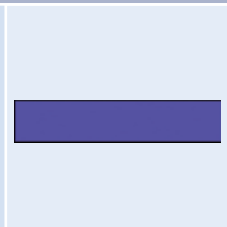
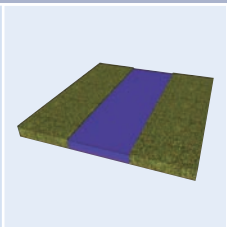
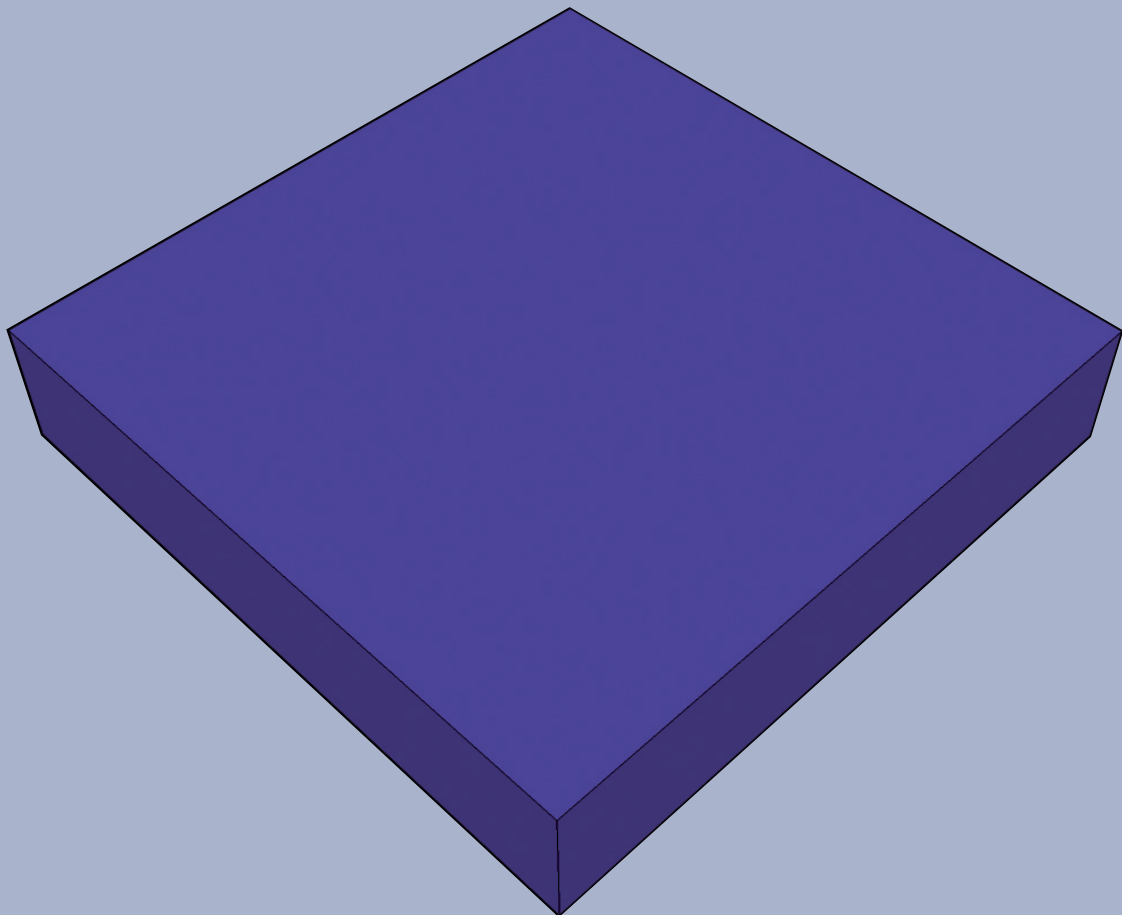


COMPACT BEARING S 65



*Unreinforced elastomeric bearing
loadable up to 10 N/mm²*

Bearing design

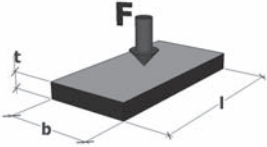


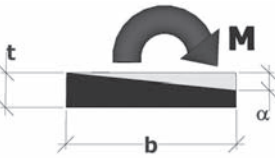
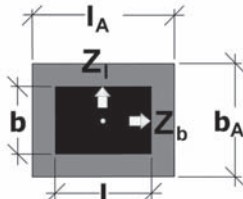
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Product description

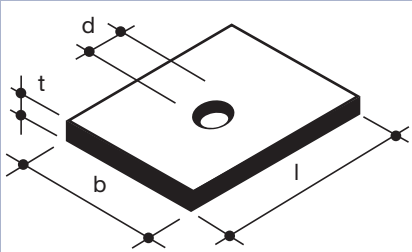
The Calenberg Compact Bearing S 65 is an unreinforced elastomeric bearing with smooth contact surfaces. The main component is an ozone-resistant elastomeric material with a hardness of 65 ± 5 Shore A. Ozone resistance in accordance with DIN 4141 Part 140/150 (200 pphm).

