

C/SIB

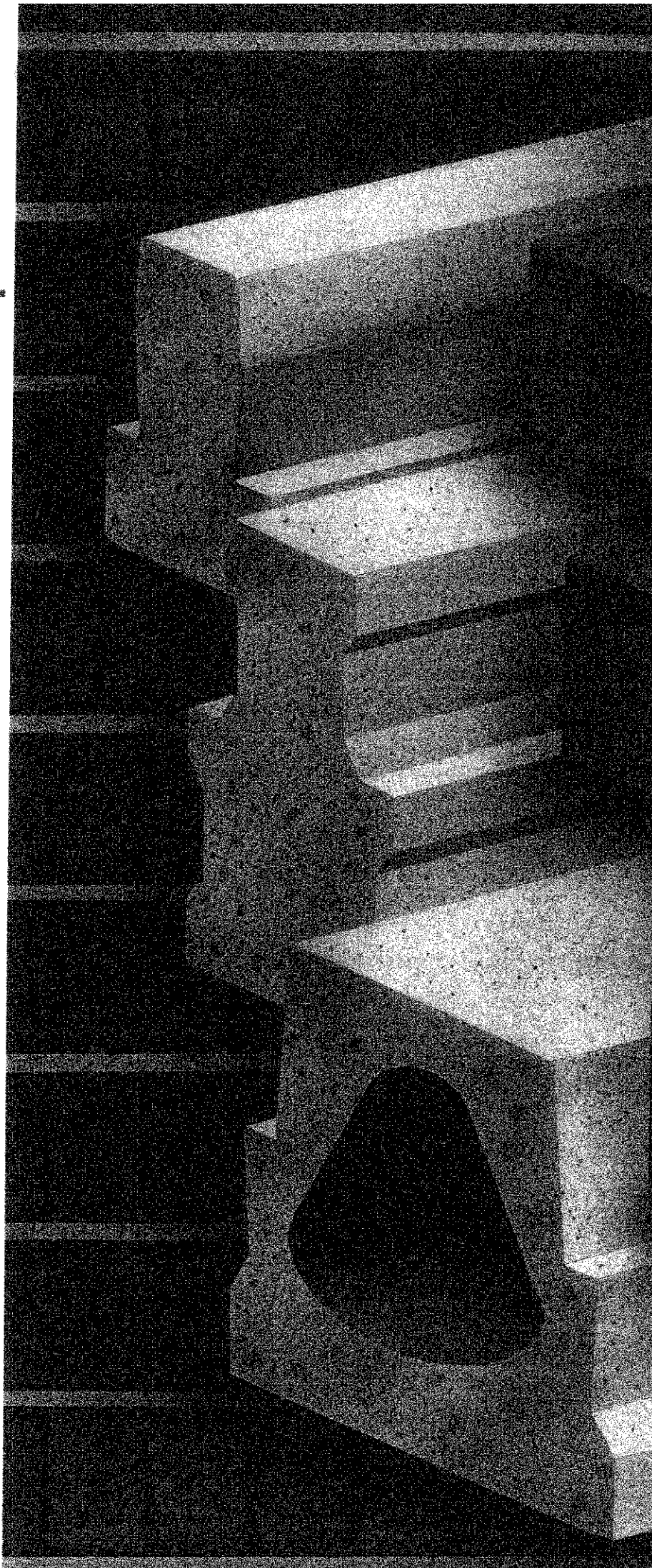
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Bison Housefloor Ltd.



BISON

Building Products



Introduction

BISON is the largest producer of precast flooring in the United Kingdom.

We have been a leader in the design and manufacture of structural concrete products since our formation in 1919, offering unrivalled expertise to the construction industry.

The Bison Beam and Block system has been developed around the combination of two high quality and economic elements: A precast prestressed concrete beam and a standard building block.

High strength concrete is used in the manufacture of the beam which provides a wide range of span and loading capabilities. There are three available beam profiles.

Infill blocks for the system are standard blocks which are available throughout the United Kingdom and thus afford maximum flexibility of choice and minimum cost to the user.

The Bison Beam and Block system is ideally suited for ground and upper floors in housing and commercial buildings.

