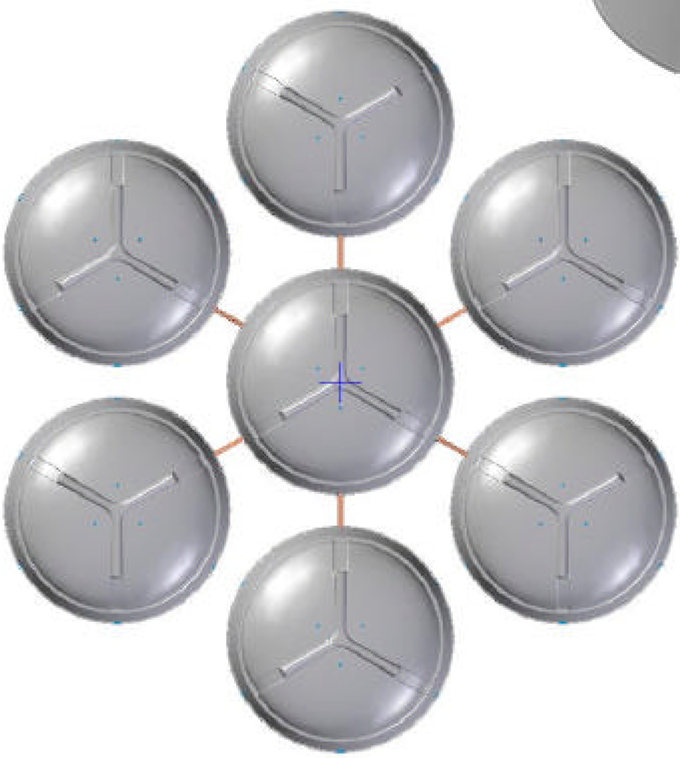

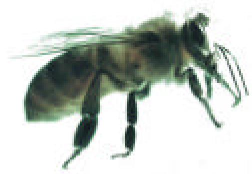

BAMTEC® BEEPLATE®
building like the bees

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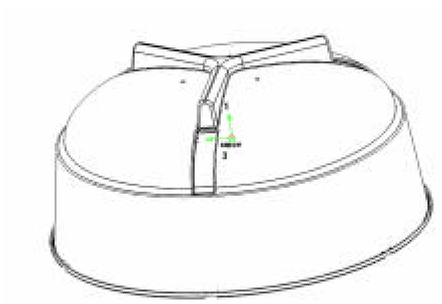
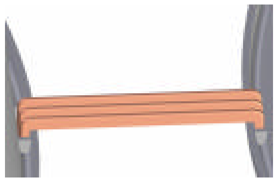
The System BAMTEC® BEEPLATE®

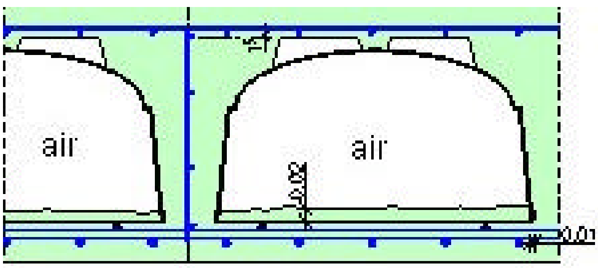
The **BAMTEC® BEEPLATE®** is a biaxial carrying in-situ concrete flat slab with any type of bedding. Installing these buoyancy-free hollow bodies congruous to a bee honey coomb structure saves concrete, weight and therefore reinforcing steel. The concrete savings amount up to 30 %.





Pictures: **BEEPLATE®**-Hollow Body with integrated reinforcement spacers on top and integrated distance stirrups between each hollow body.

The **BAMTEC® BEEPLATE®** is a flat slab system for large spans. The executable floor strength lies between 45 and 55 cm. Thus point-supported slabs with a support raster over 12 m are possible.



Picture: cross section of a **BAMTEC® BEEPLATE®**

The assembly takes place according to an in-situ concrete plain sheet. After placing the slab formwork on distance placers the two bottom BAMTEC® reinforcement layers are unrolled. On another layer of distance placers the BEEPLATE® hollow bodies are then installed with the help of the distance stirrups into a bee honeycomb structure. At the same time the edge reinforcing, possible extra reinforcement and the shear reinforcement are installed in between the hollow bodies. After the roll out of the top two BAMTEC® layers the slab is ready for concreting. The concreting takes place in three phases "wet in wet".

The calculation takes place according to European and/or national regulations. A permission is not necessary.