To demonstrate classification into bearing class 2 of DIN 4141 Part 3, a materials testing authority has carried out tests equivalent to the physical tests of material properties in the guidelines of the Institut für Bautechnik, Berlin for the manufacture of unreinforced elastomeric bearings.

Design using characteristic values in acc. with DIN 4141, Part 3 (BC 2)	
Load type	Formula
All. mean compressive stress 	$\text{All. } \sigma_m = \frac{S^2 + S + 1}{1,30} \leq 10 \text{ N/mm}^2$ <p>Shape factor S see page 3</p>
All. shear deformation 	$\text{All. } u = 0,6 \cdot (t-2) \text{ [mm]}$ <p>Horizontal force $H = C_{s(t)} \cdot u \cdot A_E / 20000$ [kN] C_s values and edge conditions see page 9</p>
Deflection 	<p>See page 10</p>
Allowable rotation 	$\text{All. } \alpha = \frac{200 \cdot t}{b} \leq 40 \text{ [‰]}; \text{ Rectangular bearing}$ $\text{All. } \alpha = \frac{226 \cdot t}{D} \leq 40 \text{ [‰]}; \text{ circular bearing}$
Transverse tensile forces* 	$\text{Act. } Z_I = 1,5 \cdot F \cdot t \cdot l / A_E \text{ [kN]}$ <p>(towards bearing long side)</p> <hr/> $\text{Act. } Z_b = 1,5 \cdot F \cdot t \cdot b / A_E \text{ [kN]}$ <p>(towards bearing short side)</p>

* More accurate proof in acc. with Booklet 339, DAfStb

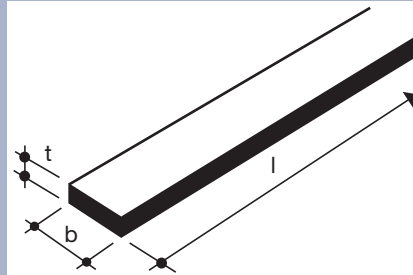
b, b_A, l, l_A, D, t, u in mm; A_E in mm²; H, ZS in kN; c_s in kN/mm, S without units



Without hole: $S = \frac{l \cdot b}{2 \cdot t \cdot (l + b)}$

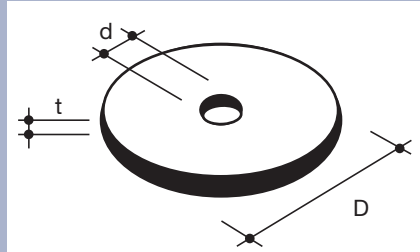
With hole: $S = \frac{4 \cdot l \cdot b - \pi \cdot d^2}{4 \cdot t \cdot (2 \cdot l + 2 \cdot b + \pi \cdot d)}$

Shape factor for rectangular bearing



$S = \frac{b}{2 \cdot t}$

Shape factor for bearing strip



Without hole: $S = \frac{D}{4 \cdot t}$

With hole: $S = \frac{D - d}{4 \cdot t}$

Shape factor for circular bearing

Text of tender documents

Supply Calenberg Compact Bearing S 65, unreinforced high aging resistance EPDM elastomeric bearing in accordance with DIN 4141 Part 3, bearing class 2, loadable depending on format up to a mean compressive stress of 10 N/mm², ozone-resistant up to 200 pphm, National Technical Approval Certificate No. 851.0364.

a) Standard installation

Length: mm
 Width: mm
 Thickness: mm
 Quantity: piece
 Price: €/piece

b) Embedded in polystyrene or Ciflamon fire protection board

Overall length: mm
 Overall width: mm
 Elastomer length: mm
 Elastomer width: mm
 Thickness: mm
 Quantity: piece
 Price: €/piece

