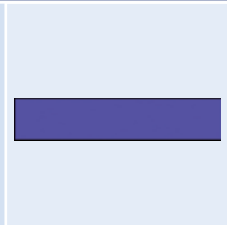
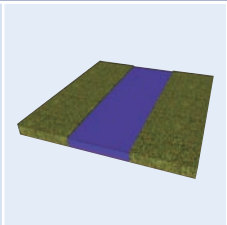
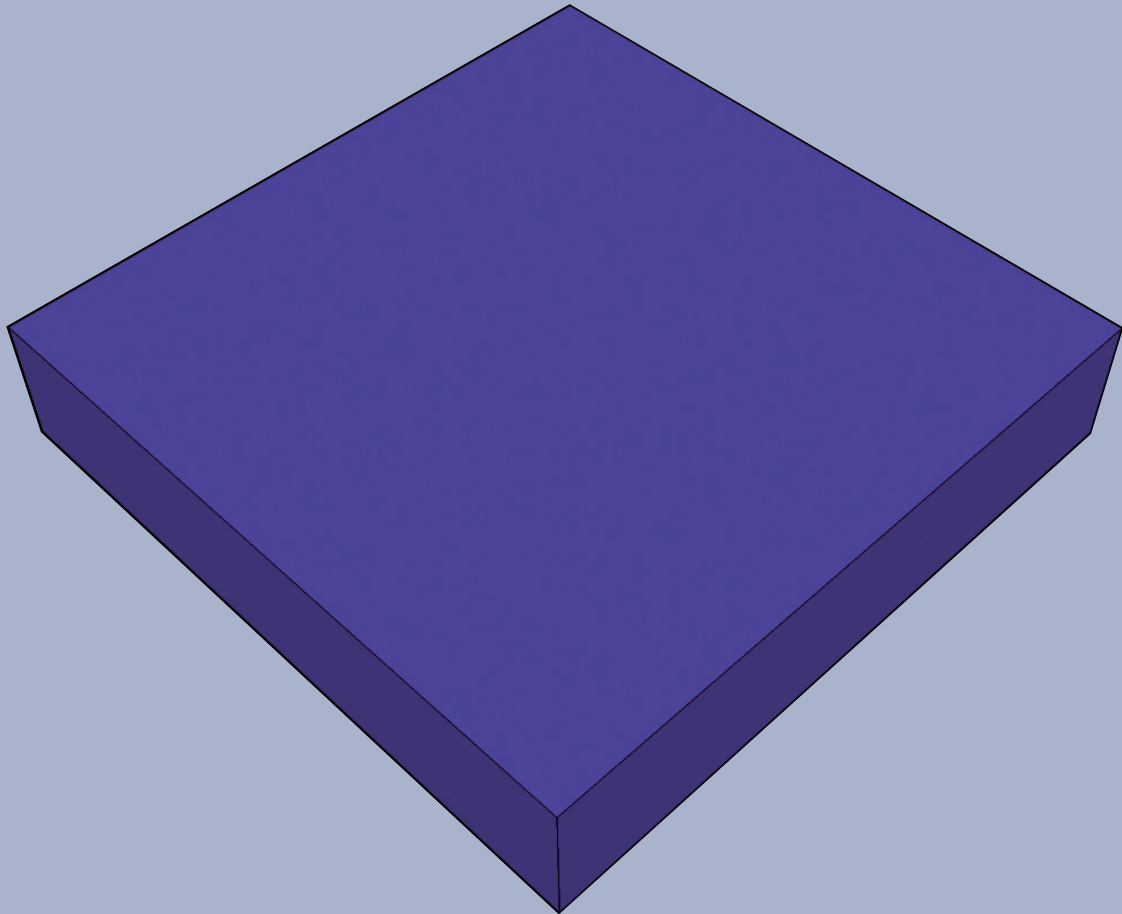