Technical Data

Beams

Beams are prestressed and are manufactured by a slip form method on a long line casting principle.

Design is in accordance with BS8110 1985 using grade C60 concrete and a cover to reinforcement to satisfy the 'moderate' exposure condition as defined in BS8110.

Blocks

Infill blocks may be standard walling or flooring blocks to meet the following specification:

100mm thick, solid and manufactured in accordance with BS6073 1981.

Block strength shall be a minimum of 7.0N/mm^2 or 3.5N/mm^2 with a transverse point load capacity of 3.5kN on a 420mm span.

Block densities between 650kg/m^3 and 1900kg/m^3 are generally available and may be selected to suit sound and thermal requirements if appropriate.

In order to meet the strength criteria, blocks of aerated concrete (density 650kg/m^3) are normally 440 x 350 x 100mm in size and blocks exceeding 1300kg/m^3 are 440 x 215 x 100mm.

When used in situations where the specified live loading is in excess of 1.5kN/m^2 it is recommended that a directly bonded screed is used.

Floor Finishes

The top surface of a beam and block floor is suitable for the application of a sand/cement screed in accordance with BS8000 and BS8204 as a directly bonded screed or on a separating membrane.

Alternatively a floating timber or chipboard finish on suitable levelling battens may be applied where a screed is not required.

Soffit Finish

A variety of clips and hangers are available which can be placed easily between block and beam or between blocks to give a versatile range of suspended ceiling options.

Shot fired or expanding fixings into the beams are not recommended.

Sound Insulation

The Building Regulations 1991 (Approved Document E) requires that separating floors between dwellings should provide adequate resistance to impact and airborne sound.

This may be achieved by:-

A Type 1 floor comprising a floor base with a mass of 365kg/m^2 (including any directly bonded screed) and to receive a soft covering finish, or a Type 2 floor comprising a floor base with a mass of 300kg/m^2 (including any directly bonded screed) to receive a floating finish which may be a sand cement screed or a timber raft laid on a resilient layer.

Varying block densities may be used in conjunction with a screed to provide either of the floor types, and the following table gives some example situations:

	Block Density	Type 1 Floor 365 kg/m^2	Type 2 Floor 300 kg/m^2
(Beam type HB @ 510c/c)	1325	95mm screed	65mm screed
	1900	70	40
(Beam type DB @ 530c/c)	1325	75	40
	1900	50	40
(Beam type MP @ 661c/c)	1325	70	40
	1900	50	40

Sand/cement screed is taken as 20kg/m^2 per 10mm thickness.

Bison Housefloor

The Bison Housefloor System has been designed to meet the specific needs of the housebuilding industry.

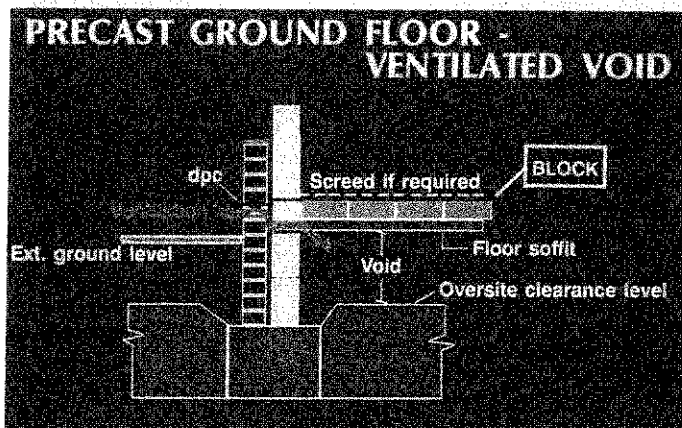
Since June 1974 it has been a mandatory requirement of the NHBC that ground floors must not be supported off deep fill. Where fill is in excess of 600mm the ground floor must be suspended. In fact many of the failures due to lack of compaction occur where fill is less than 600mm demonstrating the value of always using suspended floors.

Compared with traditional construction Bison Housefloor saves cost, reduces site work and eliminates many of the risks.

This method of construction eliminates many of the difficulties that face the builder on site not least the costly excavation and consolidation of backfill preparatory to oversite concrete.