c) Strip bearing embedded in polystyrene or Ciflamon fire protection board

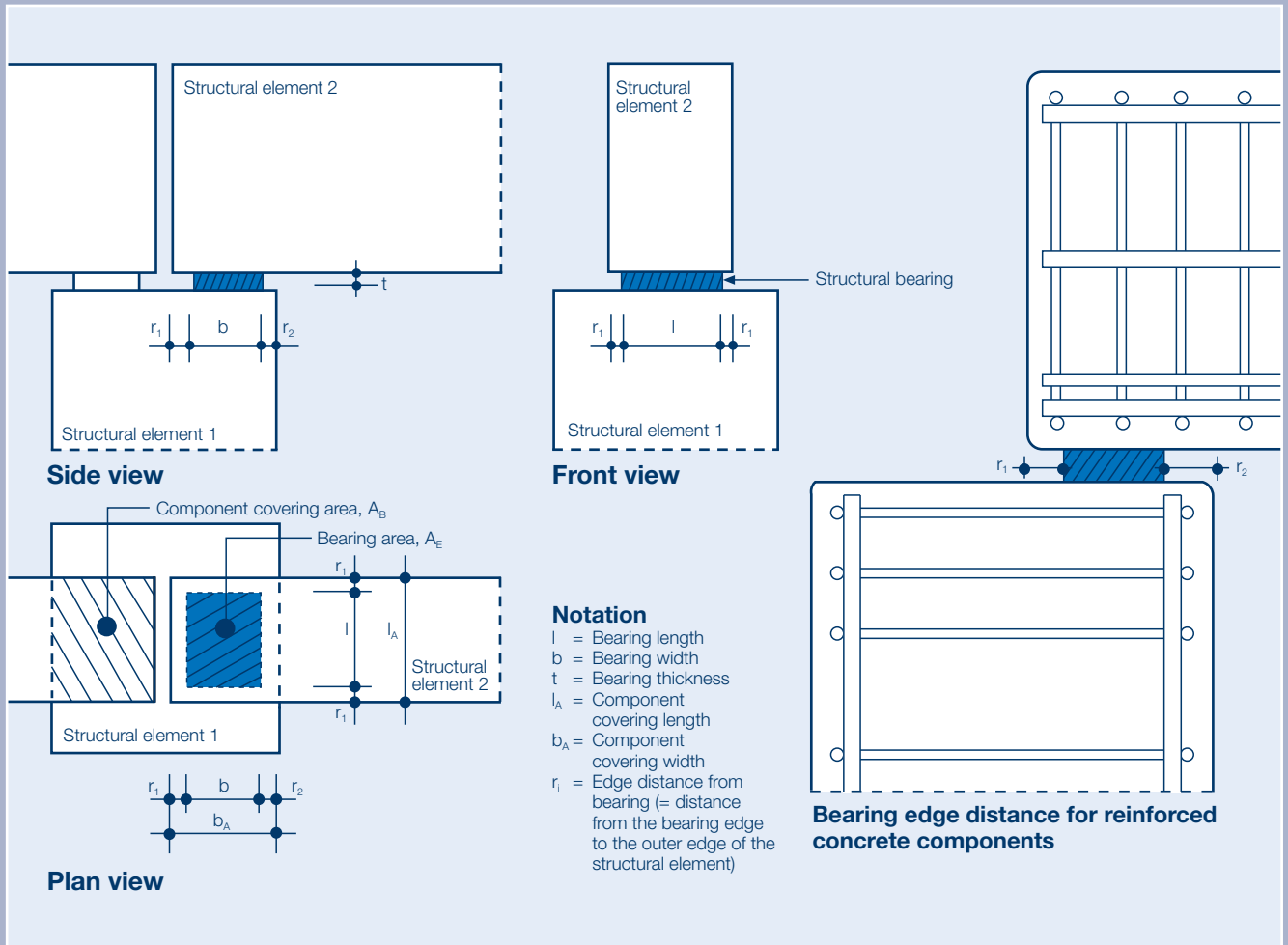
Overall width: mm
 Elastomer width: mm
 Thickness: mm
 Quantity: m
 Price: €/m

Supplier:

Calenberg Ingenieure GmbH
 Am Knübel 2-4
 D-31020 Salzhemmendorf/Germany
 Phone +49(0)5153/9400-0
 Fax +49(0)5153/9400-49

Shape factor

Edge distances



Maximum plan dimensions of an elastomeric bearing for reinforced concrete structures. The provisions of DIN 1045-1 and DAfStb Booklet 525 must be observed. In the case of timber or steel components, the edge distances must be at least 3 cm.

Compact Bearing S 65; Strip bearing

Elastomer width b [mm]	Bearing thickness									
	t = 5 mm		t = 8 mm		t = 10 mm		t = 15 mm		t = 20 mm	
	All. V [kN/m]	All. α [‰]	All. V [kN/m]	All. α [‰]	All. V [kN/m]	All. α [‰]	All. V [kN/m]	All. α [‰]	All. V [kN/m]	All. α [‰]
25	188	40	–	–	–	–	–	–	–	–
40	400	25	300	40	–	–	–	–	–	–
50	500	20	534	32	375	40	–	–	–	–
60	600	17	600	27	600	33	–	–	–	–
70	700	14	700	23	700	29	–	–	–	–
75	750	13	750	21	750	27	563	40	–	–
80	800	13	800	20	800	25	663	38	–	–
90	900	11	900	18	900	22	900	33	–	–
100	1000	10	1000	16	1000	20	1000	30	750	40
110	1100	9	1100	15	1100	18	1100	27	957	36
120	1200	8	1200	13	1200	17	1200	25	1200	33
130	1300	8	1300	12	1300	15	1300	23	1300	31
140	1400	7	1400	11	1400	14	1400	21	1400	29
150	1500	7	1500	11	1500	13	1500	20	1500	27
160	1600	6	1600	10	1600	13	1600	19	1600	25
170	1700	6	1700	9	1700	12	1700	18	1700	24
180	1800	6	1800	9	1800	11	1800	17	1800	22
190	1900	5	1900	8	1900	11	1900	16	1900	21
200	2000	5	2000	8	2000	10	2000	15	2000	20

