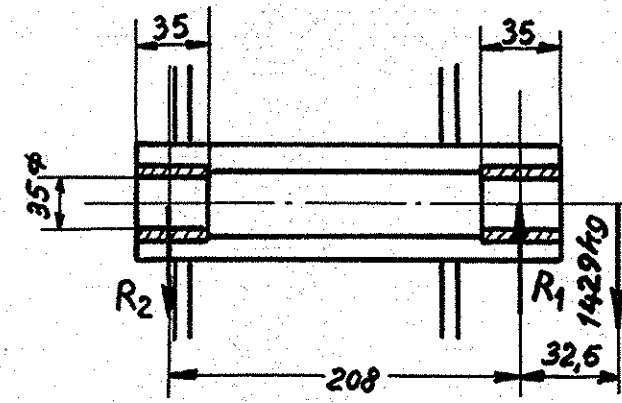


Leje for hængestang 2a og 3a 305L - 22.137 pos. 12.



Max. Lejetryk  $\sim$  :  $1310 + 85 \cdot 1,4 = 1429 \text{ kg}$   
 $R_1 = 1429 \cdot \frac{240,5}{208} = 1653 \text{ kg}$   
 $R_2 = 1429 \cdot \frac{32,5}{208} = 224 \text{ kg}$   
 Fladetryk :  $p = \frac{1653}{3,5 \cdot 3,5} = 135 \text{ kg/cm}^2$   
 $M_x R_1 = 1429 \cdot 3,25 = 4650 \text{ kgcm}$   
 $W_{\text{bolt}} = 4,23 \text{ cm}^3$   $\sigma = \frac{4650}{4,23} = 1100 \text{ kg/cm}^2$   
 Bolt af st. 60.11,  $r = 1000 - \frac{6000}{3700} = 1625 \text{ kg/cm}^2$

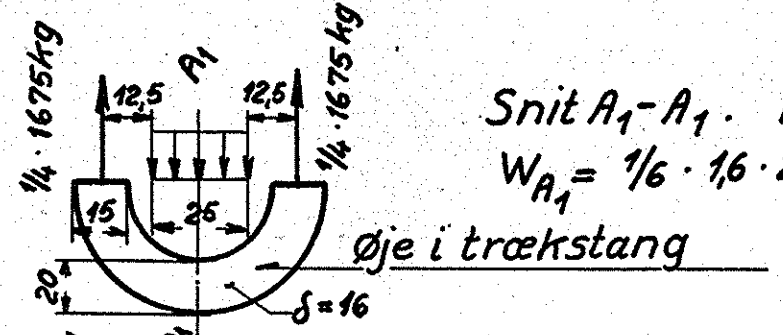
**Håndbremsen.**

Skruespindel 305L - 1.480 - 05.

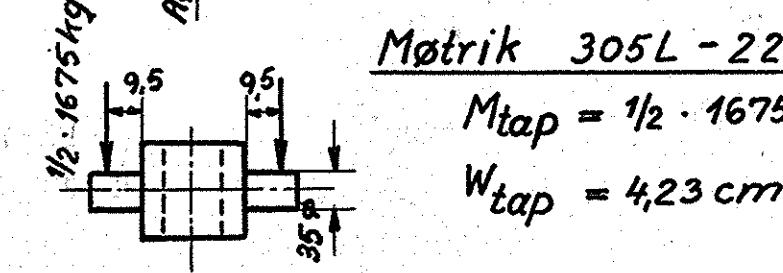
Tryk i spindel :  $1675 \text{ kg}$   $M_v = 43,5 \cdot 15,5 \cdot 0,98 = 662 \text{ kgcm}$   $\text{Kernediameter} = 32 \text{ mm}$   
 $\sigma = \frac{1675 \cdot 4}{\pi \cdot 3,2^2} = 208 \text{ kg/cm}^2$   $\tau = \frac{662 \cdot 16}{\pi \cdot 3,2^3} = 103 \text{ kg/cm}^2$   
 $\sigma_i = 3/8 \cdot 208 + 5/8 \sqrt{208^2 + 4 \cdot 103^2} \sim 262 \text{ kg/cm}^2$   
 Vridning på tap :  $662 \text{ kgcm}$ ,  $d = 25 \text{ mm}$ ,  $\tau = \frac{662 \cdot 16}{\pi \cdot 2,5^3} = 216 \text{ kg/cm}^2$   
 Fladetryk på bundspor :  $p = \frac{1675 \cdot 4}{\pi \cdot 3,2^2} = 209 \text{ kg/cm}^2$

