PLAIN JANE PROJECTS (PTY) LTD.

PRE-CAST DESIGN MANUAL

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THE PRE-CAST LATTICE BEAM SLAB SYSTEM

The Pre-cast lattice beam slab system is based on a concept originating in Europe and developed in South Africa in early 1980's since when some more than 1 000 000m² have been installed in this country.

BENEFITS

The Pre-cast system has several distinctive features that offer benefits over other rib and block and more conventional methods of construction. These are:

I. **The need for conventional decking systems eliminated.**
Because the ribs and blocks for complete deck into which the concrete poured, the ribs merely require temporary support until the concrete has gained strength. Propping centres will vary from case to case and will be specified by the Engineer.

II. **Why reduce the conventional reinforcing?**
The lattice provides a rigid steel truss like structure, which, when cast into the concrete enables the rib to withstand handling loads and support the weight of the hollow blocks, construction loads. It also contributes towards the tensile reinforcement required in the completed slab and provides an excellent shear key between the pre-cast rib and concrete.

III. **The volume of insitu concrete is greatly reduced.**
Because the hollow concrete block replaces a substantial volume of insitu concrete leading to a significant reduction in the dead load supported by the structure sub sequential cost savings made by the consequent reduction in size of other elements such as the beams, columns and foundations.

IV. **Ease of Installation and Reduced Construction Time.**
Due to the simplicity of the system, it can be swiftly installed on site using less skilled labour than is needed for more conventional slab constructions. The use of ordinary pre-cast ribs mean that the ribs are always straight simplifying the installation of the beams and the placing of the blocks in between. As the lattice girder adds stiffness and handling facilities to the beam. Time for installation of the system will reduce.

V. Design benefits.
The ribs are purpose made under strictly controlled factory conditions, eliminating potential problems of one size fits all situations. Large variety of cast-in reinforcing combinations allows for economical design. Welded Mesh.

DESIGN

As with all reinforced concrete construction, it is important that all designs done by our draughtsman must be approved by a registered engineer.

Plain Jane Projects (Pty) Ltd offers a design facility and will provide Engineer's Certificates to satisfy Local Government regulations. Where Plain Jane Projects (Pty) undertake the design Ltd and approved by the Appointed Engineer the client is supplied with layout drawings showing rib positions and detail of any additional reinforcing if this is required. Temporary propping arrangement are provided which must be strictly adhered to.

Where client's wish to use their own Consulting Engineer to do the design Plain Jane Projects (Pty) Ltd will provide assistance and design information to enable an economical solution to their structure. Design data is available from the Company and can be provided in good faith. However, the Company of the data arising out of its issue will accept no liability.

COMPONENTS OF THE SYSTEMS

THE LATTICE RIB/BEAM

The lattice rib/beam is manufactured in a die straight condition, which removes any tendency towards horizontal curvature in the manufactured rib.
Plain Jane Projects uses Ref: 1282 girder.

TABLE 1 – LATTICE DATA

REF CODE	OVERALL, HEIGHT mm	TOP BAR DAM mm	BOTTOM BARS DAM mm
2026	135	10	8
1841	135	8	8
1659	135	10	5.6
1282	85	8	5.6
1479	135	8	5.6
1783	100	8	8
1379	100	8	5.6

THE PRE-CAST RIB

The rib is a 50mm thick concrete component made from 25MPa concrete, which incorporates a lattice and any other tensile reinforcement required. It will be manufactured in a Rib Type A that is 150mm wide.

Should the design so require connection between the ribs and other concrete elements this is achieved by placing loose tie bars on top of the rib to anchor the rib to supporting beams, walls, etc. However, should particular circumstances so dictate they could be manufacture with reinforcement protruding out of the end of the concrete for this purpose.

