Static Type Calculation Load Bearing Capacity Tables

For

Unsupported Walls made from EUROMAC 2 Insulated Wall-casing Elements

Manufacturer:

EUROMAC 2
Carreau del la Mine
BP 22
F-557730 Folschviller
France

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Contents:

Calculation of standard weight of walls made from EUROMAC 2 Insulated Wall-casing Elements.

1. Preliminary Remarks

1.1 In this certificate, the maximum load (zul.n) for walls made from EUROMAC 2 insulated wall-casing elements is calculated and the type tested load bearing capacity tables are presented independent from the floor height and the eccentricity of the load.

1.2 The walls to be tested consist of polystyrene casing elements. These are filled with concrete. The dimensions of the casing elements are shown on page 5.

1.3 The maximum load (zul.n) will be calculated for concrete cross sections.

2. Basis

2.1 DIN standard 1045 – Concrete and Reinforced Concrete: Edit. July 1988

2.2 Issue no. 220 – DAFstb (German Board for Reinforced Concrete)- Measurement of Concrete – and Reinforced Concrete Building Parts according to DIN standard 1045 (2. revised edition).

2.3 Issue no. 400 – DAFstb amendment to DIN standard 1045, Edition, 07, 1998.

3. Prerequisites for the Validity of the Tables

3.1 The tables are valid for normal building structures (DIN standard 1045 Section 2.2.4).

3.2 All walls are to be built by using the same EUROMAC 2 insulated wall casing building design.

3.3 All surfaces must act as planes.

3.4 Non-uniform settlements will not be accounted for in the construction of the tables. These will be eliminated appropriately.

3.5 As a supporting structure, only the pure concrete cross section is standard. Persons laying floors or other load discharging structures are to be trained appropriately.

3.6 According to DIN standard 1045 Section 17.9 and 25.5.4.1, the measurement of the load is to be taken from the core of the concrete.

3.7 Cross section weakening is allowed in accordance with DIN standard 1045 Section 25.5.5.1.

3.8 The

3.9 The walls are allowed shearing stress, not exceeding the net cross section value 011 according to DIN standard 1045, table 2, row 13, 1b.

4. **Calculation Assumptions**

4.1 The casing elements are not supportive.
4.2 The supporting structures are the columnar core rectangular structures, that together with the cross bars, act as a supportive concrete wall.
4.3 The walls are assumed to be double-sided.

5. **Calculation**

5.1 The maximum load weight is calculated by using the approximation procedure for concrete cross sections according to issue 220, section 4.2.7, and equation 4.2.10. Within this, the following are accounted for:

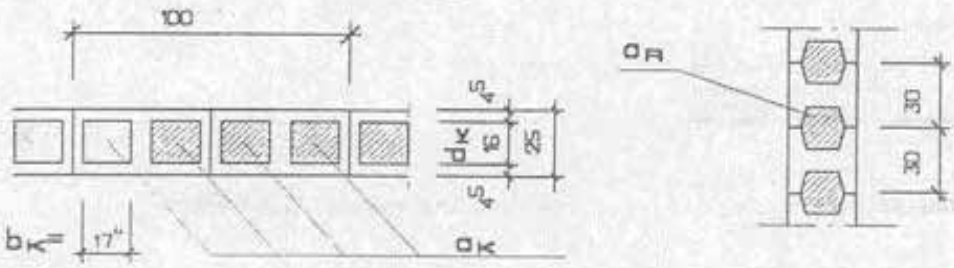
The slenderness of the wall
The eccentricity of the load
Eccentricity according to DIN standard 1045, section 17.4.6
The limitation of the gaping joint