Tandhjul 305L - 22.064 1stk. SKF EP 40 XN og 1stk. SKF EP 40 VN, spiralskærne.  
 $m = 2,5$ ,  $z = 20$ ,  $b = 16 \text{ mm}$   $D_m \sim 72 \text{ mm}$ ,  $t_m = \frac{\pi \cdot 72}{20} = 11,3 \text{ mm}$   
 $P_{\text{till}} = c \cdot b \cdot t_m$   $c = 56$  (stålstg.) iflg. „Maskinelementer.“ (A.R. Holm)  
 $P_{\text{till}} = 56 \cdot 1,6 \cdot 1,13 = 101 \text{ kg}$   $P_{\text{till}} \text{ på handhjul} : 101 \cdot \frac{3,5 \cdot 2}{15,5 \cdot 0,98} = 48 \text{ kg}$

Skrue 305L - 22.063  $\sigma_{\text{kerne}} = \frac{1675}{4 \cdot 3,2^2} = 208 \text{ kg/cm}^2$   
 Trækstang I: 305L - 22.230, pos. 1.  $\sigma = \frac{1675}{4 \cdot 1,5 \cdot 1,6} = 175 \text{ kg/cm}^2$

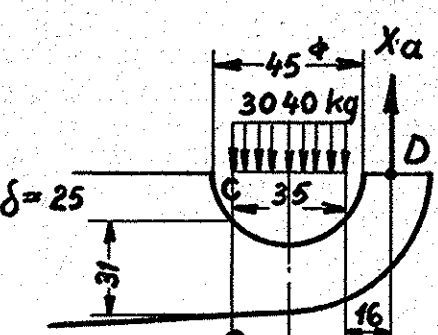


Snit A<sub>1</sub>-A<sub>1</sub>.  $M_{A_1} = 1/4 \cdot 1675 \cdot 1,25 + 1/8 \cdot 1/2 \cdot 1675 \cdot 2,5 = 785 \text{ kgcm}$   
 $W_{A_1} = 1/6 \cdot 1,6 \cdot 2^2 = 1,07 \text{ cm}^3$   $\sigma = \frac{785}{1,07} = 735 \text{ kg/cm}^2$

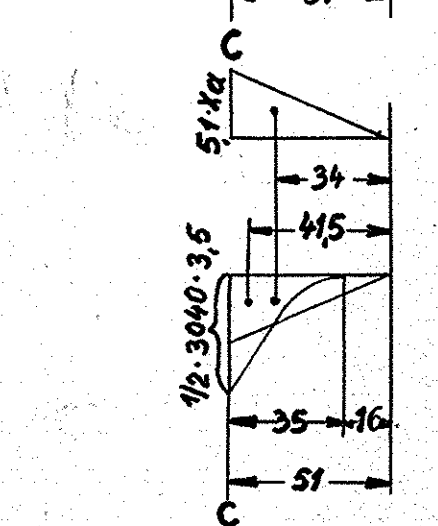


Møtrik 305L - 22.063 pos. 2  
 $M_{\text{tap}} = 1/2 \cdot 1675 \cdot 0,95 = 795 \text{ kgcm}$   
 $W_{\text{tap}} = 4,23 \text{ cm}^3$   $\sigma_{\text{tap}} = \frac{795}{4,23} = 188 \text{ kg/cm}^2$   
 $P_{\text{tap}} = \frac{1675}{2 \cdot 3,5 \cdot 1,6} = 150 \text{ kg/cm}^2$