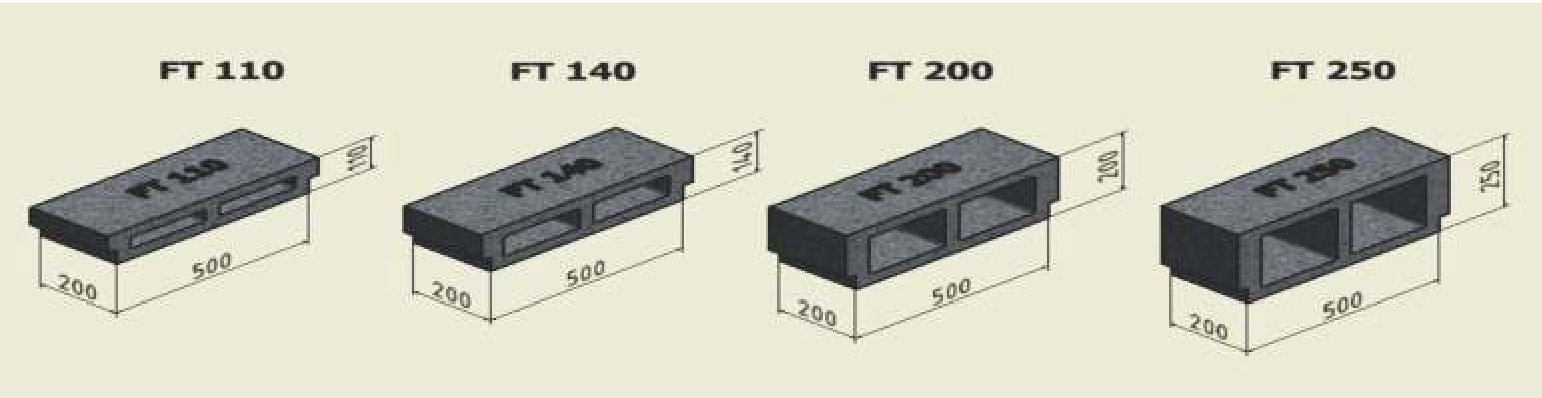
THE HOLLOW CONCRETE BLOCK

The hollow concrete block is manufactured in a range of sizes to provide the designer with full flexibility in determining an appropriate slab dept and rib arrangement to suite his/her particular needs. The range of blocks is as detailed in TABLE 2.

TABLE 2 – HOLLOW BLOCK DATA

REF CODE	DEPT mm	WIDTH mm	LENGTH mm	APPROX. MASS PER BLOCK (KG)
FT110	110	500	200	20
FT140	140	500	200	21
FT200	200	500	200	26
FT250	250	500	200	31

Blocks are manufactured under strict control procedures from concrete with a 28-day cube strength which ensures that when tested in a compression testing machine they have a minimum crushing strength of 7MPa measured on the net section when axially loaded in direction of compressive stress in the finished slab.