5.2 The tables are set the following variables:

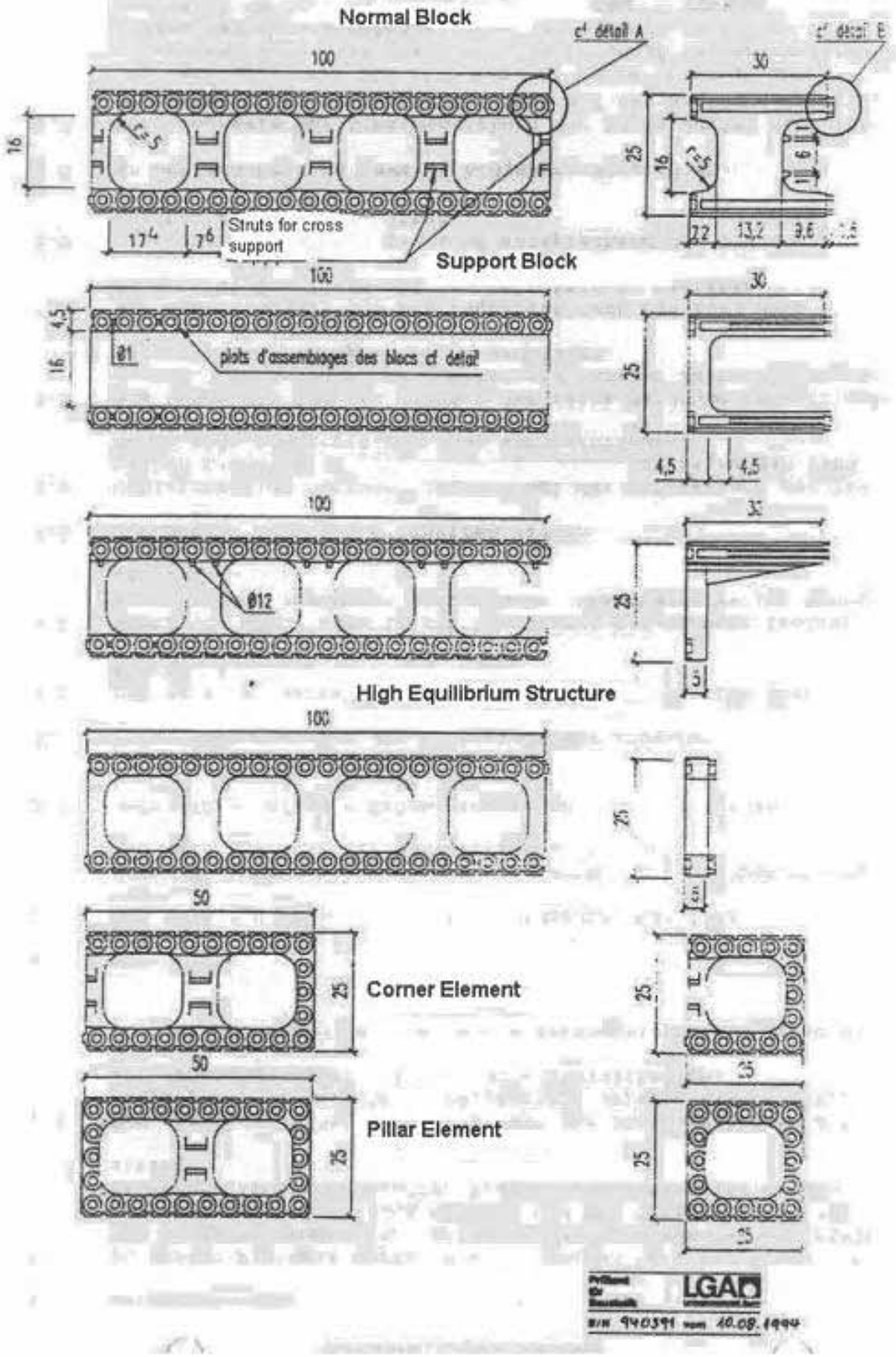
The floor height
Eccentricity in accordance with plans
The stability of the concrete

6. Dimensions of the Individual Core Sections

6. **Dimensions of the Individual Core Sections**



Horizontal Cut **Vertical Cut**


Normal Block
cf détail A
cf détail B
100
30
16
25
Struts for cross support
Support Block
plots d'assemblages des blocs cf détail
4,5
4,5
Ø12
High Equilibrium Structure
50
Corner Element
Pillar Element
LGA
940391 vom 10.08.1994

1. Measurement and Cross-Section Values

Wall Thickness	: D	=	25,0 cm
Core Concrete Thickness	: d_K	=	16,0 cm
Core Width	: b_K	=	17,4 cm

Core Areas

Posts

Measurement d/b = 16,0 / 17,4

Area	a'	=	278,40 cm²
Corner Arches	$5,0^2*3,14/4-5,0^2)*4$	= -	21,50 cm²
Individual Areas	a_K	=	256,90 cm²