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BEEPLATE® -Hollow Bodies:

Joh. Panick Gmbh & Co.KG
Am Neuen Baum 5-9
D-59229 Ahlen

e-mail: zentrale@jopa-ahlen.de
http://www.jopa-ahlen.de

BAMTEC®:

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BAMTEC® BEEPLATE®

Static Proof after DIN 1045-1
by means of application tables
and
Fire Protection Proof after DIN 4102 part 4

Status 01.09.2004

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1. Recommended Proceeding

Choice of slab thickness

The static useful height (floor thickness less bottom reinforcement distance) for the calculation of the deformations of the floor should amount at least to li/35 and/or $l_i^2/150$ in accordance with DIN 1045-1 section 11.3.2.

The additional deflection due to transverse force and shearing strain of the cross section is usually small. In cases of doubt it can be measured by Leonhardt.

The minimum thickness of a BAMTEC® BEEPLATE® is 45 cm.

With highly loaded floors it is recommended to make the floor at least 48 cm thick. Thus thick longitudinal reinforcement rods in the upper layers are accommodated better.

If fire resisting class F90 must be kept, the bottom concrete slab should be selected at least 10 cm thick (see DIN 4102 part of 4 tab. 10 line 2.1.2), in particular if hollow bodies are in floor ranges where down bending pressure prevails, thus $M_x<0$ or $M_y<0$ is. More details to be taken in chapter 7.

Choice of concrete firmness

In order to keep the solid ranges of the floor small by point-supported slabs, concrete C30/37 or more firmly is recommended (see chapter 4).

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Determination of cutting forces and bending reinforcement

Concerning this, where the floor becomes solid the environment of the supports and **line bedding** are to be specified roughly. Within the as largely as possible aimed remainder range of the floor the hollow bodies are arranged.

Therefore is in the environment of the supports and bearers for the cutting force determination (FEM-calculation) the dead weight of a solid slab (g = 25 • h) to be set, while within the hollow body range the dead weight may be reduced to be set around 3,43 kN/m² (see chapter 3).

In the very most practical applications the necessary reinforcing cross section is not or only negligibly increased by the presence of the hollow bodies; that means that the results of the FEM-calculation can be taken over. Only for slabs with unusually large utilization $M_{Sd}/(d^2 \cdot f_{cd})$ of the concrete cross section the necessary reinforcing cross section becomes namable larger in opposition to a solid plain sheet.

Considerations of fissure limitation

The necessary considerations and definitions to restrict the fissure width (minimum reinforcement, etc.) can be undertaken as with a solid slab.

Proofs of the concrete web receptible transverse force

The with extra shear reinforced hollow body floor in between the hollow bodies can only take up a certain calculation transverse force v_{Ed} [kN/m] (see chapter 4).

It must be controlled that the calculation transverse forces determined by means of FEM-calculation v_{xd} and v_{yd} in the hollow body ranges of the floor are not anywhere larger than the receptible value v_{Ed}.

Otherwise the hollow bodies are to be omitted in the range concerned. Then the floor is solid there. If those solid ranges are becoming a considerable size, a new FEM-calculation according to the appropriate load change is necessary.

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Determination of the shear reinforcement

Into the concrete web between the hollow bodies vertical standard mats are placed as shear reinforcement. Their calculation can take place after chapter 5.

So that they do not fall down during the assembly, single one-time broken pieces of mat are used. Preferably q-mats are used. The lowest horizontal rod rests upon the lower longitudinal reinforcement. The highest horizontal rod is to run scarcely under the highest longitudinal reinforcement.

In order to reinforce economically, also the edge regions of the mat with smaller reinforcing cross section should be utilized.

Proofs of punching reinforcement

In the punching area of supports and within the range of large individual loads no hollow bodies are arranged. The floor is solid there and is to be proven against punching accordingly.

Smaller individual loads in the hollow body area

With individual loads arising within the hollow body ranges the circular slab over the hollow bodies is to be proven statically in each case. The upper floor reinforcement has here also the function of a lower reinforcement of this slab. Vault effect can be set.