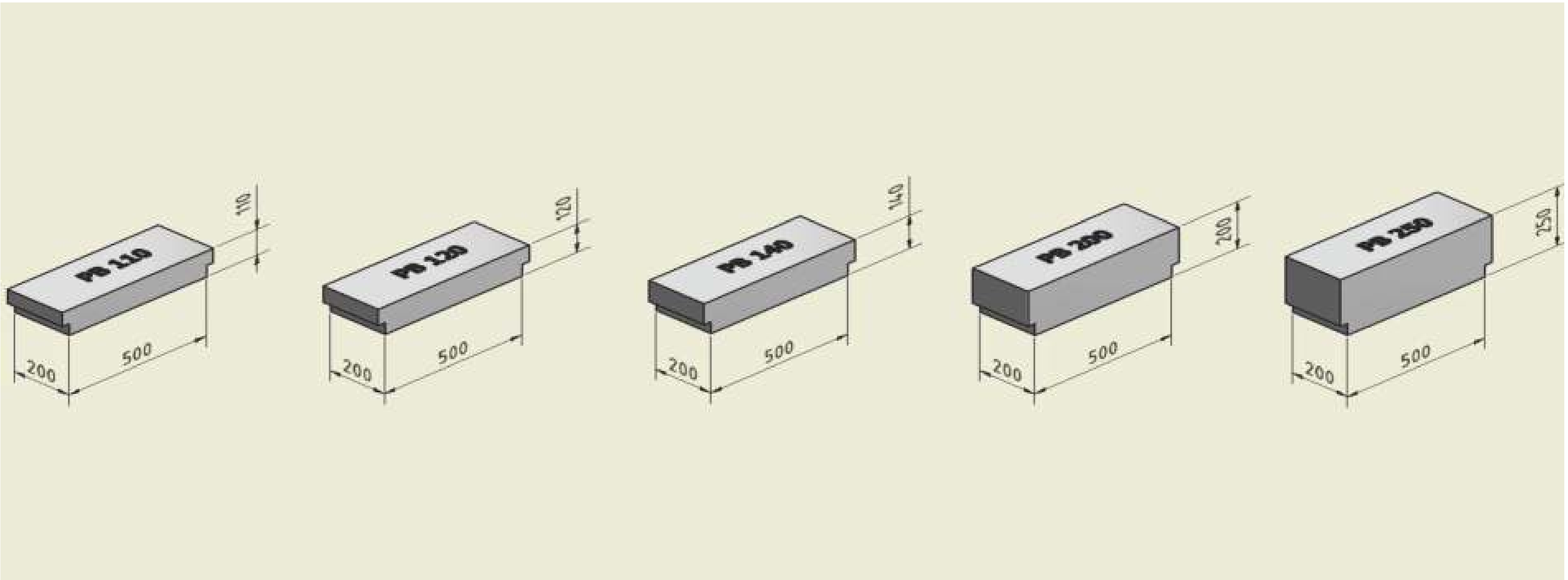


<u>Polystyrene Blocks</u>

Polystyrene is 90% lighter than concrete blocks, therefore reducing 1.6KN/m² of dead load. This is approximately 140kg per m² on a 255mm slab. Compared to an in-situ, the weight saving is even greater, being 320kg per m².
The lower weight advantage allows engineers to use polystyrene slabs on buildings where the foundation history is unknown.

Variable block sizes are:

REF CODE	DEPT mm	WIDTH mm	LENGTH mm	APPROX. MASS PER BLOCK (KG)
PB110	110	500	200	0,000296
PB120	120	500	200	0,000323
PB140	140	500	200	0,000376
PB200	200	500	200	0,000269
PB250	250	500	200	0,000336



DISCLAIMER AND CAUTION

The information provided in the accompanying data sheets are provided for guidance in the selection of an appropriate configuration of the slab system only. Circumstances regarding the loading of slabs are highly variable and can only be properly evaluated by a suitably qualified person experienced in the design of reinforced concrete structures as the appointed engineer.

It is also important to note that the requirements of the National Buildings Regulation in respect of the design of reinforced concrete structures can only be satisfied by engaging the service of a competent person such as a Professional Engineer to assume responsibility for the preparation of a rational design and to carry out onsite inspections of the construction thereof.

It is strongly recommended that such a person be appointed for the design of all Reinforced Concrete structures and the data supplied herein in offered on the assumption that it will be of assistance to such a person in the selection of a suitable slab configuration for his/her particular structure.

Although all due care has been taken in the compilation and preparation of the accompanying data sheet to ensure the accuracy of the information supplied no responsibility or liability of any kind whatsoever can be accepted by either this Company or the Authors of the information arising out of its use.

DESIGN PARAMETERS AND ASSUMPTIONS

1. All concrete in pre-cast ribs and insitu concrete has a 28 day works cube strength of 25MPa – $f_{cu} = 25\ N/mm^2$
2. All additional reinforcement inserted in ribs complies with SABS 920 - $f_y = 450\ N/mm^2$
3. Partial factors for loading are as follows:
    1) Self-Weight and Finish – For Ultimate
    2) Superposed Loads – Limit State
    3) Self-Weight and Finish – For Serviceability
    4) Superimposed Loads – Limit State

Slabs are finished with a screed topping on top with a 12 mm cement plaster on the underside.

DEFLECTION CONTROL

i. Deflection is not calculated by controlled by restricting the span to effective dept ratios in accordance with Code of Practice.
ii. For single rib slabs the ratio of web width to total flange width is less than 0.3, therefore 0.8 multiplies span to effective dept ratio.
iii. Basic span to effective dept ratio assumed to be for a nominally simply supported beam, i.e.,20.
iv. The basic ratio modified in accordance with Clause 4.3.6.3.1 of SABS 0100-1992. In terms of this Clause, the modification factor is infinitely variable depending upon the actual combination of spans, loads, moments, the theoretical areas of reinforcement required to resist those moments and the actual areas of reinforcement provided in practical terms. It is clearly beyond the scope of a simple set of guideline tables such as these to provide definitive information in this regard and it anticipates that individual designers will use their own judgement in applying the requirements of this Clause to their particular problems. However, for convenience and the establish reasonably conservative guideline for the maximum allowable spans the modification factor in terms of Clause 4.3.6.3.1 has been calculated on the basis of the following table:

The moments shown in this table approximate to the ultimate bending moments that would result from a superimposed load of 5.0Kn/m² applied on the particular slab code with a Type A rib over the span shown.