In-situ concrete installation: Embedded in polystyrene

Fire resistance classes F 90/F 120 installation: Embedded in Ciflamon fire protection board

Design table 1

Design table 2

Compact Bearing S 65; 5, 8 and 10 mm thick																				
Bearing thickness t [mm]	Bearing width b [mm]	All. rotation α [‰]	Compressive stress, All. σ_m [N/mm ²]																	
			Bearing length l [mm]																	
			50	60	70	80	90	100	120	130	150	170	180	200	250	300	350	400	450	
5	50	20.0	7.5	8.6	9.6															
	60	16.7	8.6																	
	70	14.3	9.6																	
	80	12.5																		
			10.0																	
8	50	32.0	3.8	4.3	4.7	5.1	5.4	5.7	6.2	6.4	6.8	7.1	7.3	7.5	8.0	8.3	8.6	8.8	9.0	
	60	26.7	4.3	4.9	5.5	5.9	6.4	6.8	7.5	7.8	8.3	8.8	9.0	9.4						
	70	22.9	4.7	5.5	6.1	6.8	7.3	7.8	8.8	9.2	9.9									
	80	20.0	5.1	5.9	6.8	7.5	8.2	8.8												
	90	17.8	5.4	6.4	7.3	8.2	9.0	9.8												
	100	16.0	5.7	6.8	7.8	8.8	9.8													
	120	13.3	6.2	7.5	8.8															
	140	11.4	6.6	8.1	9.6															
	150	10.7	6.8	8.3	9.9															
	180	8.9	7.3	9.0																
200	8.0	7.5	9.4																	
			10.0																	
10	50	40.0	2.9	3.2	3.5	3.8	4.0	4.2	4.5	4.7	4.9	5.1	5.2	5.4	5.7	5.9	6.1	6.3	6.4	
	60	33.3	3.2	3.7	4.0	4.3	4.6	4.9	5.4	5.6	5.9	6.3	6.4	6.6	7.1	7.5	7.8	8.0	8.2	
	70	28.6	3.5	4.0	4.5	4.9	5.3	5.6	6.2	6.5	7.0	7.4	7.6	7.9	8.6	9.1	9.6	9.9		
	80	25.0	3.8	4.3	4.9	5.4	5.8	6.3	7.0	7.4	8.0	8.6	8.8	9.2						
	90	22.2	4.0	4.6	5.3	5.8	6.4	6.9	7.8	8.3	9.0	9.7								
	100	20.0	4.2	4.9	5.6	6.3	6.9	7.5	8.6	9.1										
	150	13.3	4.9	5.9	7.0	8.0	9.0													
	200	10.0	5.4	6.6	7.9	9.2														
	250	8.0	5.7	7.1	8.6															
	300	6.7	5.9	7.5	9.1															
	350	5.7	6.1	7.8	9.6															
	400	5.0	6.3	8.0	9.9															
	450	4.4	6.4	8.2																
	500	4.0	6.5	8.3																
600	3.3	6.6	8.6																	
			10.0																	