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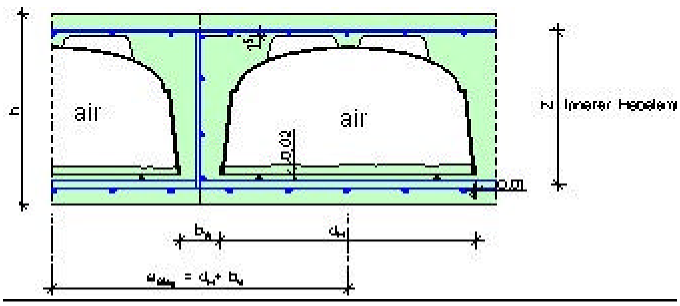
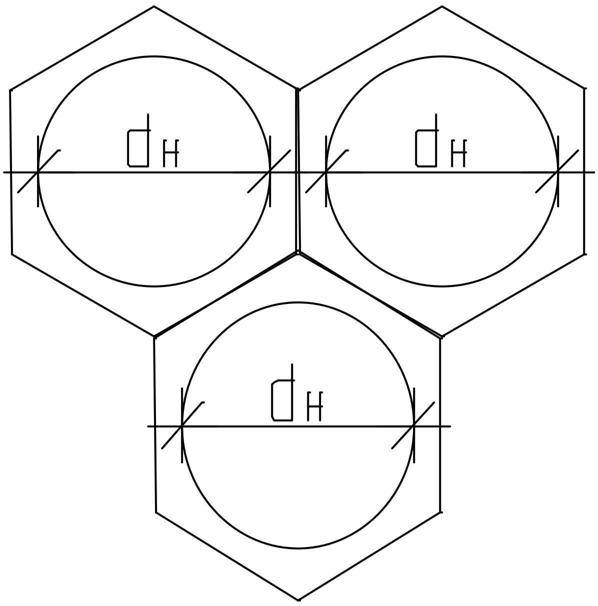
2. Geometry





The BAMTEC® BEEPLATE®-Hollow Body height is 0.31 m (including the integrated top distance placers).

The outside diameter of the hollow body is d_H = 0.66 m. The clearance distance between the hollow bodies is b_w = 0.1 m. Thus the axle base of the concrete web results too e_{Web} =0.76 m.

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3. Weight Savings

Weight- and concrete savings with the BEEPLATE®-Hollow Bodies D/h = 66/31 cm with clearance distance of 10 cm:

Slab Thickness [cm]	Weight Solid Slab [kN/m²]	Weight BEEPLATE® [kN/m²]	Concrete Savings in the Hollow Body area [kN/m²]	%
45	11,25	7,82	3,43	30,5
46	11,50	8,07	3,43	29,8
47	11,75	8,32	3,43	29,2
48	12,00	8,57	3,43	28,6
49	12,25	8,82	3,43	28,0
50	12,50	9,07	3,43	27,4
51	12,75	9,32	3,43	26,9
52	13,00	9,57	3,43	26,4
53	13,25	9,82	3,43	25,9
54	13,50	10,07	3,43	25,4
55	13,75	10,32	3,43	24,9

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4. Maximum Receptible Transverse Force

Receptible rated transverse force v_{Ed} [kN/m slab]
with BEEPLATE®-Hollow Bodies D/h = 66/31 cm with a clearance distance of 10 cm (adequate shear reinforcement implied):

Inside Lever Arm	Concrete			
z	C20/25	C25/30	C30/37	C35/45
0,35	58,8	73,5	88,1	102,8
0,36	60,4	75,6	90,7	105,8
0,37	62,1	77,7	93,2	108,7
0,38	63,8	79,8	95,7	111,7
0,39	65,5	81,8	98,2	114,6
0,40	67,2	83,9	100,7	117,5
0,41	68,8	86,0	103,3	120,5
0,42	70,5	88,1	105,8	123,4
0,43	72,2	90,2	108,3	126,3
0,44	73,9	92,3	110,8	129,3
0,45	75,6	94,4	113,3	132,2

Attention: The *permissible* transverse force is smaller for the load safety factor ?$_F$ (e.g. factor 1,45) than in the table code!

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5. Shear Reinforcement

As shear reinforcement additional shear is used in the form of vertical standard mats (q-mats) placed between the hollow bodies.

The lower edge rod of the standard mat sits on the lower horizontal reinforcement. The top edge rod is to run close to the upper floor reinforcement.

For the determination of the mat type the necessary reinforcing cross section erf a_{sw} of the vertical rods of the shear reinforcement is specified at first with the following table.

Necessary reinforcement cross section erf a_{sw} (cm2/m) of the vertical rods of the shear reinforcement of BEEPLATE® with hollow bodies D/h = 66/31 cm with the clearance distance of 10 cm, dependent on the calculation transverse force and the inside lever arm:

Rated Cross Section v_{Sd} [kN/m slab]	Inside Lever Arm z [m] 0,36	0,38	0,4	0,42	0,44
20	0,97	0,92	0,87	0,83	0,79
40	1,94	1,84	1,75	1,66	1,59
60	2,91	2,76	2,62	2,50	2,38
80	3,88	3,68	3,50	3,33	3,18
100	4,86	4,60	4,37	4,16	3,97
120	5,83	5,52	5,24	4,99	4,77
140	6,80	6,44	6,12	5,83	5,56
160	7,77	7,36	6,99	6,66	6,36
180	8,74	8,28	7,87	7,49	7,15
200	9,71	9,20	8,74	8,32	7,95

Attention: The rated cross section force contains the load security factor $?_F$ (e.g. factor 1.45)!