SLAB CODE	APPLIED MOMENT KNm	SPAN Mm
150/60	6.58	2.500
170/80	9.87	3.000
200/60	13.61	3.500
225/85	18.69	4.000
255/115	25.06	4.500
255/55	23.25	4.500
285/85	36.83	5.500
310/110	45.88	6.000
310/60	43.11	6.000
340/90	62.06	7.000
360/110	64.27	7.000
385/135	67.13	7.000

In calculating the service stress terms of Clause 4.3.6.3.1 it assumed that the area of steel provided in practice exactly matches the theoretical requirements. This does not usually occur in practice but for purpose of this guide, it is the only possible assumption.
Reducing the steel stresses by 'over designing' can be used to achieve basic span to effective dept ratio. This is left to the discretion of the designer. The service stress as calculated in accordance with SABS 0100-1992, Clause 4.3.6.3.1 is accordingly calculated as follow:

$$Fs = 0.87 \times fy \ \frac{(1.10 + 1.00)}{(1.20 + 1.60)} \times \frac{1.0 \times 1.0}{1.0 \times 1.0}$$

= 0.08 x 450 x 0.75 x 1 x 1

= 293, 63 N/mm² **SAY 293 N / mm²**

RESULTS

Typical ranges of practical slabs are selected. Clearly, these are not possible combination of standard hollow blocks and cast insitu toppings and designers are at liberty to select any combination of these to suit their particular conditions.

The particular configurations were selected using the Company's experience. It is normal building practice to cast electrical conduit into the topping of these slabs. For this reason, it is recommended that the topping thickness should not be less than 55mm. At the same time, the quantity of cast insitu concrete in an important factor both from a weight and cast point of view. The excessive thicknesses of topping are avoided. Although particular circumstances may require thicker toppings in general it is recommended that thickness of greater than 100 – 110mm should be avoided by using the next standard block size combined with a thinner topping.

Five data sheets are attached showing the following information:

The self-weight of each of the selected configuration stated both as weight per square meter. In most practical applications, slabs are finished with a mortar plaster on the underside and a cement screed and finish on top. The self-weights are thus stated including an allowance for a total of 50mm of finish at 0.024kN/m². The required total area of high tensile reinforcement for a range of typical uniformly distributed superimposed loadings. The designer is expected to apply is own judgement in selecting an appropriate bar combination to provide this amount of reinforcement. It is also at the designer's discretion as to whether or not the area of the bottom bars in the lattice taken as part of this area or not. However, it is recommended that this area is taken into account and that in general the following bar combinations are used in providing the required reinforcement:

REINFORCEMENT CONFIGURATION	AREA OF STEEL PROVIDED mm²
LATTICE ONLY	49
LATTICE + 1 NO Y10	127
LATTICE + 1 NO Y12	162
LATTICE + 2 NO Y10	206
LATTICE + 1 NO Y16	250
LATTICE + 2 NO Y12	275
LATTICE + 3 NO Y10	284
LATTICE + 3 NO Y12	388
LATTICE + 2 NO Y16	451
LATTICE + 3 NO Y16	652

NOTE - If the designer has specified a different lattice, then an appropriate adjustment should be made to these figures. The minimum area reinforcement for a 'T' beam web of 0.18% of the web width x the slab dept as specified in the Code of Practice is shown for information. The recommended weld mesh in the topping shown. This is based on 0.15% of the flange area. The insitu concrete per square meter of slab is shown to assist in evaluating the economies of each slab configuration