Øjer i arme, 305L - 22.900 pos. 3. Største tryk T<sub>2</sub> = 3040 kg

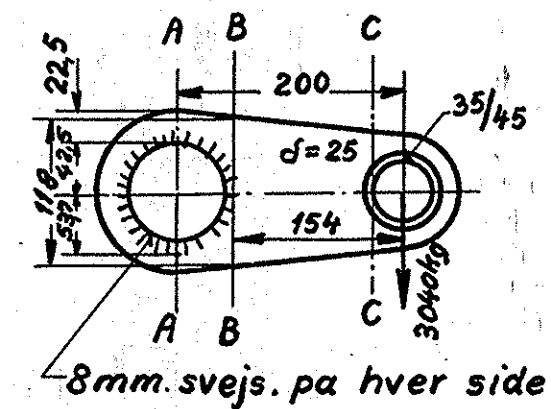


Farligste snit C-C undersøges, X<sub>a</sub> beregnes v. konj. bjælke.  
 Udbøjning af D er fælles for begge halvdele af øjet, d.v.s. momentet på den konjurerede bjælke:  
 $1/3 \cdot 3,5 \cdot (1/2 \cdot 3040 \cdot 3,5) \cdot 4,15 + 1/2 \cdot 5,1 \cdot 5,1 \cdot X_a \cdot 3,4 = 1/2 \cdot 5,1 \cdot 5,1 \cdot X_a \cdot 3,4$   
 $X_a = \frac{3,5 \cdot 1/2 \cdot 3040 \cdot 3,5 \cdot 4,15}{3 \cdot 5,1 \cdot 5,1 \cdot 3,4} = 291 \text{ kg}$



$M_x C = 291 \cdot 5,1 \cdot 3040 \cdot 1,75 = 3834 \text{ kgcm}$   
 $W_x C = 1/6 \cdot 2,5 \cdot 3,1^2 = 4 \text{ cm}^3$   $\sigma_C = \frac{3834}{4} = 960 \text{ kg/cm}^2$   
 Fladetryk :  $p = \frac{3040}{3,5 \cdot 2,5} = 347 \text{ kg/cm}^2$   
 Den farligst påvirkede bolt:  
 $M < 1/2 \cdot 3040 \cdot 2,15 = 3270 \text{ kgcm}$   
 $W = 4,23 \text{ cm}^3$   $\sigma_{\text{bolt}} < \frac{3270}{4,23} = 773 \text{ kg/cm}^2$

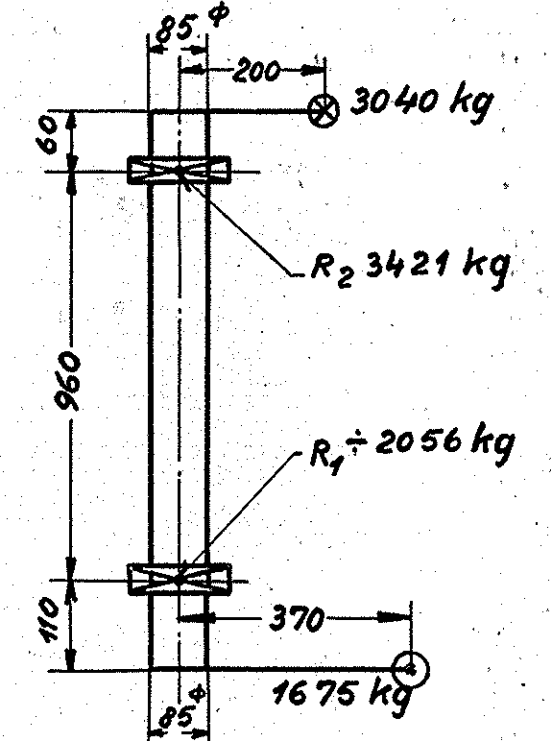
Arm for håndbremse 305L - 22.900, pos. 2.



$MA = 3040 \cdot 20 = 60800 \text{ kgcm}$   
 $MB = 3040 \cdot 15,4 = 46800 \text{ kgcm}$   
 $\sigma_A = \frac{60800}{5,37 \cdot 2 \cdot 2,5 \cdot 2,2} \cdot 1/2$  (halvdelen overført t.h.f. A-A)  $= 513 \text{ kg/cm}^2$   
 $\tau_{\text{svejs}} = \frac{60800}{4,25 \cdot 2 \cdot \pi \cdot 8,5 \cdot 0,8} = 334$   
 $WB = 1/6 \cdot 2,5 \cdot 11,8^2 = 58 \text{ cm}^3$   $\sigma_B = \frac{46800}{58} = 808 \text{ kg/cm}^2$