Subsequently, with the next table the type of mat (and/or the combination of mat types) is determined. The table considers the necessary diameter of the upper and lower horizontal edge rods according to DIN 1045-1 fig. 56 D.

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Effective shear reinforcement cross section a_s of perpendicularly inserted standard mats in BEEPLATE®-concrete web between the hollow bodies.
It must be reinforced in such a way that applies: a_s = erf a_{sw}

a_s (cm²/m)	Mats	Weight (kg/m² Mat) without Cuttings
0,96	Q 188 A	3,0
1,31	Q 257 A	4,1
1,44	Q 377 A_{Edge}	4,5
1,71	Q 335 A	5,4
1,92	2 x Q 188 A	6,0
1,96	Q 513 A_{Edge}	6,0
2,27	Q 257 A + Q 188 A	7,1
2,40	Q 377 A_{Edge} + Q 188 A	7,5
2,62	2 x Q 257 A	8,2
2,67	Q 335 A + Q 188 A	8,4
2,75	Q 377 A_{Edge} + Q 257 A	8,6
2,88	2 x Q 377 A_{Edge}	9,0
2,89	Q 377 A	6,0
2,92	Q 513 A_{Edge} + Q 188 A	9,0
3,02	Q 335 A + Q 257 A	9,5
3,15	Q 377 A_{Edge} + Q 335 A	9,9
3,27	Q 513 A_{Edge} + Q 257 A	10,0
3,40	Q 513 A_{Edge} + Q 377 A_{Edge}	10,5
3,42	2 x Q 335 A	10,8
3,67	Q 513 A_{Edge} + Q 335 A	11,4
3,85	Q 377 A + Q 188 A	9,0
3,92	Q 513 A	8,0
3,92	2 x Q 513 A_{Edge}	12,0
4,20	Q 377 A + Q 257 A	10,1
4,33	Q 377 A_{Edge} + Q 377 A	10,5
4,60	Q 377 A + Q 335 A	11,4
4,85	Q 513 A_{Edge} + Q 377 A	12,0
4,88	Q 513 A + Q188 A	11,0
5,23	Q 513 A + Q 257 A	12,1
5,36	Q 513 A + Q 377 A_{Edge}	12,5
5,63	Q 513 A + Q 335 A	13,4
5,78	2 x Q 377 A	12,0
5,88	Q 513 A + Q 513 A_{Edge}	14,0
6,81	Q 513 A + Q 377 A	14,0
7,84	2 * Q 513 A	16,0

With Q 377 A and Q 513 A always build in the double rods in *horizontal* direction!
Q 377 A_{Edge} and Q 513 A_{Edge} are mat pieces out of the edge saving strips of the mats.

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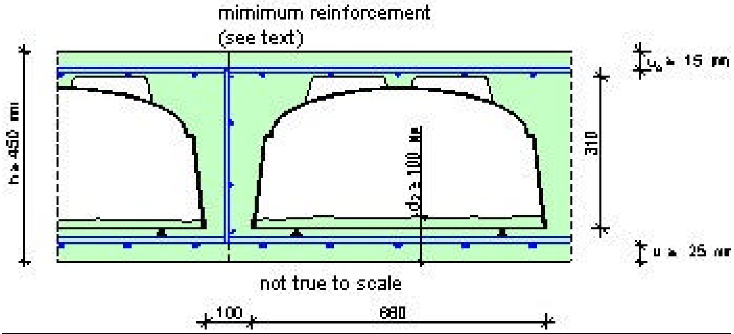
7. Fire Protection Proof

Assessment after DIN 4102 part 4 for F90

<u>System:</u>



The floor is supported as point image, statically undefined. The hollow bodies are set as flammable.

<u>Bottom slab thickness</u>

The thickness d_2 of the bottom concrete slab shall be at least 100 mm (DIN 4102 part of 4 tab. 10 line 2.1.2).