Lack of compaction and subsequent failure of flooring is a frequent claim on NHBC insurance. This risk is eliminated with Bison Housefloor which provides an immediate working platform quickly and economically.

Bison HB beams are stocked in the most popular range of lengths, allowing immediate response to customers needs.



The Bison Housefloor System has been awarded an Agreement Certificate in relation to its Housefloor beam and related Codes of Practice covering the incorporation of concrete infill block, installation and application of finishes.

Building Regulations

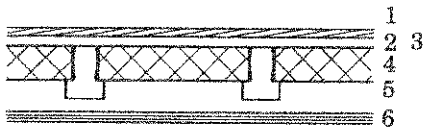
The requirements in respect of suspended concrete ground floors in the Building Regulations 1991 are summarised below.

Approved Document L 1990 (Conservation of Fuel & Power)

Ground floors are required to have a reasonable thermal resistance. Generally a 'U' value of 0.45 W/m²K is required but the thickness and type of insulation required may vary depending upon size and type of building.

Guidance upon this is set out in the Approved Document and further useful information is contained in BRE report "Thermal Insulations: Avoiding Risks".

The simplest and most effective way of providing the necessary insulation is for it to be laid above the structural floor and below a finish of sand/cement screed, chipboard or other similar material, as shown below.



1-2 Floor finish (sand cement screed or chipboard)

2-3 Vapour control layer

3-4 Rigid insulation

4-5 Precast concrete beams and blocks

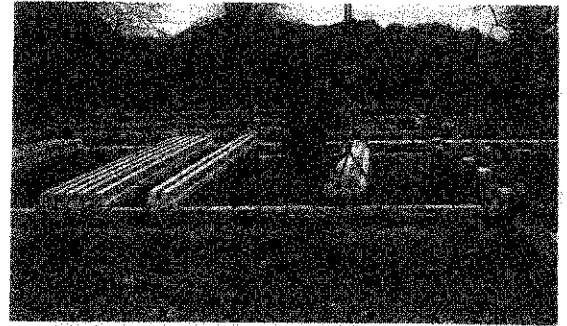
5-6 Ventilated air space.

surrounding ground and will not be effectively drained) and

b. In those situations where there is a risk of an accumulation of gas which might lead to an explosion, there is a requirement for a ventilated air space. This should measure at least 150mm clear from ground to the underside of the floor (or insulation if provided).

c. Where the ventilation referred to in b. is provided two opposing external walls should have ventilation openings placed so that the flow of air will have a free path between opposite sides and all parts. The openings should be large enough to give an actual opening of at least equivalent to 1500mm² for each metre run of wall.

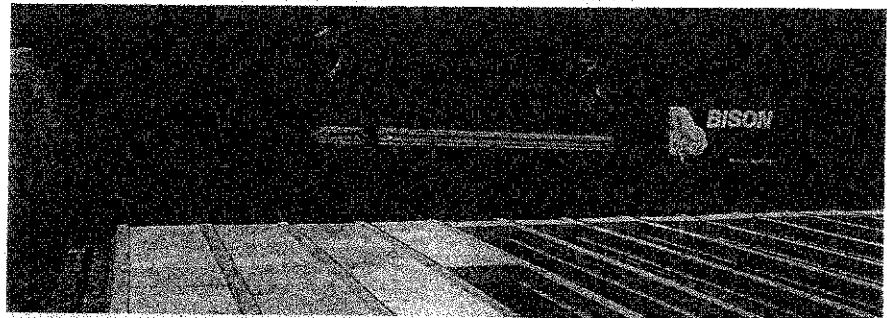
No oversite or other seal is required other than the removal of top soil and vegetable matter



and the provision of a void to accommodate any likely ground movement.

Garage Floors

For garage applications it is recommended that the floor should have a grade 20 concrete screed reinforced with an A98 steel mesh to distribute more evenly any possible excessive loads such as point loads created by the jacking of motor cars. This loading condition is equivalent to a S.I.L. of 5kN/m².