COMPACT BEARING S 70



*Unreinforced elastomeric bearing
loadable up to 15 N/mm²*

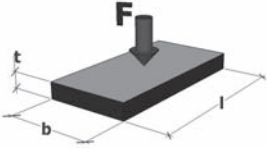


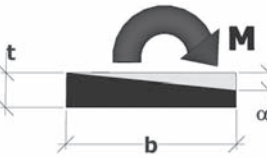
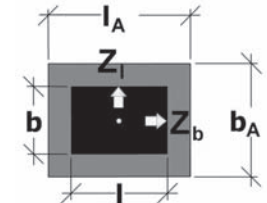
Bearing design

Contents

Bearing design formulae	Page	2
Product description		2
Shape factors		3
Text of tender documents		3
Edge distances		4
Design table 1		5
Design table 2		6
Design table 3		7
Shear modulus		8
Shear spring stiffness		9
Deflection		10
Delivery forms		11
Installation		12
Test certificates		12
Fire behaviour		12
Fields of application		12

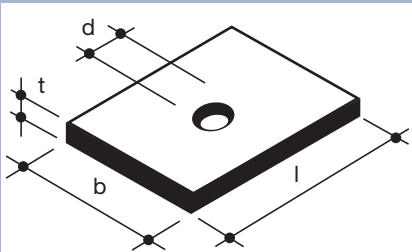
Product description

The Calenberg Compact Bearing S 70 is an unreinforced elastomeric bearing with smooth contact surfaces. The main component is an ozone-resistant elastomeric material with a hardness of 70 ± 5 Shore A. The appropriate tests have been carried out to demonstrate classification into bearing class 2 of DIN 4141 Part 3 by the Materials Testing Authority Hanover – an accredited certification authority in accordance with the State Building Regulations.

Design using characteristic values in acc. with DIN 4141, Part 3 (BC 2)	
Load type	Formula
All. mean compressive stress 	$\text{All. } \sigma_m = \frac{S^2 + S + 1}{0,85} \leq 15 \text{ N/mm}^2$ <p>Shape factor S see page 3</p>
All. shear deformation 	$\text{All. } u = 0,6 \cdot (t-2) \text{ [mm]}$ <p>Horizontal force $H = C_{s(t)} \cdot u \cdot A_E / 19000$ [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* 	$\text{Act. } Z_l = 1,5 \cdot F \cdot t \cdot l / A_E \text{ [kN]}$ <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

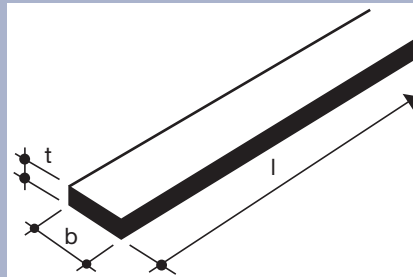
b, b_A, l, l_A, D, t, u in mm; A_E in mm²; H, Z_s in kN; c_s in kN/mm, S without units



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

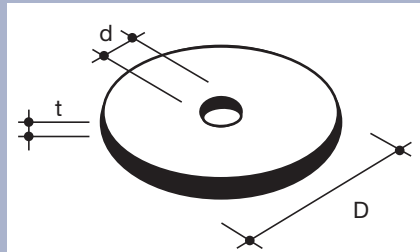
With hole: $S = \frac{4 \cdot l \cdot b - \pi \cdot d^2}{4 \cdot t \cdot (2 \cdot l + 2 \cdot b + \pi \cdot d)}$

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 70, unreinforced homogeneous elastomeric bearing in accordance with DIN 4141 Part 3, bearing class 2, loadable depending on format up to a mean compressive stress of 15 N/mm², National Technical Approval Certificate No. 850.0427.