If the thickness of the lower slab amounts to only d_2 = 90 mm, it is tolerable, if the floor is solid in the range of negative moments (down pressure), therefore in the ranges of the hollow bodies *no* down bending pressure prevails. Because in accordance with concrete fire protection manual (section 3.5.3 hollow slab thicknesses, S. 222 FF) are chip off-endangered ranges only, where *down* bending pressure prevails, thus M < 0 is. If *no* down bending pressure prevails within the ranges of hollow bodies, the value for statical determined storage may be used here analogue to concrete fire protection manual (line 2.1.1.2):

d_2 = 90 mm = 70 mm

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Average concrete thickness A_{netto} / b

$$A_{netto} / b = \frac{0{,}76 \cdot 0{,}45 - 0{,}57 \cdot 0{,}31}{0{,}76} = 0{,}217\ m = 217 mm$$

= 200 mm (tab. 9 line 2.2)
= 150 mm (tab. 9 line 2.1)
= 100 mm (tab. 9 line 1)

Even LINE 2.2 is thus kept, what actually is not necessary, since the floor is in the support range solid.

Minimum bottom axle base (floor is biaxial stressed)

$$u \geq 25 + \frac{12}{2} = 31\ mm \geq 25\ mm$$ (tab. 12 line 3.3)

Minimum top axle base

$$u_o \geq 30 + \frac{20}{2} = 40\ mm \geq 15\ mm$$ (tab. 12 line 1.1)

Top minimum reinforcement

After section 3.4.5.4 are to be inserted in the field of the supporting strip (0.4 x span width broadly) at least 20 % of the supporting reinforcement of the supporting strips!

Hegger + Partner

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Häussler Planungstechnik
z. Hd. Herrn Dr.-Ing. T. Geidner

Mozartstaße 12

87435 Kempten

Eingegangen
– 8. Dez. 2003
Erledigt: ....

04.12.2003

STELLUNGNAHME BAMTEC BEEPLATE 50/54

Sehr geehrter Herr Dr. Geidner,

Ihre Zeichnungen S02 142 Zeichnungsnr. 1 und 2 (Anlagen) vom 1.9.2003 einschließlich der Statikseiten 1 bis 5 vom 28.9.2003 möchten wir im Folgenden kommentieren.

Der Nachweis der Tragfähigkeit ist gemäß DIN 1045-1 bzw. ENV 1992 Teil 1 zu führen. Zusätzlich gelten folgende Regelungen:

- Es wird von einer monolitischen Bauweise ausgegangen.
- Der Nachweis der Druckstreben ist gemäß DIN 1045-1 oder ENV 1992 Teil 1 zu führen. Die Querkraftragfähigkeit der Stege ist auf 0,3 V_{Rdmax} bzw. 0,3 V_{Rd2} zu begrenzen, wobei ein 45°-Fachwerk zugrunde zu legen ist.
- In allen Stegen sind gerippte Schubleitern gemäß DIN 1045-1 bzw. EC2 anzuordnen. Die Schubleitern sind entsprechend einem 45°-Fachwerkmodell ohne Betontraganteil zu bemessen und horizontal wie vertikal mit dem gleichen Bewehrungsgrad auszuführen, z.B. als Q-Matten. Die Längsbewehrung der Schubzulagen darf nicht zur Biegebewehrung angerechnet werden. Die

Verankerungselemente der Schubzulagen sind gemäß DIN 1045-1 Bild 56 bzw. EC 2 Bild 5.7 auszubilden.

- Der Einfluß der Schubsteifigkeit auf die Plattendurchbiegung ist zu berücksichtigen, wenn gemäß DIN 1045-1 $V_{Ed} \geq V_{Rd,ct}$ bzw. nach ENV 1992 $V_{Sd} \geq V_{Rd1}$ gilt. Dabei ist die Stegbreite unter Berücksichtigung der Aussparungen zu ermitteln. Hinweise zur Ermittlung der Schubsteifigkeit liefert Leonhardt "Vorlesungen über Massivbau - Vierter Teil: Nachweis der Gebrauchstauglichkeit" Abschnitt 6. Das Schlankheitskriterium gemäß DIN 1045-1, Absatz 11.3.2 von $l/d = 35$ bzw $l^2/d = 150$ gilt nur für Vollplatten des allgemeinen Hochbaus.

- Die Abtriebskräfte aus den geneigten Druckstreben sind in der Zug- und Druckmembran aufzunehmen und in der Statik nachzuweisen. Dies kann mit geeigneten Stabwerkmodellen erfolgen. Der Nachweis ist bei den vorgelegten Geometrien erfüllt, wenn alle freien Plattenränder mit einer Mindest-Steckbügelbewehrung ∅ 8/10 eingefasst werden, die jeweils mit $l_b \geq 2\ h_{Platte}$ in der Druck- und Zugzone zu verankern ist.