Bar

Bar Area	(7,2+9,6)*16,0	=	268,80 cm²
Corner Arches	$(5,0^2*3,14/4-5,0^2)*4$	= -	21,53 cm²
Individual Areas	a_R	=	247,33 cm²

Bar Area per 1,0 m Height A_R = 1/0,3 * 247,33 = 824,33 cm²

Volumes

Posts

Individual Posts V_K = 256,90*100,0 = 25690,0 cm³ = 0,02569 m³

Posts per m² of wall area $V_K = V_K*4$ = 102760,0 cm³ = 0,1027 m³

Bar

Bar per m² of wall area

$V_R = A_R*(100,0-4*a_R) = 824,33*(100-4*17,4) = 25658,6$ cm³ = 0,0251 m³

Concrete Volume per m² of wall area $V_B = V_K+V_R$ = 0,1027 + 0,0251 = 0,128 m³

Total Volume per m² of wall area

V = D*1,0*1,0 = 0,25*1,0*1,0 = 0,25 m³

Net Volume of casing body per m² of wall area

$V_S = V-V_B$ = 0,25-0,128 = 0,122 m³

Wall weigth per m² of wall area

Concrete Weigth	$G_K = \gamma * V_B$	24*0,128	= 3,072 kN/m²
Casing Body	$G_S = \gamma * V_S$	0,2*0,122	= 0,024 kN/m²
Total	G		= 3,096 kN/m²

Cross-Section Values

Moment of Inertia $I = b*h^3/12-4*e_{yi}^2 F_i$ = 17,4*16³/12-1019,16 = 4920,04 cm⁴

Radius of Inertia $i = \sqrt{I/A} = \sqrt{4920,04/256,9}$ = 4,38 = 4,4 cm

Core Width k = I/d/2/a_K = 4920,04/8/256,9 = 2,39 cm

Assembly

Wall Thickness	: D	=	25,0 cm
Core Concrete Thickness	: d_K	=	16,0 cm
Core Concrete Area per Single Post	: a_K	=	256,9 cm²
Core Concrete Area per lfd. m of wall	: A_K	=	1027,6 cm²/m
Bar area per im of wall heigth	: A_R	=	824,3 cm²/m
Core Concrete Volume per m² of wall area		V_K	= 0,103 m³/m²
Concrete Volume per m² of wall area	: V_B	=	0,128 m³/m²
Concrete Weigth per m² of wall area	: G_B	=	3,072 kN/m²
Wall Weigth per m² of wall area	: G	=	3,096 kN/m²
(Without Pluster)			

Cross-Section Values

Moment of Inertia	I =	4920 cm⁴
Radius of Inertia	i =	4,4 cm
Core Width	k =	2,39 cm

The following posts are standard for measurement

Aprox. formula 4.2.10: Issue 220, Section 4.2.7

$$\text{zul. } N = 1/\gamma*A_b*\beta_r*(1-2*e/d_k)*(1-\lambda/140*(1+n/3))$$

Where:

- γ - Safety Factor for = 2,1
- A_b - Concrete Area = Core Cross-Section
- β_r - Stability of Concrete Calculation
  - B 15 } = 1,05
  - B 25 } β_r = 1,75
  - B 35 } = 2,10
- e - M/N = Planed load in the middle part of the effective length
- d_k - Core Concrete Thickness
- λ - s_K/i = Slenderness
- s_K - Effective Length = Storey Heigth
- i - Radius of Inertia
- n: e/k = of the core width

  where n ≤ 1,2 bei $\lambda \leq 70$; n ≤ 1,5 bei $\lambda \leq 40$
- k Core Width

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Table 1 Load bearing capacity of walls made from insulated EUROMAC 2 wall casing elements

s_K =	Storey Heigth	=	2,25 m

Casing elements are to be connected

D =	Wall Thickness	=	25 cm
d_K =	Core Thickness	=	16 cm
e =	Greatest load eccentricity planned in the middle third of the effective length		im s_K

