

### Incorporation of Services

Services must not be attached to joists or blocks in such a way as to impair their strength or durability. Soil pipes passing vertically through the floor can be accommodated by the removal of the infill block, making good around the pipe with in-situ concrete.

Pipework and electrical wiring can be laid within the insulated layer of the floor finishes.



## Technical Information

### 175mm & 225mm joists

#### 1. Sizes & Spans (fig 10)

For typical span/load tables and joist positioning please see the below table and Fig 10. A detailed span/load table and associated calculations are available with each individual estimate.

#### 2. Bearings

Joists should be laid dry on a suitable dpc at ground level. On brickwork or blockwork, the minimum nominal bearing should be 100mm; when supported on steelwork, it should be 75mm (minimum 50mm).

#### 3. Floor Mass (fig 9)

#### 4. Infill Blocks

Infill blocks should be standard solid light aggregate or concrete blocks 440mm x 215mm x 100mm to BS 6073 with a density as shown on workings drawings. Minimum compressive strength 3.5N<sup>2</sup>/mm<sup>2</sup> tested laterally.

#### 5. Grouting (fig 11)

The whole floor should be grouted with a 3:1 sand/cement mix (using coarse sand) as soon as possible after fixing the joists & blocks.

#### 6. Ventilation

A minimum 100mm deep void is required, dependent upon ground conditions, between the soffit and soffit of the beam. All top soil and vegetable matter should be removed from the underfloor void, and the soffit treated with a suitable weedkiller.

The void should be ventilated at a maximum of 3 metre centres with at least 600m<sup>2</sup> open area per metre run of internal wall. Provision for ventilation should also be made through sleeper walls, etc. Special provision should be made, where gas contamination is likely, e.g. radon, methane, etc. Where methane or radon gas predominates, the open area per metre run of wall should be increased to 1500m<sup>2</sup> or one vent every 1.5 metres.

#### 7. Fire Resistance

Joists are non-combustible, classified as Class 0 when assessed to BS 8110: Part 2: 1997. 175mm Deep joists have a fire resistance of half an hour, however one-hour resistance can readily be achieved by the application of appropriate ceiling finishes. 225mm Deep joists have a fire resistance of one hour.

#### 8. Sound (fig 12-14)

Nomenclature of Standard Cases			1.5 kN (U.D.L)	2.5 kN (U.D.L)
TYPE 175 PRESTRESSED	SINGLE 500		4100mm	3600mm
TYPE 175 PRESTRESSED	SINGLE 387		4600mm	3900mm
TYPE 175 PRESTRESSED	SINGLE 275		5400mm	4300mm
TYPE 225 PRESTRESSED	SINGLE 540		5700mm	5300mm
TYPE 225 PRESTRESSED	SINGLE 427		6300mm	5800mm
TYPE 225 PRESTRESSED	SINGLE 315		7200mm	6500mm

# Sitework

## Handling

Delivery vehicles are equipped with hydraulic off-loading equipment. Joists can be colour-coded and off-loaded in plot order if requested. Where longer joists are supplied, these will be delivered on flat vehicles and arrangements should be made for mechanical off-loading on arrival at site.

Handling joists to individual plots is the customer's responsibility. During handling, joists should be lifted as near as possible to the ends. Single 175mm joists for normal spans can be handled safely by two people at ground level. All 225mm joists require mechanical assistance when handling or positioning. On upper floors, both 175mm and 225mm joists require crange for safe positioning.

Joists should always be handled the right way up.

## Storage

On arrival on site, joists should be stacked carefully on timber bearers. Provided that they are well supported on timber bearers, storage on site for up to 3 months will not affect the joists. If they need to be stored for longer periods, however, they must be stored under cover.

## Preparation

For ground floors, the ground beneath the floor must be cleared of any surface soil and vegetable matter, and the solum treated with herbicide to prevent vegetable growth.

A ventilated void of at least 100mm should be left between the underside of the floor and the solum. On heavy clay soils, to prevent heave problems, the void should be increased to 150mm.

Where landfill gas (methane) or radon contamination is a possibility, additional ventilation is required for the void beneath the floor.

## Installation

Foundations must be accurately constructed so that joists are well supported on the inner leaf, but do not overhang into the cavity. On ground floors, a continuous damp-proof course must be laid along the top of the support wall, before the joists are lifted into position. To ensure a clean bearing on the support wall, and to avoid damage to the dpc, the underside of the joist should be cleaned of dirt or debris before it is placed into position.

As the joists are positioned, infill blocks should be laid between the ends to ensure correct spacing. Joists should be 'tightened up' as they are laid to minimise gaps between blocks and joists.

Once the joists are in place, the infill blocks should be laid over the entire floor area. The whole floor should be grouted with a 3:1 sand/cement mix (using coarse sand) as soon as possible after the fixing of the joists and blocks has been completed. This should be done by brushing the grout over the floor with a stiff broom after the surface has been well 'wetted' so that the grout penetrates into the joints and provides a monolithic construction.

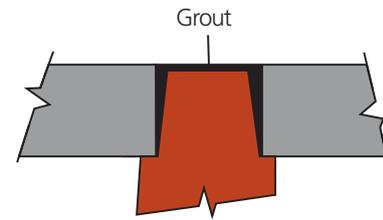
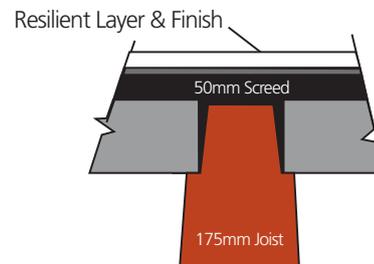


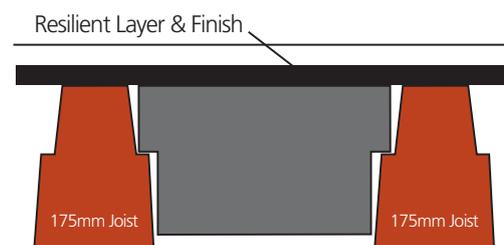
Fig 11.