- Am Auflager ist die Längsbewehrung für die Kraft V_{Ed} voll zu verankern. Eine Abminderung der Verankerungslänge in Abhängigkeit des Versatzmaßes gemäß DIN 1045-1, Absatz 13.2.2. (7) bzw. infolge eines günstig wirkenden Querdrucks gemäß DIN 1045-1, Absatz 13.2.2.(8) ist unzulässig, da der Versatz durch die Rippen ungleichmäßig über die Plattenbreite eingeleitet wird und die Querpressung am Auflager ebenfalls ungleichmäßig wirkt. Gleiches gilt bei Anwendung von EC 2.

- Die Plattenränder sind stets durch einen umlaufenden Ringbalken gemäß DIN 1045-1 13.12.2 einzufassen. Die Ringbalkenbewehrung ist bei freien Plattenrändern durch die Steckbügelbewehrung zu umfassen.

- Die Anwendung gilt nur für Platten des üblichen Hochbaus unter ruhenden Lasten. Unter nicht-ruhenden Lasten ist im Einzelfall die Dauerschwingfestigkeit der Schubzulagen und deren Verankerung zu überprüfen. Dazu wird auf DAfStb Heft 525 verwiesen.

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- Bei Einzellasten ist der Lastpfad durch geeignete statische Modelle (z.B. Stabwerke) nachzuweisen. Bei punktförmigen Lasten ist ein Durchstanznachweis zu führen und die Platte ist gegebenenfalls im Bereich des Durchstanzkegels als Vollplatte auszuführen.

- Von unten angehängte Lasten sind gesondert nachzuweisen. Hierbei sind Horizontalrisse im Übergangsbereich Steg/unterer Plattenspiegel zu verhindern.

- Bei der Bauausführung ist sicherzustellen, dass die Eimer planmäßig mit Luft verfüllt sind. Die Betondeckung der Bewehrung ist gemäß DIN 1045-1 auch innerhalb der Verdrängungskörper einzuhalten. Es wird von einer monolitischen Bauweise ausgegangen.

- Der vorgelegte Berechnungsansatz steht in guter Übereinstimmung mit den Ergebnissen unserer numerischen Simulationen.

Mit freundlichen Grüßen

Dr.-Ing. R. Beutel   Dr.-Ing. W. Roeser

Anlagen:

Zeichnungen S02 142 Zeichnungsnr. 1 und 2

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Span with BAMTEC® BEEPLATE® flat slabs even further – and still save on concrete and reinforcement!

With the understandable desire of owners for a more flexible building use the stress analyst is demanded ever more frequently of larger floor spans. At the same time an economical floor structure is required of him. Both together is not to be fulfilled with usual building method.

Then the solid flat slab with its actually favourable biaxial carrying behaviour, the even concrete lower surface and the simple fabrication advantageous is not economical because of the increase of floor thickness and floor weight over an approximately 8 m of span width.

Alternative binding beam systems or ribbed floors are easier, but in the production more expensive and offer no even lower floor surface. Prestressed floors are also easier, are however unpopular with the stress analyst because of the planning expenditure, can or like not to be supplied by all building firms and are also not cheap.

A genuine alternative are hollow body floors, in particular one like the BAMTEC® BEEPLATE®, which manages without complex anchorage of the hollow bodies against buoyancy and is biaxial load-carrying without disadvantages.

With the BAMTEC® BEEPLATE® round, bottom open plastic hollow bodies are built in the middle range of the floor height. Since the hollow bodies are open at the bottom, they are not exposed to any buoyancy in the fresh concrete and do not have to be embodied time-consuming and expensively. Because of the tenacity of the fresh concrete it does not climb into the hollow space.

The arrangement of the hollow bodies takes place optimally in a hexagon raster. This results in the most confine-possible packing of hollow bodies and thus the largest weight savings (approx. 30 % opposite to a solid floor). Because of the similarity with a bee honeycomb the system is called "BEEPLATE®". The roof layout is arbitrary.

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The calculation can take place according to DIN 1045-1. Very extensive computational simulation of the carrying behaviour in ripped condition by the experts Hegger & Partner display the load-carrying capacity of the system.

For an adequate shear bearing capacity of up to one limit transverse force extra shear in the form of standing, snapped standard mesh is sufficient. With larger transverse forces and in the punching area with supports one simply omits the hollow bodies and has here the static advantages of a thick solid slab.

The lower and upper bending reinforcement happens economically with the BAMTEC®-Reinforcement System. Thus reinforcing steel is not only saved by the smaller floor weight, but also by the dropped mat overlaps and the to the locally needed adapted BAMTEC®-Reinforcement. Besides shorten BEEPLATE® and BAMTEC® the construction period.

The system BAMTEC® BEEPLATE® was already several times successfully implemented. The building firms were inspired.