Approved Document C 1992 (Site Preparation and Resistance to Moisture)

A suspended concrete floor should incorporate:

a. Damp-proof membrane (to be provided if the ground below the floor has been excavated below the lowest level of the

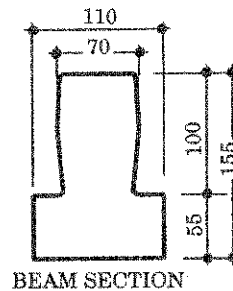
Load/Span Table (Type HB)

Most common applications		Block spacing (mm)	Load/Span Chart (Self weight of beam is included)								
			0.75	1.50	2.00	2.50	3.00	4.00	5.00		
CONDITION No. 1		Beams @ 510mm c/c	1425	1.71	4.93	4.49	4.24	4.07	3.89	3.68	3.29
			650	1.14	5.40	4.86	4.49	4.24	4.02	3.68	3.40
CONDITION No. 2		Beams @ 510 & 285mm c/c (eq. to 508mm c/c average)	1725	1.87	5.45	5.02	4.77	4.51	4.30	3.97	3.70
			650	1.28	5.99	5.34	5.01	4.73	4.50	4.12	3.82
CONDITION No. 3		Double Beams @ 324mm c/c (eq. to 312mm c/c average)	1625	1.93	6.15	5.49	5.24	5.03	4.81	4.44	4.14
			650	1.46	6.69	5.91	5.56	5.26	5.01	4.59	4.27
CONDITION No. 4		Beams @ 285mm c/c	1325	2.04	6.38	5.81	5.56	5.25	5.00	4.62	4.32
			650	1.53	6.82	6.18	5.77	5.47	5.21	4.78	4.45
CONDITION No. 5		Double Beams @ 399mm c/c (eq. to 390mm c/c average)	1925	2.35	6.57	6.06	5.95	5.69	5.41	5.07	4.77
			650	1.92	6.97	6.37	6.64	6.31	6.03	5.57	5.19
CONDITION No. 6		Beams @ 114mm c/c with Concrete between	1125	2.39	6.97	6.97	6.97	6.97	6.97	6.69	6.31
			650	1.92	6.97	6.97	6.97	6.97	6.97	6.69	6.31
CONDITION No. 7		Beams @ 510 & 420mm c/c (eq. to 468mm c/c)	1425	2.04	6.38	5.81	5.56	5.25	5.00	4.62	4.32
			650	1.19	5.26	5.00	4.68	4.42	4.20	3.84	3.56
CONDITION No. 8		Beams @ 420mm c/c	1425	2.04	6.38	5.81	5.56	5.25	5.00	4.62	4.32
			650	1.25	5.86	5.22	4.89	4.62	4.39	4.02	3.73
CONDITION No. 9		Double Beams @ 534mm c/c (eq. to 520mm c/c average)	1925	2.35	6.57	6.06	5.95	5.69	5.41	5.07	4.77
			650	1.60	6.92	6.29	5.92	5.62	5.35	4.92	4.58

The table is given as a guide only. When using maximum or near maximum spans consideration must be given to the effect of camber and deflections on partitions or finishes. Allowance should be given to specific line and point loads from partitions etc. Bison Housefloor Limited will be pleased to offer design advice on request.

Details of Beam

SECTION CONSTANTS						
Area mm ²	ANA mm	BNA mm	I M(mm ⁴)	Za M(mm ³)	Zb M(mm ³)	Self wt. kN/m
12656	86.7	68.3	26.137	0.80	0.383	0.298
FINAL PRESTRESS				ULTIMATE		
Force kN	ECC mm	FPT N/mm ²	FPB N/mm ²	DC mm	MU kNm	VCO kN
74.94	22.7	0.29	10.36	65.64	8.33	16.31



Fire Resistance

When assessed in accordance with BS8110 pt 2, sect 4.3.1 the HB Beam has a fire resistance period of 0.5 Hr. This would normally be enhanced to 1 Hr with most suspended ceiling types.

EXAMPLE

Normal domestic house loading 1.5kN/m², span 3.75 metres finishes of 40mm screed plus tiles (say 1.2kN/m²).

Select: Bison HB. Beam @ 510mm c/c (Max. permissible span 4.49 metres.)