## SOUND INSULATION - UPPER FLOORS



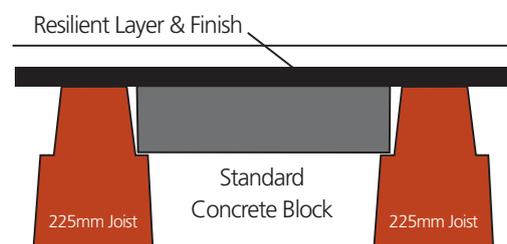
**175mm Joists:** when used in conjunction with a 2000kg/m<sup>3</sup> density infill block and a 50mm screed will satisfy the requirements of Building Regulations Approved Document E Section 2, Floor Type 2.

Fig 12.



If a full depth infill block is used the 300kg/m<sup>2</sup> mass is achieved without the need for an applied screed. The sound resilient layer and floor finish can then be applied directly onto the joist and block floor.

Fig 13.



**225mm Joists:** when used in conjunction with a standard 2000kg/m<sup>3</sup> density infill block achieves a mass in excess of 300kg/m<sup>2</sup>.

Fig 14.

## PRE-CAST CONCRETE PRODUCTS

Walls running parallel with the joists are usually required to support a row of blocks and bearing levels should be prepared accordingly.

Partitions can be built off the floor providing these have been allowed for in the design and are shown on the layout drawings supplied by Annandale. It is sometimes necessary to place either two or three joists together to carry the additional load; in such cases care should be taken to ensure that the partitions are built directly over these units, which must be grouted solidly together.

On upper floors, ceiling clips can be supplied to provide a fixing for timber battens. It is recommended that the clips be staggered on plan and lined up prior to grouting. The legs are then bent around the batten and screwed or nailed to the timber, thus securing the batten in place. Perimeter battens can be secured directly onto adjacent walls.

During construction care should be taken to avoid overloading the floor. The following guidelines should be observed:-

- Planks should be laid across the beams before stacking materials on top.
- Stacked materials should be positioned as near as possible to the floor bearings.
- Stacks of bricks, blocks or similar materials should be restricted to a total weight of 350kg (e.g. 120 bricks or 20 blocks on each joist).

### Prices

To help Annandale produce accurate and complete estimates for your site, please supply a dimensioned plan showing the floor finishes, internal partition walls and loading conditions wherever possible.

Please advise the invoice address, and also the full postal address of your site so that we can calculate delivery costs. On larger developments, if you require phased deliveries please supply a schedule of the dates and plot numbers for your deliveries.

Annandale estimators will prepare a detailed estimate for your development, computerised design drawings, relevant technical specifications and conditions of sale.

### Supply

As well as prestressed concrete floor joists, Annandale can supply a range of ancillary products to complement the floor. Cranked ventilators and air bricks (in three colours), closure blocks, cantilevers and steel trimmers are all available from stock. (Standard infill blocks should be obtained from your normal supplier).

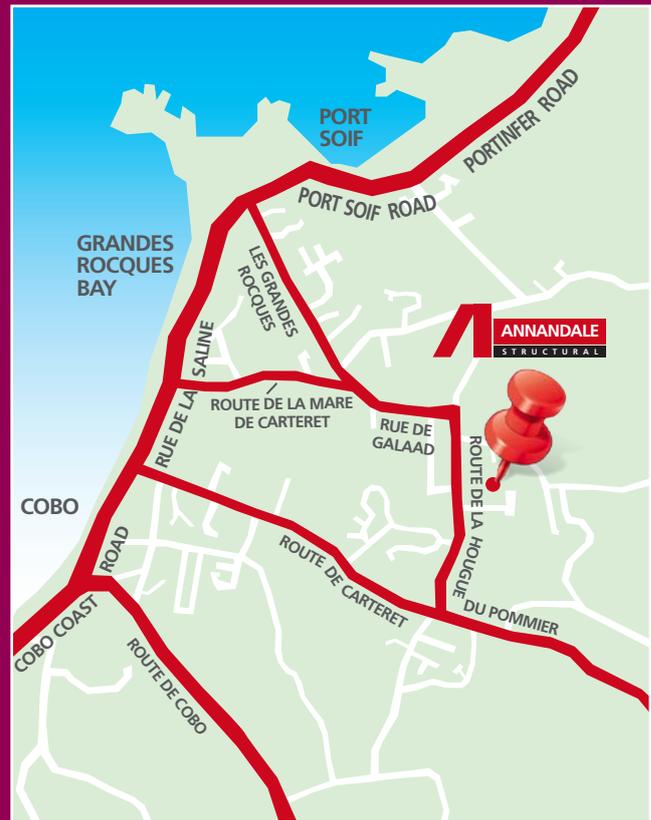
Annandale also supplies prestressed concrete lintels from stock, as well as stainless steel lintels to order (see relevant Annandale literature).

Combined orders for joists and lintels together can prove very cost-effective.

### Technical Service

A full technical advisory service is available to answer questions relating to design, compliance with Building Regulations, and interpretation of information. Calculations for submission to States Authorities are also available on request.

### Where We Are



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