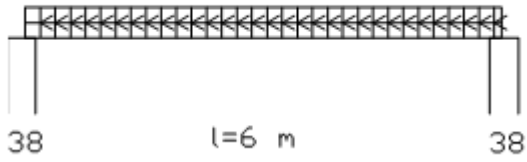
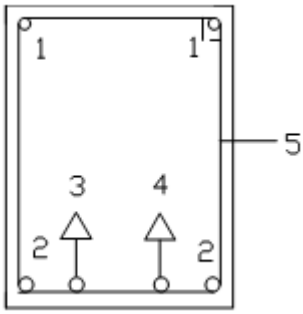
Vasbeton gerenda

C 12 várt térbe vakolt
b 60.40

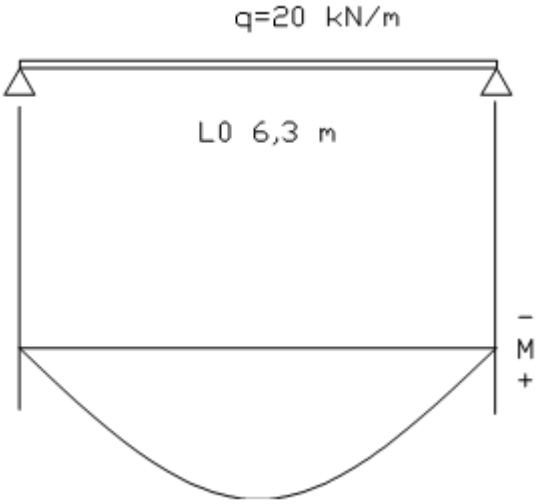


Ht= 400



1	2 db ϕ 8
2	2 db ϕ 20
3	1 db ϕ 20
4	1 db ϕ 20
5	ϕ 6/200

B= 300



$\sigma_{bh}=0,9\ kN/cm^2$

$\sigma_{bh}=35\ kN/cm^2$

$\xi_0=0,48$ beton acél minőségi tényezője

$\boxed{1,05*l=1,05*6=6,30\ m}$

$l+ht=6+0,4=6,40\ m$

$l+2*v/2=6+0,38=6,38\ m$

Maximális hajlító nyomaték

$$M_m=\frac{q*l_0^2}{8}=\frac{20*6,3^2}{8}=99,225\ kNm$$

1, gerenda méretezési mérete

$c=c_1+c_2+c_3 \qquad c=20+0-0,5=1,5\ mm$

Elhelyezési pontatlanság

$$a=c+d_k+\frac{d_s}{2}+1=1,5+0,6+\frac{2}{2}+1=4,1\ cm$$

$h=ht-a=40-4,1=35,9\ cm$

2Nyomót betonöv kiszámítása

N=H

$$A_s=\frac{n*d_s*\pi}{4}=4\frac{2^2*\pi}{4}=12,57\ cm^2$$

$$b*x*\sigma_{bh}=A_s*\sigma_{sh}\Rightarrow x=\frac{A_s*\sigma_{sa}}{b*\sigma_{sh}}=\frac{12,57*35,9}{30*0,9}=16,71\ cm$$