THE PRE-CAST LATTICE BEAM SLAB SYSTEM

RECOMMENDED SLAB CONFIGURATION

MOMENTS OF RESISTANCE – CHART 1

SINGLE RIB SLAB – RIB TYPE A 150MM WIDE

DESIGN PARAMETERS fcu = 25N/mm² fyv = 425N/mm² fy = 450/mm² COVER 20m											
SLAB CODE	MOMENT OF RESISTANCE CONCRETE	MOMENT OF RESISTANCE OF REINFORCEMENT BASED ON LATTICE REF 1282 PLUS									
		LATTICE	1 NO Y10	1 NO Y12	2 NO Y10	1 NO Y16	2 NO Y12	3 NO Y10	3 NO Y12	2 NO Y16	3 NO Y16
		49	127	162	206	250	275	284	388	451	652
Mm	kNm	kNm	kNm	kNm	kNm	kNm	kNm	kNm	kNm	kNm	kNm
150/60	39.56	2.30	5.90	7.51	9.60	11.59	12.68	13.05	17.40	19.91	27.43
170/80	53.23	2.65	6.85	8.75	11.10	13.50	14.82	15.29	20.45	23.45	32.51
200/60	66.47	3.19	8.29	10.55	13.43	16.29	17.89	18.49	24.99	28.75	40.20
225/85	98.12	3.65	9.45	12.05	15.29	18.59	20.49	21.13	28.81	33.19	46.59
255/115	133.92	4.19	10.88	13.88	17.62	21.47	23.53	24.29	33.19	38.47	54.19
255/55	93.09	4.19	10.87	13.87	17.62	21.39	23.53	24.30	33.19	38.47	54.19
285/85	142.72	4.74	12.29	15.67	19.92	24.18	26.59	27.47	37.52	43.61	61.88
310/110	188.72	5.20	13.46	17.17	21.84	26.50	29.15	30.10	41.13	47.81	68.26
310/60	132.88	5.20	13.46	17.17	21.84	26.50	29.15	30.10	41.13	47.81	68.26
340/90	193.65	5.74	14.88	18.98	24.14	29.29	32.22	33.27	45.46	52.84	75.92
360/110	237.54	6.11	15.82	20.19	25.67	31.15	34.26	35.39	48.34	56.19	81.02
385/135	296.20	6.56	17.01	21.69	27.58	33.47	26.82	38.03	51.95	60.39	87.30

REINFORCEMENT REQUIREMENTS FOR SINGLE RIB SLABS – TYPES A RIB – CHART 2 (150 mm WIDE)

UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD 1.5Kn/m² CODE – SLABS 0100 – 1992

SLAB CODE	SELF WEIGHT INCLUDES 50mm FINISH	SELF WEIGHT INCLUDES 50mm FINISH	HOLLOW TILE TYPE	MIN REINF IN RIB	ARE OF HIGH TENSILE REINFORCEMENT REQUIRED FOR SPANS IN METERS FOR UNIFORMLY DISTRIBUTED LOAD															WELD MESH REQUIRE D IN TOPPING	VOLUME INSITU CONCR
Mm	kN/m	kN/m²		mm²	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5		m³per m²
150/60	2.68	4.12	FT90	40	29	51	80	115	157											REF156	0.08
170/80	2.98	4.58	FT90	47	26	47	73	106	146	190										REF193	0.09
200/60	3.08	4.74	FT140	54		40	63	91	124	161	204	254								REF156	0.09
225/85	3.46	5.32	FT140	60			60	87	118	153	195	240	290							REF193	0.11
255/115	3.92	6.03	FT140	70				82	111	146	184	228	275	330						REF245	0.14
255/55	3.32	5.11	FT200	70				73	99	129	163	201	244	292	344					REF156	0.09
285/85	3.78	5.82	FT200	76						126	160	197	239	284	333	388				REF193	0.12
310/110	4.16	6.40	FT200	83							157	193	234	278	326	379				REF245	0.15
310/60	3.65	5.62	FT250	83							142	175	212	252	296	343				REF156	0.11
340/90	4.11	6.32	FT250	90									210	250	293	339	390			REF193	0.14
360/110	4.41	6.78	FT250	97										248	290	337	387	440		REF245	0.15
385/135	4.80	7.38	FT250	103												334	385	436	494	REF311	0.18

THE PRE-CAST LATTICE BEAM SLAB SYSTEM

UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD 2.5kN/m² CODE – SABS 0100 - 1992