	Max.Weigth (kN / m)		
Concrete	B 15	B 25	B 35
e / dk			
0	326,26	543,76	714,66
0,01	315,63	526,05	691,39
0,02	305,18	508,63	668,48
0,03	294,89	491,48	645,94
0,04	284,76	474,61	623,77
0,05	274,81	458,02	601,96
0,06	265,02	441,70	580,52
0,07	255,40	425,67	559,45
0,08	245,95	409,91	538,74
0,09	236,66	394,44	518,40
0,1	227,54	379,24	498,43
0,11	218,59	364,32	478,82
0,12	209,81	349,68	459,58
0,13	201,19	335,32	440,71
0,14	192,74	321,24	422,20
0,15	184,46	307,44	404,06
0,16	176,35	293,91	386,28
0,17	168,40	280,67	368,88
0,18	160,62	267,70	351,83
0,19	153,01	255,01	335,16
0,2	145,56	242,60	318,85
0,2077	139,94	233,24	306,54
zul. max e/dk = 0,2077			

Typenprüfung
In bautechnischer Hinsicht geprüft
Siehe Prüfbericht S/N 94 0394 vom 10.08.1994
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Prüfamt für Baustatik
Nürnberg, den 10.08.1994
Der Bearbeiter Der Leiter

When applying the table, please observe sections 17.9 and 25.5 of DIN standard 1045

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Table 3 Load bearing capacity of walls made from insulated EUROMAC 2 wall casing elements

s_K =	Storey Heigth	=	2,75 m

Casing elements are to be connected

D =	Wall Thickness	=	25 cm
d_K =	Core Thickness	=	16 cm
e =	Greatest load eccentricity planned in the middle third of the effective length		im s_K

	Max.Weigth (kN / m)		
Concrete	B 15	B 25	B 35
e / dk			
0	284,54	474,23	623,27
0,01	273,84	456,39	599,83
0,02	263,34	438,90	576,84
0,03	253,05	421,75	554,29
0,04	242,96	404,93	532,20
0,05	233,08	388,46	510,55
0,06	223,40	372,33	489,35
0,07	213,93	356,54	468,60
0,08	204,66	341,09	448,30
0,09	195,59	325,99	428,44
0,1	186,73	311,22	409,03
0,11	178,08	296,79	390,07
0,12	169,62	282,71	371,56
0,13	161,38	268,96	353,49
0,14	153,34	255,56	335,88
0,15	145,50	242,50	318,71
0,16	137,86	229,77	301,99
0,17	130,44	217,39	285,72
0,18	123,21	205,35	269,89
0,19	116,19	193,65	254,51
0,1907	115,71	192,85	253,46
max e/dk = 0,1907			

Typenprüfung
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Prüfamt für Baustatik
Nürnberg, den 10.08.1994
Der Bearbeiter Der Leiter

en applying the table, please observe sections 17.9 and 25.5 of DIN standard 1045

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KÖRPERSCHAFT DES ÖFFENTLICHEN RECHTS

Table 4 Load bearing capacity of walls made from insulated EUROMAC 2 wall casing elements

s_K =	Storey Heigth	=	3,00 m

Casing elements are to be connected

b =	Wall Thickness	=	25 cm
d_K =	Core Thickness	=	16 cm
e =	Greatest load eccentricity planned in the middle third of the effective length		im s_K

	Max.Weigth (kN / m)		
Concrete	B 15	B 25	B 35
e / dk			
0	263,68	439,46	577,57
0,01	252,94	421,56	554,05
0,02	242,42	404,03	531,02
0,03	232,13	386,88	508,47
0,04	222,06	370,10	486,41
0,05	212,21	353,69	464,85
0,06	202,59	337,65	443,77
0,07	193,19	321,98	423,17
0,08	184,01	306,68	403,07
0,09	175,06	291,76	383,46
0,1	166,33	277,21	364,33
0,11	157,82	263,03	345,70
0,12	149,53	249,22	327,55
0,13	141,47	235,78	309,89
0,14	133,63	222,72	292,72
0,15	126,02	210,03	276,03
0,16	118,62	197,71	259,84
0,17	111,45	185,76	244,14
0,18	104,51	174,18	228,92
0,182	103,14	171,91	225,94
zul. max e/dk = 0,182			

Typenprüfung
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Der Sachbearbeiter Der Leiter

When applying the table, please observe sections 17.9 and 25.5 of DIN standard 1045

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