$x_0=\xi*h=0,48*35,9=17,23\ cm$ nyomot beton maximális értéke

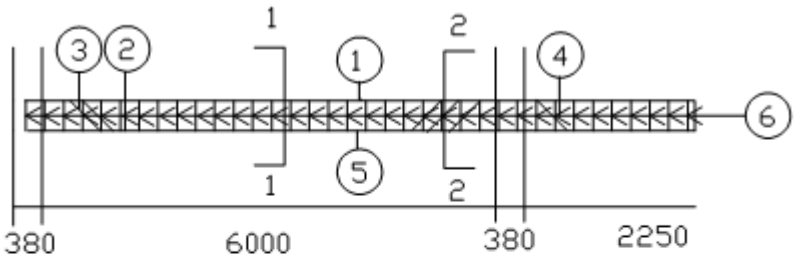
$x_0\geq x$

3 Maximális teherbírás kiszámítása

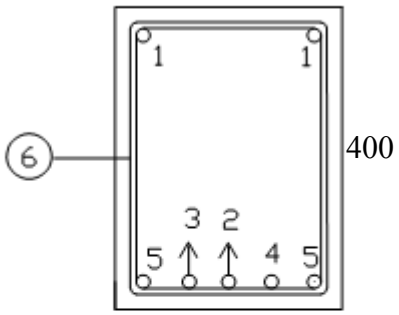
$M_h=N*Z$

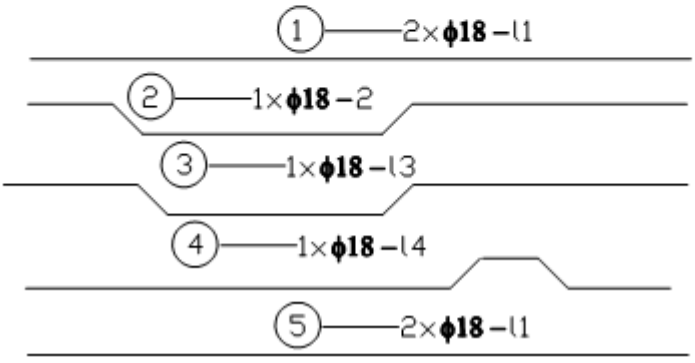
$$M_h=b*x*\sigma_{bh}(h-\frac{x}{2})=30*16,71*0,9*(35,9-\frac{16,71}{2})=12427\ kNcm=124,3\ kNm$$

$M_h>M_m$

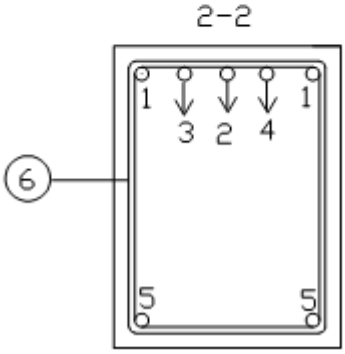


B 60.40
σ_{sh}=35 kN/cm^2
ξ=0,48
C16
σ_{bh}=1,15 kN/cm^2





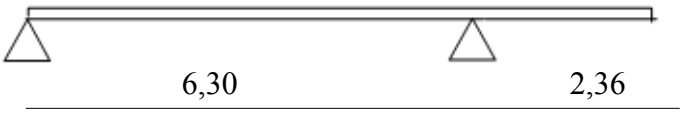
1. 2xϕ18
2. 1xϕ18
3. 1xϕ18
4 1xϕ18
5 2xϕ18
6 33x ϕ8 / 300

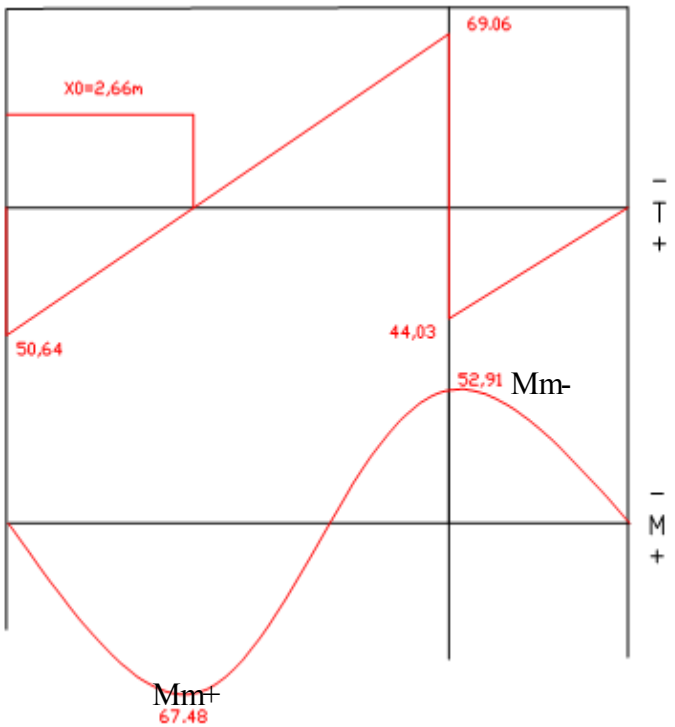


6*1,05 = 6,30
6+ ht = 6+0,4 = 6,40
6+ 0,38/2*2 = 6,38

qm= 19 kN/m

2,25*1,05= 2,36





$$\Sigma M_A = 0$$

$$q*l\frac{l}{2} - B*6{,}3 = 0 \Rightarrow B = \frac{19*8{,}56\frac{8{,}56}{2}}{6{,}3} = 113{,}08\,kN$$