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

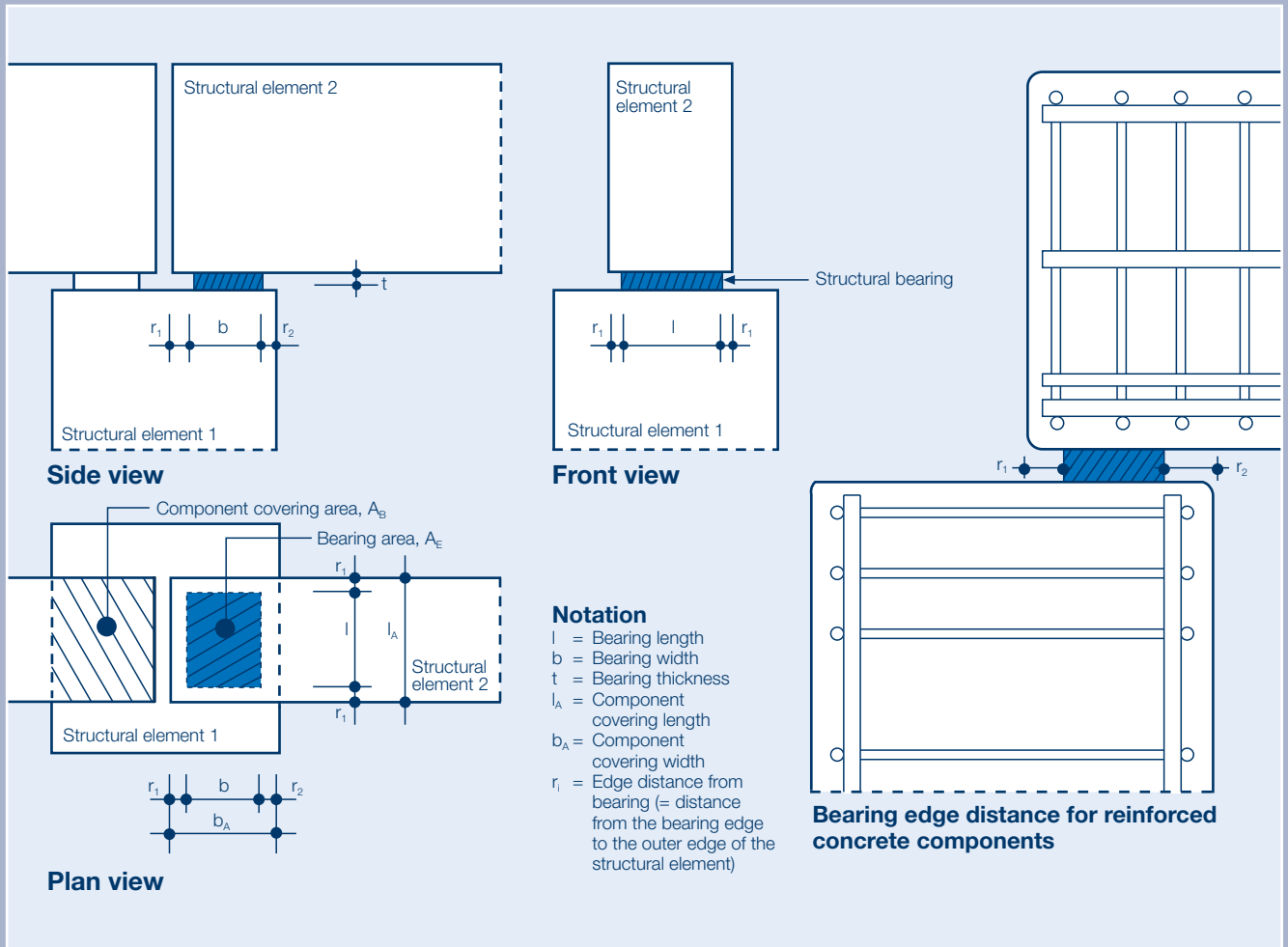
- Overall width: mm
- Elastomer width: mm
- Thickness: mm
- Quantity: m
- Price: €/m