SLAB CODE	SELF WEIGHT INCLUDES 50mm FINISH	SELF WEIGHT INCLUDES 50mm FINISH	HOLLOW TILE TYPE	MIN REINF IN RIB	ARE OF HIGH TENSILE REINFORCEMENT REQUIRED FOR SPANS IN METERS FOR UNIFORMLY DISTRIBUTED LOAD															WELD MESH REQUIRE D IN TOPPING	VOLUME INSITU CONCR
Mm	kN/m	kN/m²		mm²	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5		m³per m²
150/60	2.68	4.12	FT90	40	35	63	98	140	192											REF156	0.08
170/80	2.98	4.58	FT90	47	31	56	88	129	175	229										REF193	0.09
200/60	3.08	4.74	FT140	54		48	76	109	148	193	245									REF156	0.09
225/85	3.46	5.32	FT140	60			71	103	139	181	230	284	343							REF193	0.11
255/115	3.92	6.03	FT140	70				95	129	170	214	265	323	384						REF245	0.14
255/55	3.32	5.11	FT200	70				86	117	153	194	238	289	346						REF156	0.09
285/85	3.78	5.82	FT200	76						147	187	230	279	329	390					REF193	0.12
310/110	4.16	6.40	FT200	83							182	224	271	322	378	439				REF245	0.15
310/60	3.65	5.62	FT250	83							167	206	249	296	348	403				REF156	0.11
340/90	4.11	6.32	FT250	90									244	291	341	395	452			REF193	0.14
360/110	4.41	6.78	FT250	97										285	334	388	446	507		REF245	0.15
385/135	4.80	7.38	FT250	103												382	439	500	564	REF311	0.18

PRE-CAST LATTICE BEAM SLAB SYSTEM

UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD 3.0kN/m² CODE – SABS 0100 - 1992

SLAB CODE	SELF WEIGHT INCLUDES 50mm FINISH	SELF WEIGHT INCLUDES 50mm FINISH	HOLLOW TILE TYPE	MIN REINF IN RIB	ARE OF HIGH TENSILE REINFORCEMENT REQUIRED FOR SPANS IN METERS FOR UNIFORMLY DISTRIBUTED LOAD															WELD MESH REQUIRE D IN TOPPING	VOLUME INSITU CONCR
Mm	kN/m	kN/m²		mm²	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5		m³per m²
150/60	2.68	4.12	FT90	40	38	68	106	153	209											REF156	0.08
170/80	2.98	4.58	FT90	47	34	61	95	128	190	248										REF193	0.09
200/60	3.08	4.74	FT140	54		52	82	118	160	209	265									REF156	0.09
225/85	3.46	5.32	FT140	60			76	110	150	195	248	302	370							REF193	0.11
255/115	3.92	6.03	FT140	70				102	138	181	229	283	343	412						REF245	0.14
255/55	3.32	5.11	FT200	70				93	126	164	209	257	312	374						REF156	0.09
285/85	3.78	5.82	FT200	76						158	201	247	300	356	418					REF193	0.12
310/110	4.16	6.40	FT200	83							194	239	290	344	404	469				REF245	0.15
310/60	3.65	5.62	FT250	83							179	221	268	318	374	433				REF156	0.11
340/90	4.11	6.32	FT250	90									261	311	364	422	481			REF193	0.14
360/110	4.41	6.78	FT250	97										304	356	414	475	540		REF245	0.15
385/135	4.80	7.38	FT250	103												406	467	531	599	REF311	0.18

THE PRE-CAST LATTICE BEAM SYSTEM

UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD 4.0kN/m² CODE – SABS 0100 – 1992

SLAB CODE	SELF WEIGHT INCLUDES 50mm FINISH	SELF WEIGHT INCLUDES 50mm FINISH	HOLLOW TILE TYPE	MIN REINF IN RIB	ARE OF HIGH TENSILE REINFORCEMENT REQUIRED FOR SPANS IN METERS FOR UNIFORMLY DISTRIBUTED LOAD															WELD MESH REQUIRE D IN TOPPING	VOLUME INSITU CONCR
Mm	kN/m	kN/m²		mm²	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5		m³per m²
150/60	2.68	4.12	FT90	40	44	79	124	178	244											REF156	0.08
170/80	2.98	4.58	FT90	47	39	70	112	161	220	288										REF193	0.09
200/60	3.08	4.74	FT140	54		60	94	136	185	241	306									REF156	0.09
225/85	3.46	5.32	FT140	60			87	126	171	223	283	349	426							REF193	0.11
255/115	3.92	6.03	FT140	70				116	157	205	259	323	392	469						REF245	0.14
255/55	3.32	5.11	FT200	70				106	145	188	239	294	357	429						REF156	0.09
285/85	3.78	5.82	FT200	76						180	228	281	340	405	475					REF193	0.12
310/110	4.16	6.40	FT200	83							219	270	327	389	456	529				REF245	0.15
310/60	3.65	5.62	FT250	83							204	252	305	362	426	493				REF156	0.11
340/90	4.11	6.32	FT250	90									293	349	410	475	546			REF193	0.14
360/110	4.41	6.78	FT250	97										341	400	465	534	607		REF245	0.15
385/135	4.80	7.38	FT250	103												453	521	593	670	REF311	0.18