For vinkelarmen 305L - 22.900 pos. 3 undersøges et snit E-E. 206 mm. fra øjet; snit E-E = 128 x 25 mm.  $M_E = 3040 \cdot 20,6 = 62600 \text{ kgcm}$   
 $W_E = 1/6 \cdot 2,5 \cdot 12,8^2 = 68,3 \text{ cm}^3$   $\sigma_E = \frac{62600}{68,3} = 918 \text{ kg/cm}^2$

Tryki vinkelarmens omdrejningspunkt:  $P \sim \sqrt{2} \cdot 3040 = 4300 \text{ kg}$ , som fordeles over to bøsninger:  $42/52 \times 16$ , d.v.s. fladetryk  $p = \frac{4300}{2 \cdot 4,2 \cdot 1,6} = 320 \text{ kg/cm}^2$   
 Moment på bolt:  $M = 1/2 \cdot 4300 \cdot 1,7 = 3650 \text{ kgcm}$   $W = 7,26 \text{ cm}^3$   
 $\sigma_{\text{bolt}} = \frac{3650}{7,26} = 503 \text{ kg/cm}^2$



Aksel 305L - 22.900, pos. 4.  
 $M_b \text{ max} = M_b R_1 = 1675 \cdot 11 = 18400 \text{ kgcm}$ ,  $W_b = 60,4 \text{ cm}^3$   
 $M_v R_1 = 1675 \cdot 37 = 62000 \text{ kgcm}$ ,  $W_v = 120,8 \text{ cm}^3$   
 $\sigma = \frac{18400}{60,4} = 305 \text{ kg/cm}^2$   
 $\tau = \frac{62000}{120,8} = 514 \text{ kg/cm}^2$   $\sigma/\tau = 0,6$ , d.v.s.  $\sigma_i/\tau_i = 1,84$  \*)  
 $\sigma_i = 1,84 \cdot 514 = 940 \text{ kg/cm}^2$   
 $R_1 = \frac{1675 \cdot 107 + 3040 \cdot 6}{96} = 1866 + 190 = 2056 \text{ kg}$   
 $R_2 = \frac{1675 \cdot 11 + 3040 \cdot 102}{96} = 191 + 3230 = 3421 \text{ kg}$

Overpart af leje R<sub>1</sub>, 305L - 22.281, pos. 1.  
 Trykket 2056 kg regnes ensformig fordelt over 70 mm.  
 $M_S = 1/2 \cdot 2056 \cdot 3,5 + 1/8 \cdot 2056 \cdot 7 = 5400 \text{ kgcm}$   
 $W_S = 1/6 \cdot 6 \cdot 3,15^2 = 9,92 \text{ cm}^3$   $\sigma_S = \frac{5400}{9,92} = 545 \text{ kg/cm}^2$   
 Max lejetryk :  $p = \frac{3421}{8,5 \cdot 6} = 67 \text{ kg/cm}^2$