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 70; 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	287	40	–	–	–	–	–	–	–	–
40	600	25	459	40	–	–	–	–	–	–
50	750	20	750	32	574	40	–	–	–	–
60	900	17	900	27	900	33	–	–	–	–
70	1050	14	1050	23	1050	29	–	–	–	–
75	1125	13	1125	21	1125	27	860	40	–	–
80	1200	13	1200	20	1200	25	1014	38	–	–
90	1350	11	1350	18	1350	22	1350	33	–	–
100	1500	10	1500	16	1500	20	1500	30	1147	40
110	1650	9	1650	15	1650	18	1650	27	1464	36
120	1800	8	1800	13	1800	17	1800	25	1800	33
130	1950	8	1950	12	1950	15	1950	23	1950	31
140	2100	7	2100	11	2100	14	2100	21	2100	29
150	2250	7	2250	11	2250	13	2250	20	2250	27
160	2400	6	2400	10	2400	13	2400	19	2400	25
170	2550	6	2550	9	2550	12	2550	18	2550	24
180	2700	6	2700	9	2700	11	2700	17	2700	22
190	2850	5	2850	8	2850	11	2850	16	2850	21
200	3000	5	3000	8	3000	10	3000	15	3000	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 70; 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	11.5	13.1	14.6																15.0
	60	16.7	13.1																		
	70	14.3	14.6																		
	80	12.5																			
8	50	32.0	5.9	6.6	4.7	5.1	5.4	5.7	9.5	9.8	10.4	10.9	11.1	11.5	12.2	12.8	13.2	13.5	13.8		
	60	26.7	6.6	7.5	5.5	5.9	6.4	6.8	11.5	11.9	12.8	13.5	13.8	14.4							
	70	22.9	7.2	8.3	6.1	6.8	7.3	7.8	13.4	14.0											
	80	20.0	7.8	9.1	6.8	7.5	8.2	8.8													
	90	17.8	8.3	9.8	7.3	8.2	9.0	9.8													
	100	16.0	8.7	10.4	7.8	8.8	9.8														
	120	13.3	9.5	11.5	8.8																
	140	11.4	10.1	12.4	9.6																
	150	10.7	10.4	12.8	9.9																
	180	8.9	11.1	13.8																	
200	8.0	11.5	14.4																		
10	50	40.0	4.5	5.0	5.4	5.8	6.1	6.4	6.9	7.1	7.5	7.8	8.0	8.2	8.7	9.1	9.4	9.6	9.8		
	60	33.3	5.0	5.6	6.1	6.7	7.1	7.5	8.2	8.5	9.1	9.6	9.8	10.2	10.9	11.5	11.9	12.3	12.5		
	70	28.6	5.4	6.1	6.8	7.5	8.1	8.6	9.5	9.9	10.7	11.3	11.6	12.1	13.2	14.0	14.6				
	80	25.0	5.8	6.7	7.5	8.2	8.9	9.6	10.8	11.3	12.3	13.1	13.5	14.1							
	90	22.2	6.1	7.1	8.1	8.9	9.8	10.6	12.0	12.6	13.8	14.8									
	100	20.0	6.4	7.5	8.6	9.6	10.6	11.5	13.1	13.9											
	150	13.3	7.5	9.1	10.7	12.3	13.8														
	200	10.0	8.2	10.2	12.1	14.1															
	250	8.0	8.7	10.9	13.2																
	300	6.7	9.1	11.5	14.0																
	350	5.7	9.4	11.9	14.6																
	400	5.0	9.6	12.3																	
	450	4.4	9.8	12.5																	
	500	4.0	9.9	12.8																	
600	3.3	10.2	13.1																		