THE PRE-CAST LATTICE BEAM SYSTEM

UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD 5.0kN/m² CODE – 0100 – 1992

SLAB CODE	SELF WEIGHT INCLUDES 50mm FINISH	SELF WEIGHT INCLUDES 50mm FINISH	HOLLOW TILE TYPE	MIN REINF IN RIB	ARE OF HIGH TENSILE REINFORCEMENT REQUIRED FOR SPANS IN METERS FOR UNIFORMLY DISTRIBUTED LOAD															WELD MESH REQUIRE D IN TOPPING	VOLUME INSITU CONCR
Mm	kN/m	kN/m²		mm²	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5		m³per m²
150/60	2.68	4.12	FT90	40	51	91	141	203	280											REF156	0.08
170/80	2.98	4.58	FT90	47	44	80	124	183	249	329										REF193	0.09
200/60	3.08	4.74	FT140	54		68	107	154	209	273	347									REF156	0.09
225/85	3.46	5.32	FT140	60			98	142	192	251	319	364	483							REF193	0.11
255/115	3.92	6.03	FT140	70				129	175	229	289	362	438	528						REF245	0.14
255/55	3.32	5.11	FT200	70				119	163	212	269	331	406	487						REF156	0.09
285/85	3.78	5.82	FT200	76						201	255	314	381	453	535					REF193	0.12
310/110	4.16	6.40	FT200	83							244	300	364	433	508	593				REF245	0.15
310/60	3.65	5.62	FT250	83							229	282	342	406	478	555				REF156	0.11
340/90	4.11	6.32	FT250	90									372	389	457	529	609			REF193	0.14
360/110	4.41	6.78	FT250	97										379	444	516	592	677		REF245	0.15
385/135	4.80	7.38	FT250	103												501	576	655	745	REF311	0.18

THE PRE-CAST LATTICE BEAM SYSTEM

UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD 7.5kN/m² CODE - SABS – 0100 – 1992

SLAB CODE	SELF WEIGHT INCLUDES 50mm FINISH	SELF WEIGHT INCLUDES 50mm FINISH	HOLLOW TILE TYPE	MIN REINF IN RIB	ARE OF HIGH TENSILE REINFORCEMENT REQUIRED FOR SPANS IN METERS FOR UNIFORMLY DISTRIBUTED LOAD															WELD MESH REQUIRE D IN TOPPING	VOLUME INSITU CONCR
Mm	kN/m	kN/m²		mm²	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5		m³per m²
150/60	2.68	4.12	FT90	40	66	119	185	269	375											REF156	0.08
170/80	2.98	4.58	FT90	47	57	103	165	237	327	436										REF193	0.09
200/60	3.08	4.74	FT140	54		88	138	199	270	355	457									REF156	0.09
225/85	3.46	5.32	FT140	60			126	181	246	321	409	513	631							REF193	0.11
255/115	3.92	6.03	FT140	70				162	220	289	365	459	562	679						REF245	0.14
255/55	3.32	5.11	FT200	70				153	208	271	344	431	527	637						REF156	0.09
285/85	3.78	5.82	FT200	76						255	323	398	483	582	689					REF193	0.12
310/110	4.16	6.40	FT200	83							306	377	457	544	645	756				REF245	0.15
310/60	3.65	5.62	FT250	83							291	359	435	517	613	717				REF156	0.11
340/90	4.11	6.32	FT250	90									411	489	574	671	778			REF193	0.14
360/110	4.41	6.78	FT250	97										473	555	646	748	858		REF245	0.15
385/135	4.80	7.38	FT250	103												620	716	821	936	REF311	0.18

NOTES

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CONCRETE HOLLOW BLOCKS

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