Compact Bearing S 65; 15 and 20 mm thick

Bearing thickness t [mm]	Bearing width b [mm]	All. rotation α [%]	Compressive stress, All. σ_m [N/mm ²]																
			Bearing length l [mm]																
			50	60	70	80	90	100	120	130	150	170	180	200	250	300	350	400	450
15	100	30.0	2.6	2.9	3.3	3.6	3.9	4.2	4.7	4.9	5.4	5.8	5.9	6.3	7.0	7.5	7.9	8.3	8.6
	110	27.3	2.7	3.1	3.4	3.8	4.1	4.5	5.1	5.3	5.8	6.3	6.5	6.9	7.7	8.4	8.9	9.3	9.7
	120	25.0	2.7	3.2	3.6	4.0	4.3	4.7	5.4	5.7	6.3	6.8	7.0	7.5	8.5	9.2	9.9		
	130	23.1	2.8	3.3	3.7	4.1	4.6	4.9	5.7	6.0	6.7	7.3	7.6	8.1	9.2				
	140	21.4	2.9	3.4	3.8	4.3	4.7	5.2	6.0	6.4	7.1	7.8	8.1	8.7	10.0				
	150	20.0	2.9	3.4	3.9	4.4	4.9	5.4	6.3	6.7	7.5	8.2	8.6	9.2					
	200	15.0	3.2	3.8	4.4	5.0	5.7	6.3	7.5	8.1	9.2								
	250	12.0	3.3	4.0	4.7	5.5	6.2	7.0	8.5	9.2									
	300	10.0	3.4	4.2	5.0	5.8	6.6	7.5	9.2										
	350	8.6	3.5	4.3	5.2	6.1	7.0	7.9	9.9										
	400	7.5	3.6	4.4	5.3	6.3	7.3	8.3											
	450	6.7	3.7	4.5	5.5	6.5	7.5	8.6											
	500	6.0	3.7	4.6	5.6	6.6	7.7	8.8											
550	5.5	3.7	4.7	5.7	6.7	7.9	9.1												
600	5.0	3.8	4.7	5.7	6.8	8.0	9.2												
20	100	40.0	1.9	2.2	2.4	2.6	2.8	2.9	3.2	3.4	3.7	3.9	4.0	4.2	4.6	4.9	5.2	5.4	5.6
	110	36.4	2.0	2.2	2.5	2.7	2.9	3.1	3.5	3.6	3.9	4.2	4.3	4.6	5.0	5.4	5.7	6.0	6.2
	120	33.3	2.0	2.3	2.6	2.8	3.0	3.2	3.7	3.8	4.2	4.5	4.6	4.9	5.5	5.9	6.3	6.6	6.9
	130	30.8	2.1	2.4	2.6	2.9	3.2	3.4	3.8	4.1	4.4	4.8	5.0	5.3	5.9	6.5	6.9	7.3	7.6
	140	28.6	2.1	2.4	2.7	3.0	3.3	3.5	4.0	4.3	4.7	5.1	5.3	5.6	6.4	7.0	7.5	7.9	8.3
	150	26.7	2.2	2.5	2.8	3.1	3.4	3.7	4.2	4.4	4.9	5.4	5.6	5.9	6.8	7.5	8.1	8.6	9.0
	200	20.0	2.3	2.7	3.1	3.4	3.8	4.2	4.9	5.3	5.9	6.6	6.9	7.5	8.8				
	250	16.0	2.4	2.8	3.3	3.7	4.1	4.6	5.5	5.9	6.8	7.6	8.0	8.8					
	300	13.3	2.5	2.9	3.4	3.9	4.4	4.9	5.9	6.5	7.5	8.5	9.0						
	350	11.4	2.5	3.0	3.5	4.1	4.6	5.2	6.3	6.9	8.1	9.3	9.8						
	400	10.0	2.6	3.1	3.6	4.2	4.8	5.4	6.6	7.3	8.6	9.9							
	450	8.9	2.6	3.1	3.7	4.3	4.9	5.6	6.9	7.6	9.0								
	500	8.0	2.6	3.2	3.8	4.4	5.0	5.7	7.1	7.9	9.4								
550	7.3	2.7	3.2	3.8	4.5	5.1	5.8	7.3	8.1	9.7									
600	6.7	2.7	3.2	3.9	4.5	5.2	5.9	7.5	8.3										