Load/Span Table (Type DB)

440x350x100 Applications		Block density assumed as kg/m ³	WT of Beam Block + Grout (kNm ³)	Load/Span Chart (kN/m ² live load on ceiling) Self Wt. (as above) + finish of 25kN/m ² + 1.1 kN/m ² shown							
				0.75	1.50	2.00	2.50	3.00	4.00	5.00	
CONDITION No. 1		130	1.58	7.81	7.06	6.31	5.56	4.81	4.06		
		650	1.58	7.85	7.06	6.65	6.30	6.00	5.82	5.18	
CONDITION No. 2		130	1.81	8.56	7.74	7.31	6.94	6.63	6.11	5.69	
		650	1.81	8.56	7.74	7.31	6.94	6.63	6.11	5.69	
CONDITION No. 3		130	2.35	8.94	8.19	7.78	7.43	7.11	6.59	6.17	
		650	2.35	8.94	8.19	7.78	7.43	7.11	6.59	6.17	
CONDITION No. 4		130	2.25	9.00	8.67	8.22	7.84	7.51	6.95	6.51	
		650	2.25	9.00	8.67	8.22	7.84	7.51	6.95	6.51	
CONDITION No. 5		130	3.20	9.00	9.00	8.91	8.55	8.23	7.69	7.24	
		650	3.20	9.00	9.00	8.91	8.55	8.23	7.69	7.24	
CONDITION No. 6		130	2.00	9.00	8.90	8.60	8.20	7.70	7.20	6.70	
		650	2.00	9.00	8.90	8.60	8.20	7.70	7.20	6.70	
CONDITION No. 7		130	1.65	8.11	7.31	6.89	6.54	6.23	5.73	5.34	
		650	1.65	8.11	7.31	6.89	6.54	6.23	5.73	5.34	
CONDITION No. 8		130	1.78	8.40	7.59	7.16	6.80	6.49	5.98	5.57	
		650	1.78	8.40	7.59	7.16	6.80	6.49	5.98	5.57	
CONDITION No. 9		130	2.61	9.00	8.59	8.18	7.82	7.51	6.98	6.54	
		650	2.61	9.00	8.59	8.18	7.82	7.51	6.98	6.54	

The table is given as a guide only. When using maximum or near maximum spans consideration must be given to the effect of camber and deflections on partitions or finishes. Allowance should be given to specific line and point loads from partitions etc. Bison Housefloor Limited will be pleased to offer design advice on request.

Details of Beam

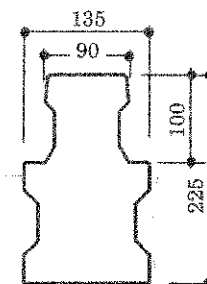
SECTION CONSTANTS						
Area mm ²	ANA mm	BNA mm	I M(mm ⁴)	Za M(mm ³)	Zb M(mm ³)	Self wt. kN/m
23336	123.7	101.3	95.861	0.775	0.947	0.549
FINAL PRESTRESS				ULTIMATE		
Force kN	ECC mm	FPT N/mm ²	FPB N/mm ²	DC mm	MU kNm	VCO kN
113.73	42.6	-1.37	9.99	88.09	20.70	27.73

EXAMPLE

Live loading 3kN/m² span 5.5 metres, finishes of 40mm screed plus tiles (say 1.2kN/m²).

Select: Bison DB. Beam @ 530mm c/c (Max. permissible span 5.75 metres.)

Ed. Ky/m



BEAM SECTION

Fire Resistance

When assessed in accordance with BS8110 pt 2, sect 4.3.1 the DB Beam has a fire resistance period of 1 Hr. without further finishes

Load/Span Table (Type MP)