Compact Bearing S 70; 15 and 20 mm thick

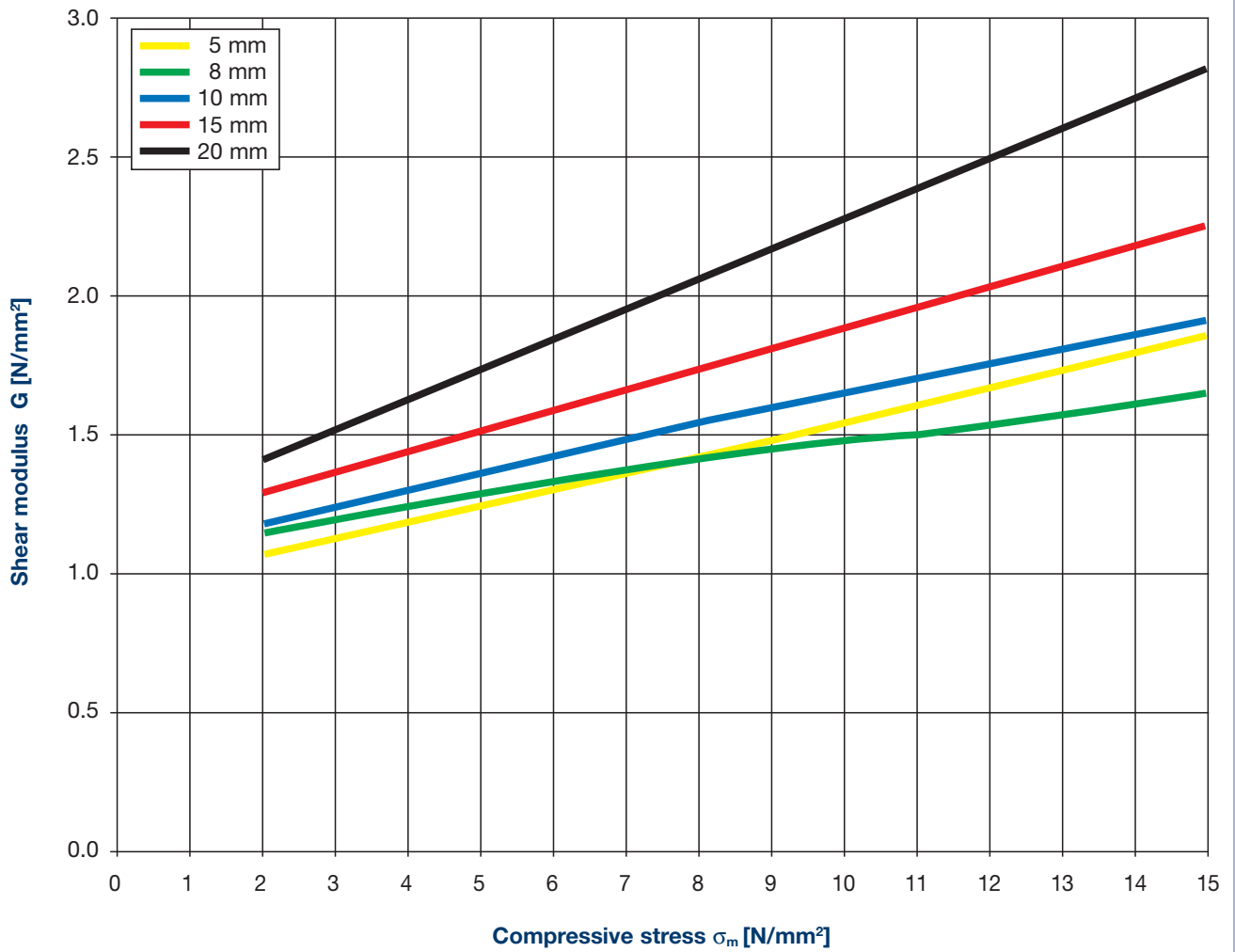
Bearing thickness t [mm]	Bearing width b [mm]	All. rotation α [%]	Compressive stress, All. σ_m [N/mm ²]																	
			Bearing length l [mm]																	
			50	60	70	80	90	100	120	130	150	170	180	200	250	300	350	400	450	
15	100	30.0	3.9	4.5	5.0	5.5	6.0	6.4	7.2	7.6	8.2	8.8	9.1	9.6	10.6	11.5	12.1	12.7	13.1	
	110	27.3	4.1	4.7	5.2	5.8	6.3	6.8	7.7	8.2	8.9	9.6	9.9	10.5	11.8	12.8	13.6	14.3	14.9	
	120	25.0	4.2	4.8	5.5	6.1	6.7	7.2	8.2	8.7	9.6	10.4	10.8	11.5	12.9	14.1				
	130	23.1	4.3	5.0	5.7	6.3	7.0	7.6	8.7	9.2	10.2	11.2	11.6	12.4	14.1					
	140	21.4	4.4	5.1	5.9	6.6	7.2	7.9	9.2	9.8	10.9	11.9	12.4	13.3						
	150	20.0	4.5	5.3	6.0	6.8	7.5	8.2	9.6	10.2	11.5	12.6	13.1	14.1						
	200	15.0	4.8	5.8	6.7	7.7	8.6	9.6	11.5	12.4	14.1									
	250	12.0	5.1	6.1	7.2	8.4	9.5	10.6	12.9	14.1										
	300	10.0	5.3	6.4	7.6	8.9	10.2	11.5	14.1											
	350	8.6	5.4	6.6	7.9	9.3	10.7	12.1												
	400	7.5	5.5	6.8	8.2	9.6	11.1	12.7												
	450	6.7	5.6	6.9	8.3	9.9	11.5	13.1												
	500	6.0	5.7	7.0	8.5	10.1	11.8	13.5												