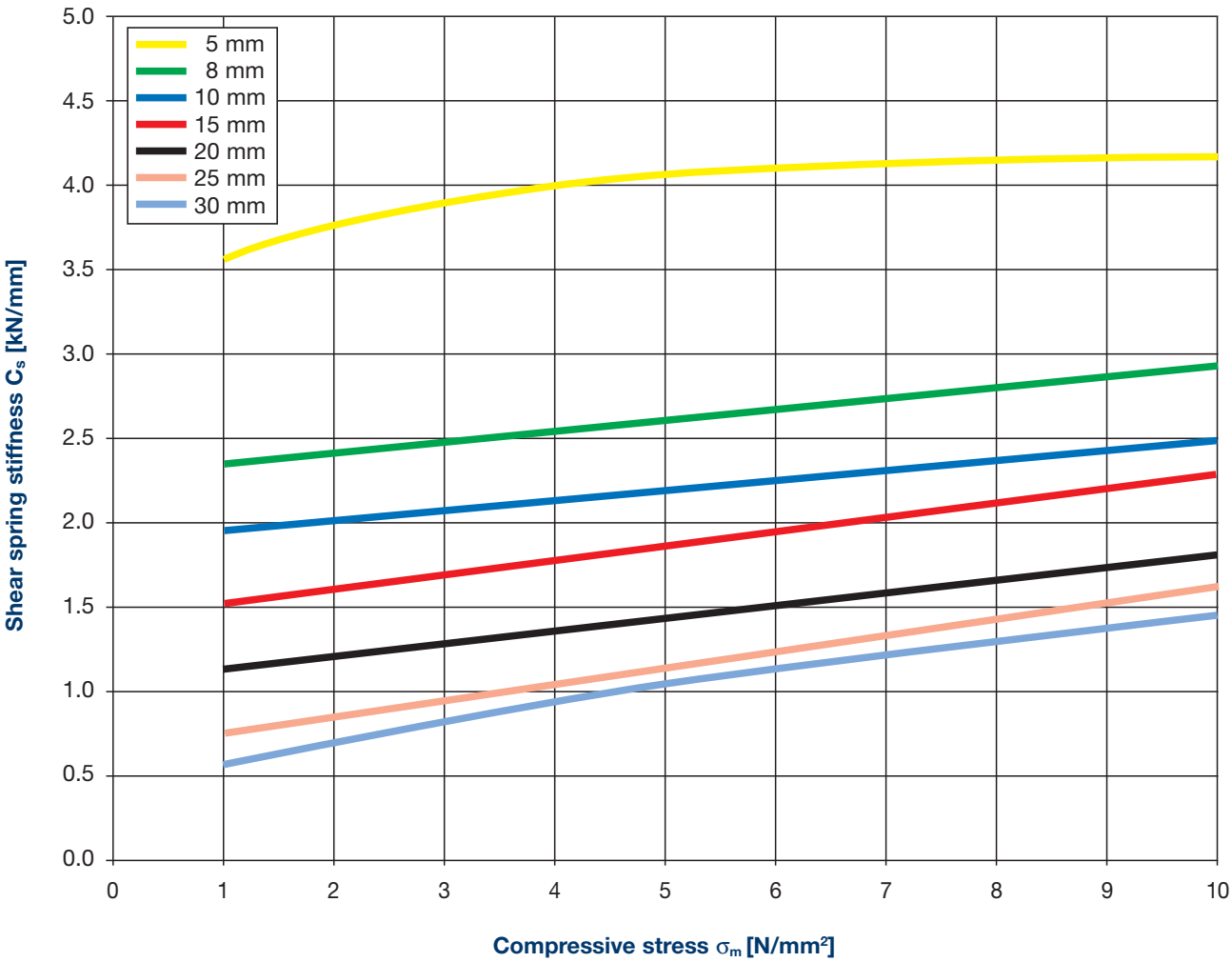
10.0

10.0

Design table 3

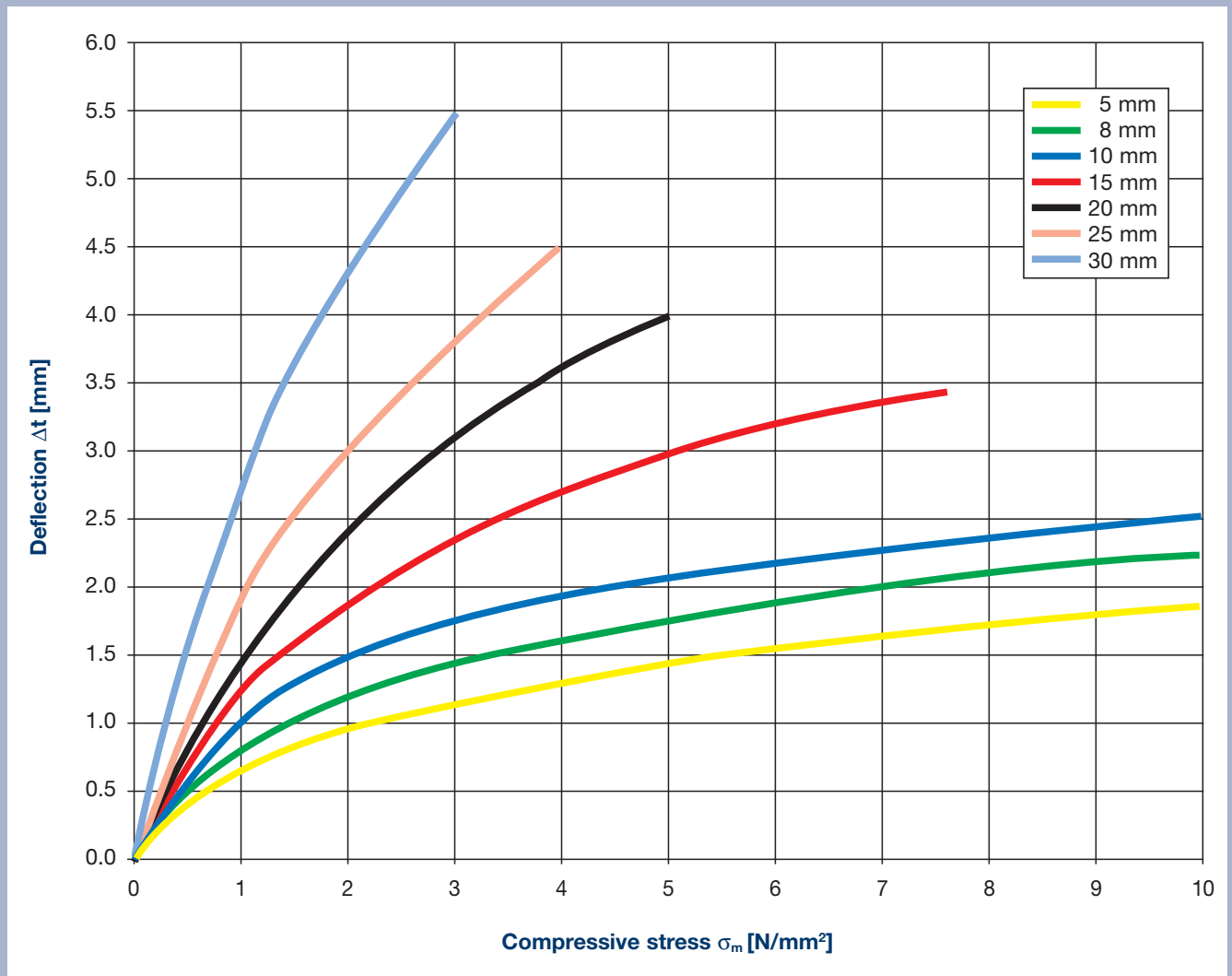
Design table 4

Compact Bearing S 65; 25 and 30 mm thick																			
Bearing thickness t [mm]	Bearing width b [mm]	All. rotation α [%]	Compressive stress, All. σ_m [N/mm ²]																
			Bearing length l [mm]																
			50	60	70	80	90	100	120	130	150	170	180	200	250	300	350	400	450
25	100	40.0	1.6	1.8	1.9	2.1	2.2	2.3	2.5	2.6	2.8	3.0	3.0	3.2	3.4	3.7	3.8	4.0	4.1
	110	40.0	1.7	1.8	2.0	2.1	2.3	2.4	2.7	2.8	3.0	3.2	3.3	3.4	3.7	4.0	4.2	4.4	4.5
	120	40.0	1.7	1.9	2.1	2.2	2.4	2.5	2.8	2.9	3.2	3.4	3.5	3.7	4.0	4.3	4.6	4.8	5.0
	130	38.5	1.7	1.9	2.1	2.3	2.5	2.6	2.9	3.1	3.3	3.6	3.7	3.9	4.3	4.7	5.0	5.2	5.5
	140	35.7	1.8	2.0	2.2	2.3	2.5	2.7	3.0	3.2	3.5	3.8	3.9	4.1	4.6	5.0	5.4	5.7	5.9
	150	33.3	1.8	2.0	2.2	2.4	2.6	2.8	3.2	3.3	3.7	3.9	4.1	4.3	4.9	5.4	5.8	6.1	6.4
	200	25.0	1.9	2.1	2.4	2.7	2.9	3.2	3.7	3.9	4.3	4.8	5.0	5.4	6.3	7.0	7.7	8.3	8.8
	250	20.0	1.9	2.2	2.5	2.8	3.1	3.4	4.0	4.3	4.9	5.5	5.7	6.3	7.5	8.6	9.6		
	300	16.7	2.0	2.3	2.6	3.0	3.3	3.7	4.3	4.7	5.4	6.1	6.4	7.0	8.6				
	350	14.3	2.0	2.4	2.7	3.1	3.4	3.8	4.6	5.0	5.8	6.6	6.9	7.7	9.6				
	400	12.5	2.1	2.4	2.8	3.2	3.6	4.0	4.8	5.2	6.1	7.0	7.4	8.3					
	450	11.1	2.1	2.4	2.8	3.2	3.7	4.1	5.0	5.5	6.4	7.4	7.8	8.8					
500	10.0	2.1	2.5	2.9	3.3	3.7	4.2	5.1	5.6	6.6	7.7	8.2	9.2						