Most common applications	Block density (assumed at 1800 kg/m ³)	WL of Beam (Block + Grout) (kN/m)	Load/Span Chart - Effective span in metres						
			Self Wt. (as shown) + Finish (1.2kN/m ²) + S.F.L. (kN/m) shown						
			0.75	1.50	2.00	2.50	3.00	4.00	5.00
CONDITION No. 1 440 x 215 x 100 Blocks Beams @ 661mm c/c		1125	8.44	7.73	7.40	7.07	6.74	6.41	6.10
		650	8.88	8.12	7.69	7.32	7.00	6.67	6.34
CONDITION No. 2 440 x 215 x 100 Blocks Beams @ 661 & 436mm c/c (ave. 549mm)		1325	9.40	8.47	8.10	7.76	7.41	7.06	6.71
		650	9.49	8.72	8.27	7.89	7.56	7.20	6.85
CONDITION No. 3 440 x 215 x 100 Blocks - C30 Site Concrete Beams @ 661 & 300mm c/c (ave. 481mm)		1325	9.52	8.71	8.34	7.99	7.63	7.27	6.91
		650	9.69	8.96	8.54	8.17	7.84	7.49	7.13
CONDITION No. 4 440 x 215 x 100 Blocks Beams @ 661mm c/c		1125	9.01	8.25	7.79	7.42	7.05	6.68	6.31
		650	9.32	10.25	9.47	9.02	8.62	8.27	7.89
CONDITION No. 5 440 x 215 x 100 Blocks - C30 Site Concrete Beams @ 436 & 300mm c/c (ave. 368mm)		1325	10.20	9.44	9.12	8.79	8.45	8.10	7.75
		650	9.98	10.45	9.79	9.36	8.99	8.65	8.09
CONDITION No. 6 C30 Site Concrete Beams @ 300mm c/c with concrete between		330	10.66	10.14	9.76	9.41	9.06	8.71	8.36
CONDITION No. 7 440 x 350 x 100 Blocks Beams @ 661 & 571mm c/c (ave. 616mm)		650	8.11	8.35	7.91	7.54	7.21	6.87	6.53
CONDITION No. 8 440 x 350 x 100 Blocks Beams @ 571mm c/c		650	8.96	8.59	8.15	7.77	7.44	7.09	6.74
CONDITION No. 9 440 x 350 x 100 Blocks - C30 Site Concrete Beams @ 571 & 300mm c/c (ave. 436mm)		650	9.99	9.27	8.84	8.47	8.14	7.78	7.43

The table is given as a guide only. When using maximum or near maximum spans consideration must be given to the effect of camber and deflections on partitions or finishes. Allowance should be given to specific line and point loads from partitions etc. Bison Housefloor Limited will be pleased to offer design advice on request.

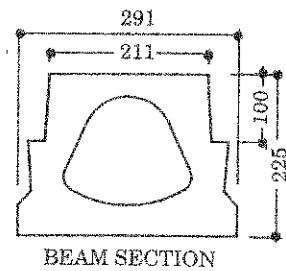
Details of Beam

SECTION CONSTANTS						
Area mm ²	ANA mm	BNA mm	I M(mm ⁴)	Za M(mm ²)	Zb M(mm ²)	Self wt. kN/m
36607	122.9	102.05	202.091	1.6437	1.9803	0.862
MINI/PRESTRESS			ULTIMATE			
Force kN	ECC mm	FPT N/mm ²	FPB N/mm ²	DC mm	MU kNm	VCO kN
153.31	57.1	-1.13	8.60	55.35	37.89	34.41

EXAMPLE

Live loading 2.5kN/m² span 6.9 metres, finishes of 40mm screed plus tiles (say 1.2kN/m²).