550	5.5	5.7	7.1	8.7	10.3	12.0	13.9													
600	5.0	5.8	7.2	8.8	10.5	12.3	14.1													
20	100	40.0	3.0	3.3	3.6	3.9	4.2	4.5	5.0	5.2	5.6	5.9	6.1	6.4	7.0	7.5	7.9	8.2	8.5	
	110	36.4	3.1	3.4	3.8	4.1	4.4	4.7	5.3	5.5	6.0	6.4	6.6	7.0	7.7	8.3	8.8	9.2	9.5	
	120	33.3	3.1	3.5	3.9	4.3	4.6	5.0	5.6	5.9	6.4	6.9	7.1	7.5	8.4	9.1	9.7	10.2	10.6	
	130	30.8	3.2	3.6	4.0	4.4	4.8	5.2	5.9	6.2	6.8	7.3	7.6	8.1	9.1	9.9	10.6	11.1	11.6	
	140	28.6	3.3	3.7	4.2	4.6	5.0	5.4	6.1	6.5	7.2	7.8	8.1	8.6	9.7	10.7	11.5	12.1	12.7	
	150	26.7	3.3	3.8	4.3	4.7	5.2	5.6	6.4	6.8	7.5	8.2	8.5	9.1	10.4	11.5	12.4	13.1	13.8	
	200	20.0	3.5	4.1	4.7	5.3	5.8	6.4	7.5	8.1	9.1	10.1	10.6	11.5	13.5					
	250	16.0	3.7	4.3	5.0	5.7	6.3	7.0	8.4	9.1	10.4	11.7	12.3	13.5						
	300	13.3	3.8	4.5	5.2	6.0	6.7	7.5	9.1	9.9	11.5	13.0	13.8							
	350	11.4	3.9	4.6	5.4	6.2	7.1	7.9	9.7	10.6	12.4	14.2								
	400	10.0	3.9	4.7	5.5	6.4	7.3	8.2	10.2	11.1	13.1									
	450	8.9	4.0	4.8	5.7	6.6	7.5	8.5	10.6	11.6	13.8									
	500	8.0	4.0	4.9	5.8	6.7	7.7	8.7	10.9	12.0	14.4									
550	7.3	4.1	4.9	5.8	6.8	7.8	8.9	11.2	12.4	14.9										
600	6.7	4.1	5.0	5.9	6.9	8.0	9.1	11.5	12.7											