550	9.1	2.1	2.5	2.9	3.3	3.8	4.3	5.3	5.8	6.9	8.0	8.5	9.6						
600	8.3	2.1	2.5	2.9	3.4	3.9	4.3	5.4	5.9	7.0	8.2	8.8							
																			10.0
30	100	40.0	1.4	1.6	1.7	1.8	1.9	1.9	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.1	3.2	3.2
	110	40.0	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3	2.4	2.6	2.6	2.8	3.0	3.2	3.3	3.5	3.6
	120	40.0	1.5	1.6	1.8	1.9	2.0	2.1	2.3	2.4	2.6	2.7	2.8	2.9	3.2	3.4	3.6	3.8	3.9
	130	40.0	1.5	1.7	1.8	1.9	2.1	2.2	2.4	2.5	2.7	2.9	3.0	3.1	3.4	3.7	3.9	4.1	4.2
	140	40.0	1.5	1.7	1.8	2.0	2.1	2.2	2.5	2.6	2.8	3.0	3.1	3.3	3.6	3.9	4.2	4.4	4.6
	150	40.0	1.6	1.7	1.9	2.0	2.2	2.3	2.6	2.7	2.9	3.1	3.2	3.4	3.8	4.2	4.5	4.7	4.9
	200	30.0	1.6	1.8	2.0	2.2	2.4	2.6	2.9	3.1	3.4	3.8	3.9	4.2	4.8	5.4	5.9	6.3	6.6
	250	24.0	1.7	1.9	2.1	2.3	2.6	2.8	3.2	3.4	3.8	4.3	4.5	4.8	5.7	6.5	7.2	7.8	8.3
	300	20.0	1.7	1.9	2.2	2.4	2.7	2.9	3.4	3.7	4.2	4.7	4.9	5.4	6.5	7.5	8.4	9.2	
	350	17.1	1.7	2.0	2.2	2.5	2.8	3.1	3.6	3.9	4.5	5.0	5.3	5.9	7.2	8.4	9.6		
	400	15.0	1.8	2.0	2.3	2.6	2.9	3.2	3.8	4.1	4.7	5.3	5.7	6.3	7.8	9.2			
	450	13.3	1.8	2.0	2.3	2.6	2.9	3.2	3.9	4.2	4.9	5.6	5.9	6.6	8.3				
500	12.0	1.8	2.1	2.4	2.7	3.0	3.3	4.0	4.4	5.1	5.8	6.2	7.0	8.8					
550	10.9	1.8	2.1	2.4	2.7	3.0	3.4	4.1	4.5	5.2	6.0	6.4	7.2	9.3					
600	10.0	1.8	2.1	2.4	2.7	3.1	3.4	4.2	4.6	5.4	6.2	6.6	7.5	9.7					
																			10.0