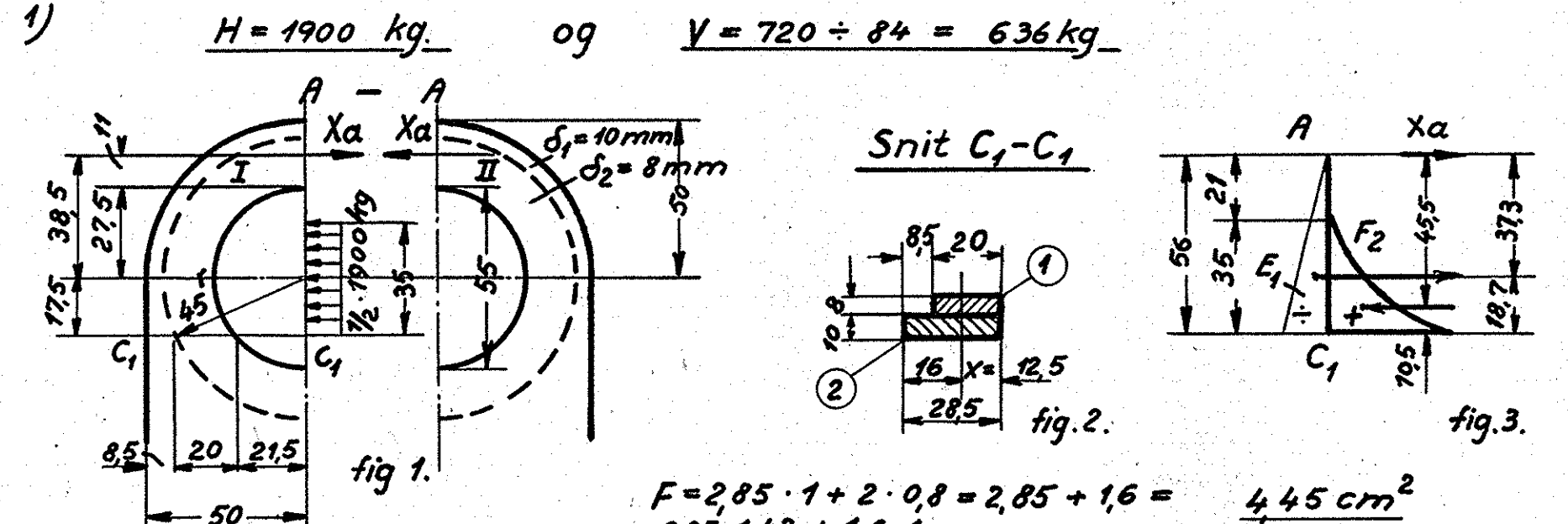
Trækstang II 305L - 22.230 pos. 1.  
 Snit A<sub>1</sub>-A<sub>1</sub>.  $M_{A_1} = 1/4 \cdot 3040 \cdot 1,9 + 1/8 \cdot 1/2 \cdot 3040 \cdot 2,5 = 1920 \text{ kgcm}$   
 $W_{A_1} = 1/6 \cdot 1,6 \cdot 2,75^2 = 2,01 \text{ cm}^3$   $\sigma = \frac{1920}{2,01} = 955 \text{ kg/cm}^2$   
 $\sigma_{B_1} = \frac{3040}{4 \cdot 1,6 \cdot 2,75} = 173 \text{ kg/cm}^2$   
 Fladetryk :  $p = \frac{3040}{2 \cdot 3,5 \cdot 1,6} = 272 \text{ kg/cm}^2$

Kæde (stang III) 305L - 22.230 pos. 3.  
 Kæden må efter forskrift belastes med: 3500 kg. > 2980 kg  
 Snit A<sub>1</sub>-A<sub>1</sub>.  $M_{A_1} = 1/4 \cdot 2980 \cdot 1,9 + 1/8 \cdot 1/2 \cdot 2980 \cdot 2,5 = 1883 \text{ kgcm}$   
 $W_{A_1} = 1/6 \cdot 1,8 \cdot 2,75^2 = 2,3 \text{ cm}^3$   $\sigma = \frac{1883}{2,3} = 825 \text{ kg/cm}^2$   
 $\sigma_{B_1} = \frac{2980}{4 \cdot 1,8 \cdot 2,75} = 151 \text{ kg/cm}^2$   
 $p = \frac{2980}{2 \cdot 1,8 \cdot 3,5} = 237 \text{ kg/cm}^2$

$M_x = 1/2 \cdot 2980 \cdot 0,9 + 1/8 \cdot 2980 \cdot 2,5 = 1340 + 930 = 2240 \text{ kgcm}$   
 $W_x = 4,23 \text{ cm}^3$   $\sigma = \frac{2240}{4,23} = 530 \text{ kg/cm}^2$   
 $p = \frac{2980}{2,5 \cdot 3,5} = 340 \text{ kg/cm}^2$

305L - 1.480 - 05

Undersøgelse af øje for konsol for hæng 2b og 3b for henh.:



1)  $H = 1900 \text{ kg}$  og  $V = 720 \div 84 = 636 \text{ kg}$   
 $F = 2,85 \cdot 1 + 2 \cdot 0,8 = 2,85 + 1,6 = 4,45 \text{ cm}^2$   
 $X = \frac{2,85 \cdot 1,42 + 1,6 \cdot 1}{4,45} = 0,91 + 0,36 = 1,27 \text{ cm} \sim 12,5 \text{ mm}$   
 $J_x C_1 = 1/2 \cdot 2,85^3 \cdot 1,0 + 2,85 \cdot 0,18^2 + 1/2 \cdot 0,8 \cdot 2^3 + 1,6 \cdot 0,25^2 = 1,94 + 0,09 + 0,53 + 0,1 = 2,66 \text{ cm}^4$   
 $W_{x1} = \frac{2,66}{1,6} = 1,66 \text{ cm}^3$   $W_{x2} = \frac{2,66}{1,25} = 2,13 \text{ cm}^3$

Kraften  $1/2 H = 950 \text{ kg}$  regnes ensformig fordelt over 35 mm. X<sub>a</sub> beregnes som overtallig trækraft, idet det udtrykkes, at udbøjningen er fælles for drager I og II. Kræfter på drager I giver momenterne:  
 $M_1 C_1 = 950 \cdot 1/2 \cdot 3,5 = 1665 \text{ kgcm}$   
 $M_2 C_1 = X_a \cdot 5,6 \text{ kgcm}$   
 Konj. bjælke indspændt ved A:  $M'A = 1665 \cdot 1/3 \cdot 3,5 \cdot 4,55 + 1/2 \cdot X_a \cdot 5,6^2 \cdot 3,73$  (drager I).  
 På drager II virker kun X<sub>a</sub>:  $M'A = 1/2 X_a \cdot 5,6^2 \cdot 3,73$   
 Deraf:  $1/2 X_a \cdot 5,6^2 \cdot 3,73 = 1/3 \cdot 3,5 \cdot 1665 \cdot 4,55 + 1/2 X_a \cdot 5,6^2 \cdot 3,73$ .  $X_a = 76 \text{ kg}$   
 På drager I:  $M_x C_1 = 1665 + 76 \cdot 5,6 = 1665 + 425 = 1240 \text{ kgcm}$  (tryk 2)  
 $\sigma_2 = \frac{1240}{1,66} = 745 \text{ kg/cm}^2$

2)  $H = 1100 \text{ kg}$   $V = 636 \text{ kg}$   
 Snit A-A  
 $F = 2,25 + 1,75 \cdot 0,8 = 2,25 + 1,4 = 3,65 \text{ cm}^2$   
 $X = \frac{2,25 \cdot 1,12 + 1,4 \cdot 0,88}{3,65} = 0,69 + 0,34 = 1,03 \text{ cm} \sim 10,5 \text{ mm}$   
 $J_x = 1/2 \cdot 2,25^3 + 2,25 \cdot 0,08^2 + 1/2 \cdot 1,75^3 \cdot 0,8 + 1,4 \cdot 0,17^2 = 0,95 + 0,01 + 0,36 + 0,04 = 1,36 \text{ cm}^4$   
 $W_{x1} = \frac{1,36}{1,2} = 1,13 \text{ cm}^3$   $W_{x2} = \frac{1,36}{1,05} = 1,29 \text{ cm}^3$   
 $M_x A = 1/2 \cdot 318 \cdot 2,05 + 1/8 \cdot 318 \cdot 3,5 = 326 + 139 = 465 \text{ kgcm}$   
 Regnes X<sub>a</sub> proportional med H, f.ås:  $X_a = 76 \cdot \frac{1100}{1900} = 44 \text{ kg}$   
 $\sigma_1 = \frac{465}{1,13} + \frac{44}{3,65} = 410 + 12 = 422 \text{ kg/cm}^2$   
 $\sigma_2 = \frac{465}{1,29} + \frac{44}{3,65} = 360 + 12 = 372 \text{ kg/cm}^2$

Sik.	Belegning	Pos.	Materiale kvalitet	Model nr. eller materiale størrelse	rå Vægt/stk.	5			
Tepp.	27-4-55 EA Rev.	Afc.				4			
Kalk.	BF 13-5-55 Norm.	Dato				3			
Dato		Rotulose				2			
						1			
Anvendelse			Målestok:						
1500 hk. diesel-el. lokomotiv.			FRICHS						
Tegningens benævnelse			Tegningens nummer						
Bremseberegning.			305L - 1480-05.						
Indeks			Indeks						