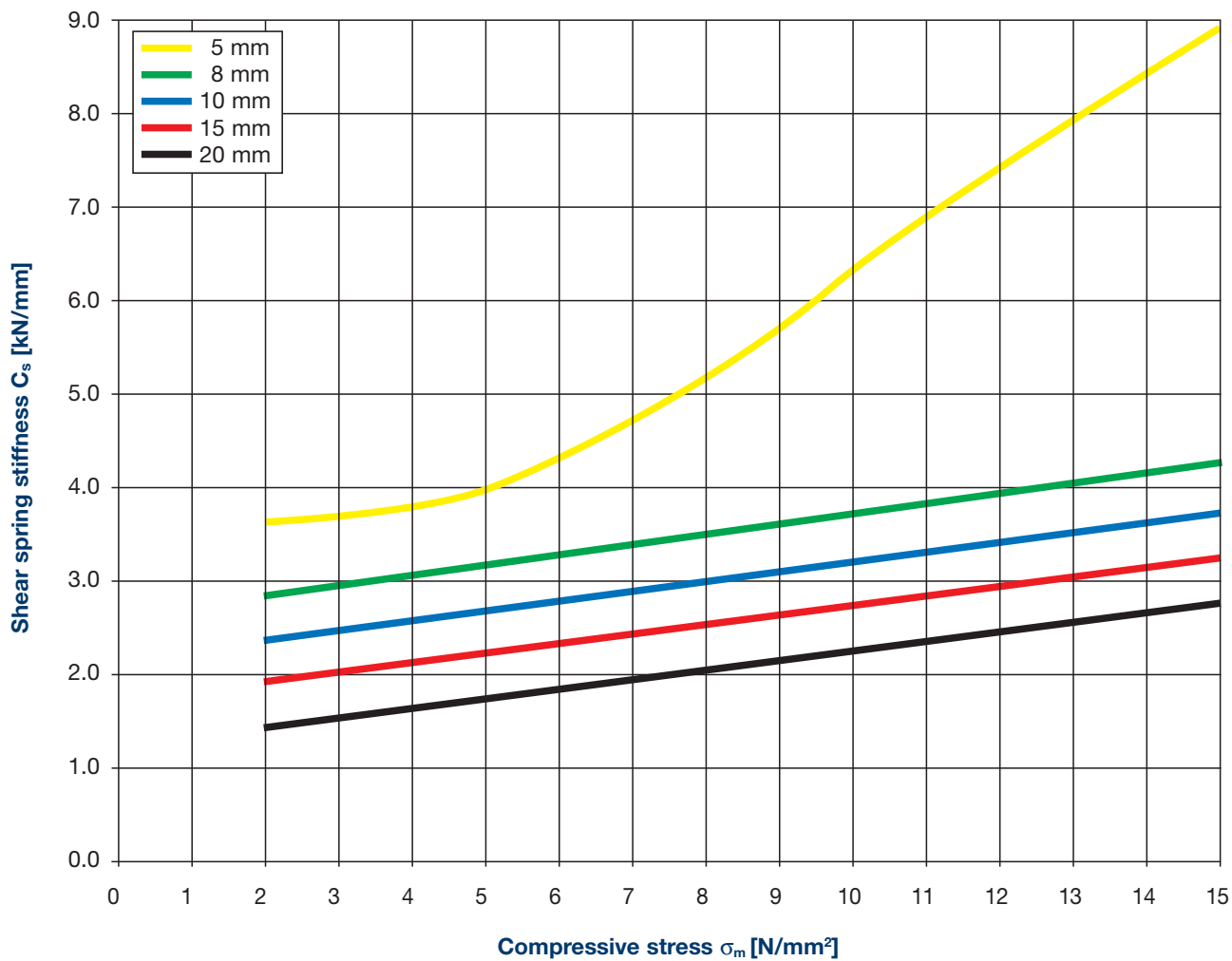
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15.0