For more information to the BAMTEC® BEEPLATE® please contact Häussler Planung GmbH (Tel. 0831-52173-11, Fax 0831/24437, www.bamtec.com, info@bamtec.com).

Suggestion for submissions for the BAMTEC®-BEEPLATE®-Hollow Bodies

To the usual submission positions (for concrete, encasing, gaps, punching reinforcement, additional to the BAMTEC®-plane reinforcement (e.g. edge reinforcement) necessary steel bars- and mesh reinforcement, etc.) the following positions are added:

B1.01 BAMTEC®-plane reinforcement

Prefabricated, rolled floor- or base slab reinforcement as
plane reinforcement, e.g. BAMTEC®,

of BSt 500 S after DIN 488 in different diameters and lengths,
including distance placers for the lowest reinforcement layer,
according to reinforcement- and rollout plans supplied and professionally installed.

Maximum roll length: 15,00 m
Maximum weight: 1,5 tons/roll

Information at :

Engineer office ....

or alternatively at

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Mozartstraße 12
87435 Kempten
Tel: 0831 - 5217311
Fax: 0831 - 24437
http://www.bamtec.com
e-mail: info@bamtec.com

Contact: Mr. Franz Häussler

Clue: Slab Load Capacity : .... kN/m²

Quantity: ... t EP: .... GP: ....

B1.02 Reinforcing Steel Mats BSt 500 M as Shear Reinforcement

Reinforcing steel – standard mesh of BSt 500 M (IV M) after DIN 488
cutting, bending, delivering and professionally installing as shear reinforcement

Quantity: ... t EP: .... GP: ....

B1.03 Hollow Bodies for BAMTEC®-BEEPLATE®-HollowBodies Floors

Buoyancy-free BEEPLATE® Hollow Bodies from polyethylene with outside diameter 66 cm and overall height 31 cm, including 2-cm-distance placers from plastic under the hollow bodies supplied and inserted

Manufacture Company of the Hollow Bodies:

JOPA®
Joh. Panik GmbH & Co. KG
Am Neuen Baum 5-9
59229 Ahlen
http://www.jopa-ahlen.de
e-mail: zentrale@jopa-ahlen.de

Quantity: ... pieces EP: .... GP: ....

B1.04 Distance stirrups

BEEPLATE®-distance stirrups from plastic
for a distance measure of 10 cm
delivery and build-in between the hollow bodies

Manufacture Company:

JOPA®
Joh. Panik GmbH & Co. KG
Am Neuen Baum 5-9
59229 Ahlen
http://www.jopa-ahlen.de
e-mail: zentrale@jopa-ahlen.de

Quantity: ... pieces EP: .... GP: ....

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BAMTEC® BEEPLATE®
Instruction of Execution

Status 01.09.2004

Concrete

To reduce the fissure widths more shrink-poor, little setting heat developing concrete must be manufactured. For this among other things a slowly hardening cement with low heat of hydration is to be used.

Installation of Reinforcement and Hollow Bodies

After placing the inflated horizontal formwork and the lateral formwork the bottom two layers of BAMTEC®-reinforcement on plastic distance placers are unrolled.

Then the additional reinforcement (e.g. edge reinforcing) of the floor is installed.

Following the buoyancy-free BEEPLATE®-Hollow Bodies from plastic are put according to the reinforcement plans on the plastic distance placers onto the bottom reinforcement.

The distance placers under the hollow bodies may not protrude up to the web centre between the hollow bodies. Because the lower horizontal rods of the in between the hollow bodies to be installed extra shear (vertically standing cant off standard mats) must rest upon the BAMTEC®-reinforcement directly.

Right after putting in the extra shear the snap-in distance stirrups from plastic between the hollow bodies are inserted for their location fixation.

Necessary electrical empty pipes are installed and/or led by drillings between the hollow bodies, if possible in the upper range (however underneath the hollow body upper edge). The pipes can be fixed at the extra shear.

Directly on the BEEPLATE®-Hollow Bodies the top two layers BAMTEC®-Reinforcement can be unrolled, since the distance placers are already above integrated into the BEEPLATE®-Hollow Bodies.

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Placing of Concrete

Concreting the floor takes place in three phases:

(1) First the lower slab (possibly under addition of small quantities of solvent) is concreted scarcely over the hollow body lower edge.

The filling height of the concrete can be measured by small control openings in some hollow bodies.

(2) For the following filling of the web between the hollow bodies in earlier floors a concrete with 0/32 granulation without additives was used successfully.

Concreting the web happens "wet in wet" beginning with the already concreted lower slab, in the same concreting direction as that one, thus with the same floor side as with the first concreting phase started.