Shear spring stiffness

Deflection

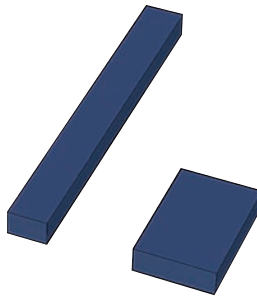


Standard cut-outs

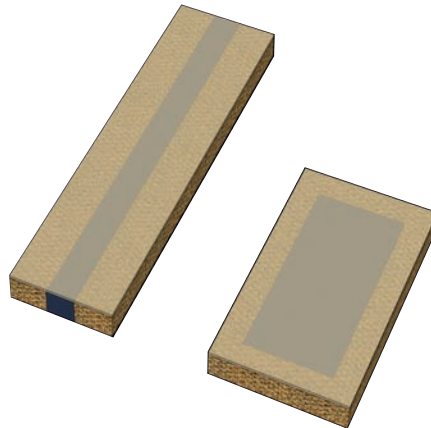


- Round hole
- Corner notch
- Slit notch
- Rectangular notch
- Slot
- Rectangular hole
- Corner chamfer

Point and strip bearings
in precast construction



Point and strip bearings in
in-situ construction,
embedded in polystyrene or
Ciflamon with cover



Delivery forms

Calenberg Compact bearings S 65 are supplied cut to the plan sizes required for each structure. Holes, cut-outs, slots etc. can be provided to allow bolts or dowels to pass through the bearing.

The bearings can be embedded in polystyrene at the factory for installation in in-situ concrete structures. Where fire resistance classes F 90 or F 120 are required, the bearings are supplied embedded in a Ciflamon fire protection board at least 30 mm wide.

Dimensions

- Bearing thickness:
5, 8, 10, 15, 20, 25, 30 mm
- Maximum cut size:
1200 mm x 1200 mm

Calenberg Compact Bearing S 65, standard cut-outs and delivery forms

Delivery forms

Test certificate

Test certificate, proof of suitability

- National Technical Approval Certificate No. 851.0364 basic investigations for the classification of Compact Bearings in accordance with DIN 4141 Part 3, Testing Institute for Mechanical Engineering Materials and Plastics, Technical University of Hanover, 2001
- Fire Safety Assessment No. 3799/7357-AR; Assessment of Calenberg elastomeric bearings regarding classification into the fire resistance class F 90 or F 120 according to DIN 4102 part 2 (issued 9/1977); Accredited Material Testing Authority for Civil Engineering at the Institute for Construction Materials, Reinforced Concrete Construction and Fire Protection, Technical University, Braunschweig; March 2005.

Use and fields of application

Calenberg Compact Bearings S 65 are used in all areas of construction as permanently elastic articulating connection elements. In building structures, their main use is as point bearings for providing elastic support to beams and joists, and as strip bearings under decks and walls.

Installation

In precast construction, no special constructional measures are required where Compact Bearings S 65 are installed centrally on the bearing surface. In the case of concrete components, the distance to the outer edge of the component must be at least 3 cm and the steel reinforcement must enclose the area of the bearing. Chamfered component edges are to be similarly treated. The provisions of DIN 1045-1 and DAfStb Booklet 525 must be observed.

In in-situ concrete construction the bearing joints must be filled and covered so that no concrete can penetrate them. A rigid connection must be avoided; the spring effect of the bearing must be guaranteed in every case.

Fire behaviour

Fire Safety Report No. 3799/7357-AR by the Technical University (TU) of Braunschweig shall be determinant for elastomeric bearings installed in situations where fire safety has to be taken into account. The report describes minimum dimensions and other measures that fulfil the requirements of DIN 4102-2: Fire Behaviour of Building Materials and Building Components, 1977-09.

The contents of the publication in the result of many years of research an experience gained in application technology. All information is given in good faith; it does not represent a guarantee with respect to characteristics an does not exempt the user from testing the suitability of products and from ascertaining that the industrial property rights of third parties are not violated. No liability whatsoever will be accepted for damage – regardless of its nature and its legal basis – arising from advice given in this publication. This does not apply in the event that we or our legal representatives or our management are found guilty of having acted with intent or gross negligence. The exclusion of liability applies also to the personal liability of or legal representatives and employed in performing our obligations.

Calenberg Ingenieure GmbH
Am Knübel 2-4
D-31020 Salzhemmendorf, Germany
Phone +49 (0) 51 53/94 00-0
Fax +49 (0) 51 53/94 00-49
info@calenberg-ingenieure.de
www.calenberg-ingenieure.de