Design table 3

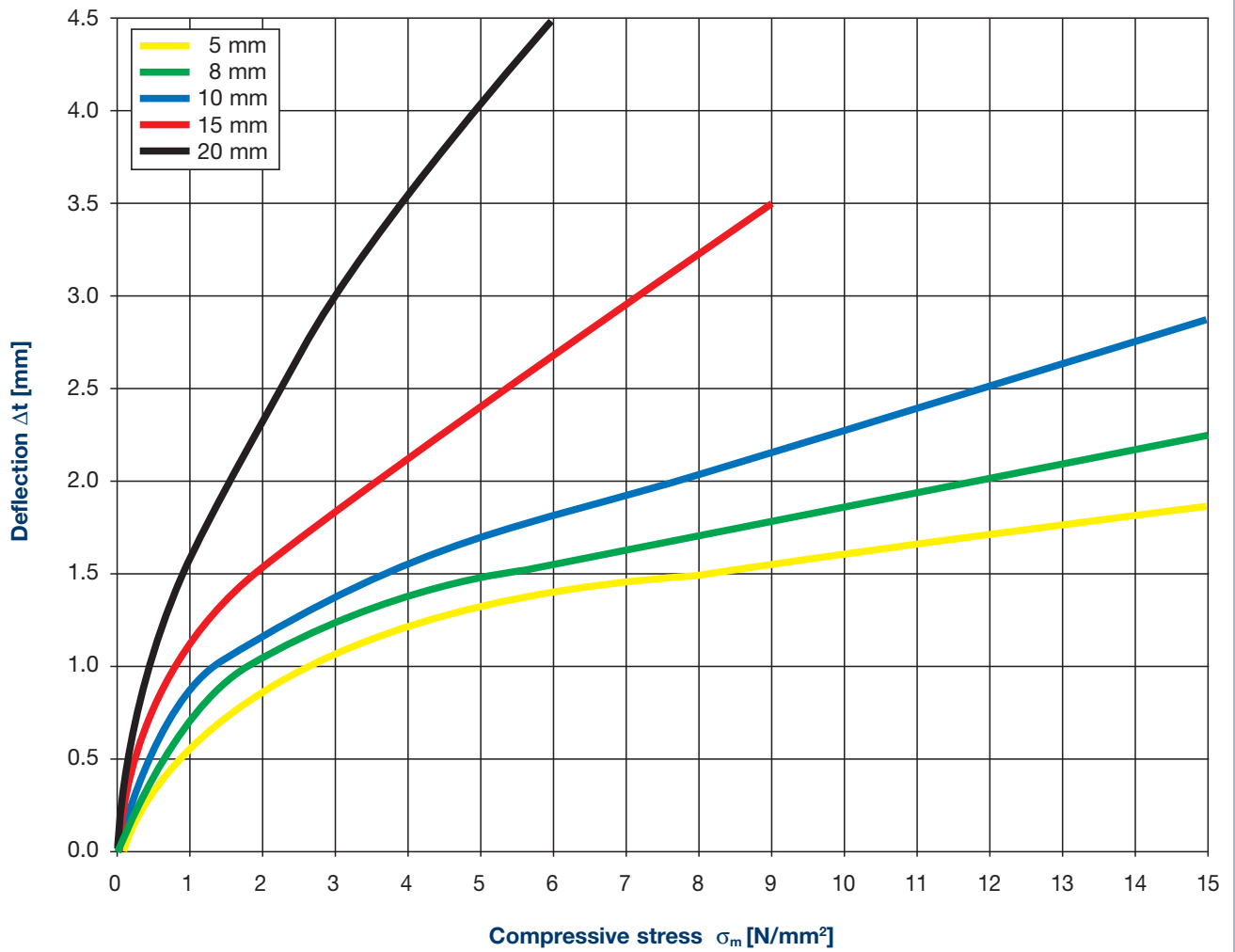
Shear modulus



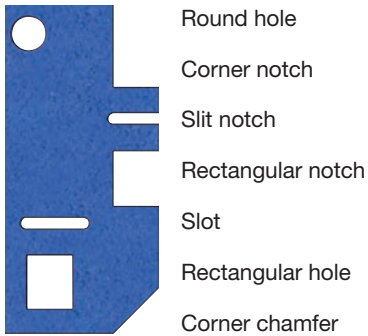


Shear spring stiffness

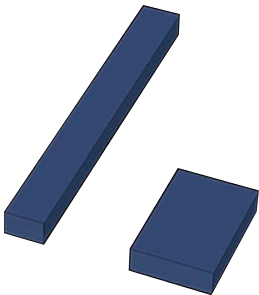
Deflection



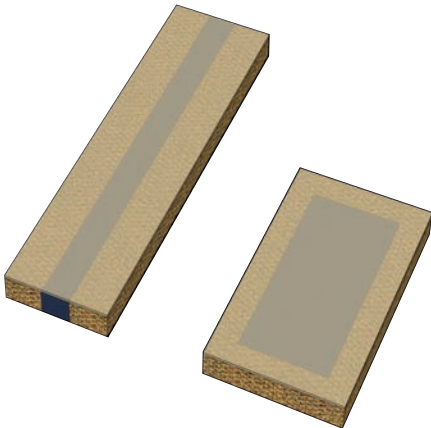
Standard cut-outs



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 70 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 bearings.

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, mm
- Maximum cut size: 1200 mm x 1200 mm

Calenberg Compactlager S 70, standard cut-outs and delivery forms

Delivery forms

Test certificate

Test certificate, proof of suitability

- National Technical Approval Certificate No. 850.0427, 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, 2000
- 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 70 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 the Compact Bearing S 70 is 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.

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