By exemplary measurements of the concrete upper edge in the hollow bodies with the help of the control openings is to be examined that the concrete in the hollow bodies rises only approx. 2 cm over the hollow bodies lower edge.

(3) As last processing step one concretes "wet into wet" the upper slab, again in the same concreting direction. With earlier floors this took place without additives.

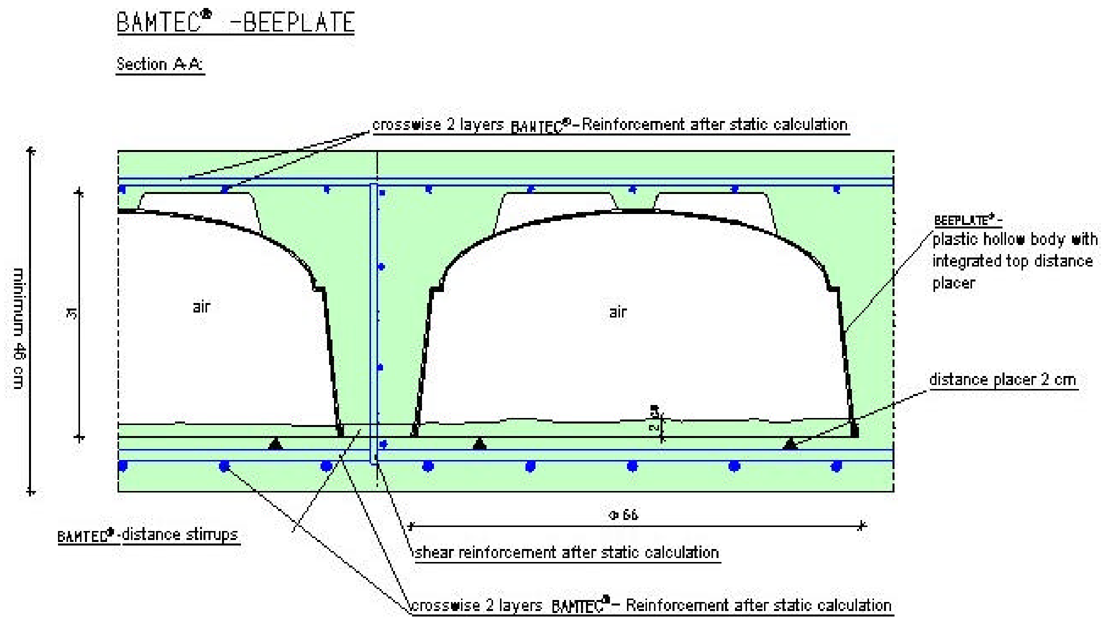
Concrete curing

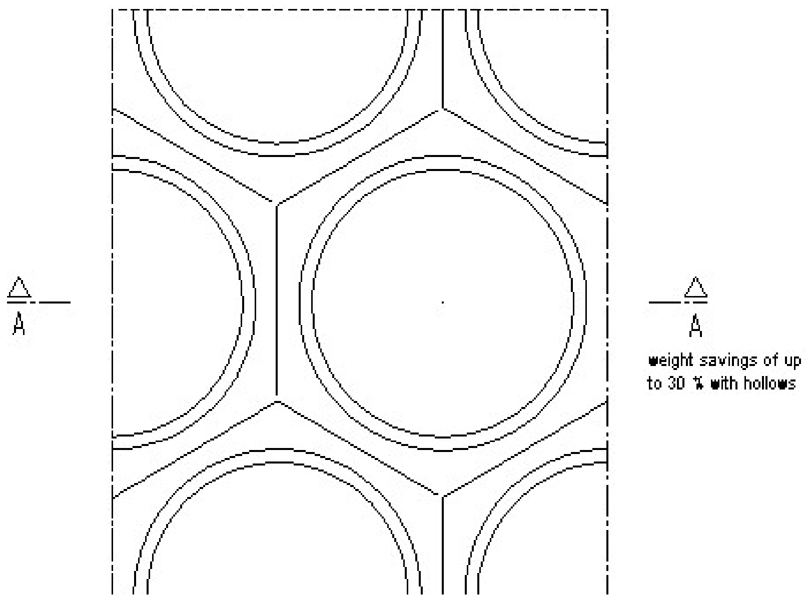
By suitable subsequent treatment in accordance with DIN 1045-3 section 8.7 the concrete surface is absolutely sufficiently long kept damp after concreting (according to DIN 1045-3 section 8.7.4 (2)).

BAMTEC® BEEPLATE®

with hollow bodies D/h = 66/31 cm with distance of 10 cm

floor thickness 45 – 55 cm





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