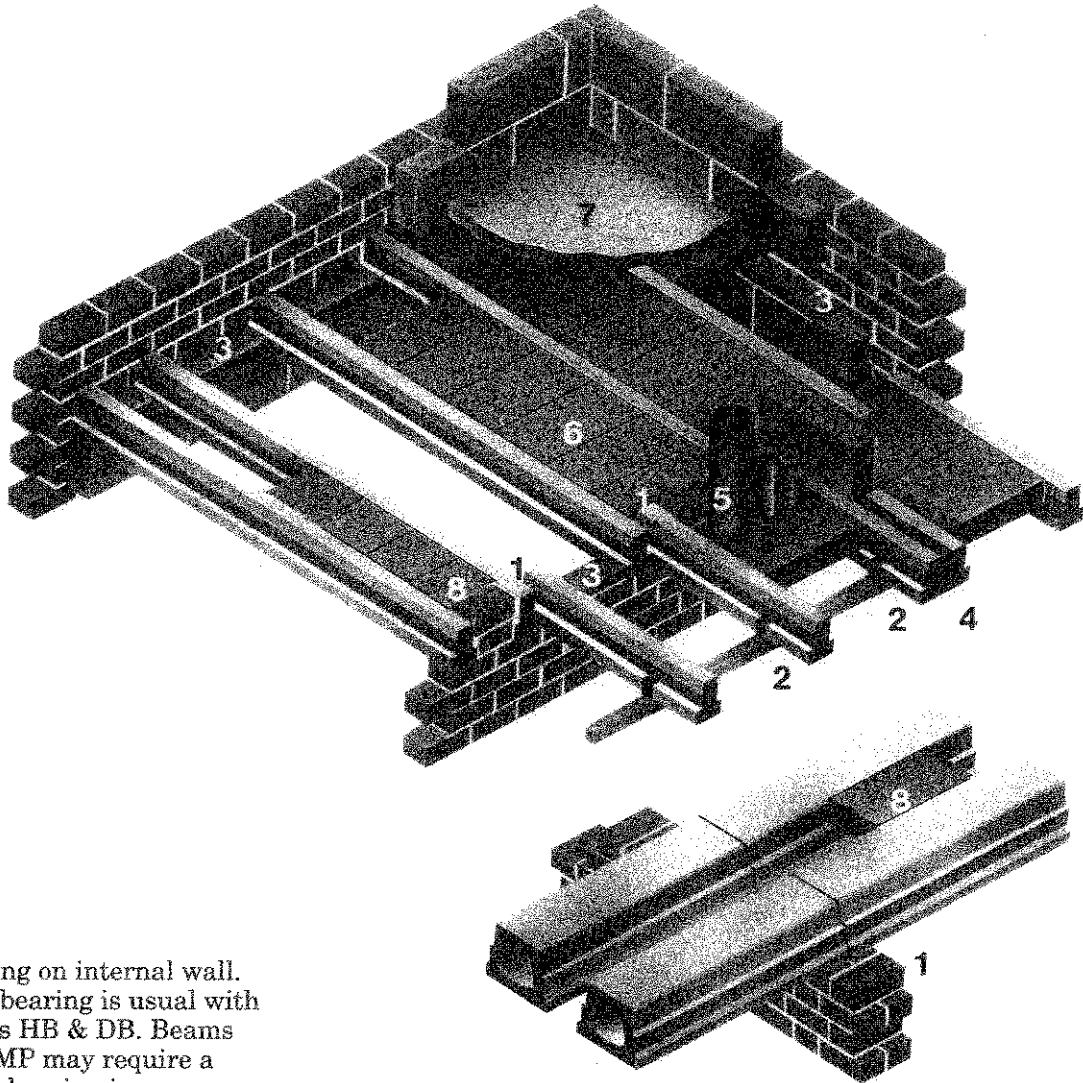
Select: Bison MP. Beam @ 661mm c/c (Max. permissible span 7.07 metres.)



Fire Resistance

When assessed in accordance with BS8110 pt 2, sect 4.3.1 the MP Beam has a fire resistance period of 0.5 Hr. This would normally be enhanced to 1 Hr with most suspended ceiling types.

Typical Construction Details



Key

- | | | |
|--|--|---|
| <p>1 Bearing on internal wall. Dual bearing is usual with beams HB & DB. Beams type MP may require a wider bearing in some circumstances.</p> | <p>5 Blocks may be easily omitted to accommodate service ducts.</p> | <p>8 Beam spacing may be adjusted to suit span/load requirements.</p> |
| <p>2 Ceiling clips and hangers to suit beam profile can be supplied by Bison.</p> | <p>6 Standard walling blocks of various densities to suit acoustic or thermal requirements.</p> | <p>It is normal building practice to lay the beams on a DPC in ground floor situations.</p> |
| <p>3 Slip blocks are available for use in conjunction with beam type HB if required.</p> | <p>7 Applied floor finish, screed or floating timber floor.</p> | |
| <p>4 Multiple beams where required to carry line loads etc.</p> | | |

BISON HOUSEFLOOR LTD.
Amington House,
Silica Road,
Tamworth Staffs B77 4AZ.
Tel: 0827 64141,
Fax: 0827 69009.



Reg. No. FM11