$$\Sigma F_y = 0$$

$$Q - B = A = 19*8{,}56 - 113{,}09 = 50{,}64\,kN$$

$$x_0 = \frac{T}{q} = \frac{50{,}64}{19} = 2{,}66\,m$$

$$M_m^{+} = A*x_0 - q*x_0\frac{x_0}{2} = 50{,}64*2{,}66 - 19*2{,}66\frac{2{,}66}{2} = 67{,}48\,kNm$$

$$M_m^{-} = q*2{,}36\frac{2{,}36}{2} = 19*2{,}36\frac{2{,}36}{2} = -52{,}91\,kNm$$

Ellenőrzés + hajlításra

beton takarás

$c = c_1 + c_2 + c_3 = 2 + 0{,}5 - 0{,}5 = 2\,cm$

$a = c + d_k + \frac{d_s}{2} + 1 = 4{,}7\,cm$

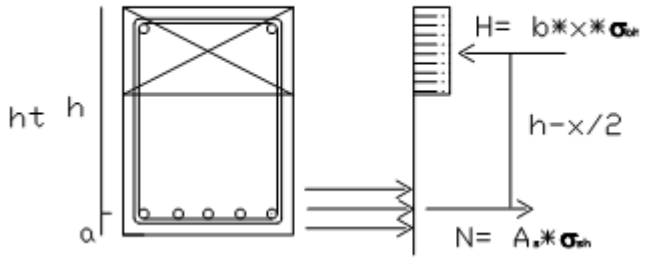
$h = ht - a = 40 - a = 35{,}3\,cm$

$x_0 = \xi * h = 0{,}48 * 35{,}3 = 16{,}94\,cm$ elméleti nyomot beton öv

N=H

$b * x * \sigma_{bh} = A_s * \sigma_{sh} \Rightarrow x = \frac{A_s * \sigma_{sa}}{b * \sigma_{sh}} = \frac{\frac{5 * 1{,}8^2 * \pi}{4} * 35{,}9}{30 * 1{,}15} = 12{,}9\,cm$ tényleges nyomot beton öv

A gerenda keresztmetszete megfelel mert x0>x



$M_H = N * Z = b * x * \sigma b_h * (h - \frac{x}{2})$

$30 * 12{,}9 * 1{,}15 * (35{,}3 - \frac{12{,}9}{2}) = 12839\,kNcm\ 128{,}39\,kNm$

A gerenda teherbírás megfelel

Ellenőrzés- hajlításra Letaposás veszélye miatt

$a' = c + d_k + \frac{d_s}{2} + 1 + 1 = 5{,}7\,cm$

$h' = ht - a' = 40 - 5{,}7 = 34{,}3\,cm$

$x_0' = 0{,}48 * 34{,}3 = 16{,}46\,cm$

$b * x * \sigma_{bh} = A_s * \sigma_{sh} \Rightarrow x' = \frac{A_s * \sigma_{sa}}{b * \sigma_{sh}} = \frac{\frac{5 * 1{,}8^2 * \pi}{4} * 35{,}9}{30 * 1{,}15} = 12{,}9\,cm$

$M_H^{-i} N * Z = b * x * \sigma b_h * (h - \frac{x}{2})$

$30 * 12{,}9 * 1{,}15 * (34{,}3 - \frac{12{,}9}{2}) = 123{,}94\,kNm$ megfelel

Gerenda minimális szélesége

$b = 2 * (c + d_k) + n * d_s + (n-1) * 2 = 2 * (2 + 0{,}8) + 5 * 1{,}8 + 4 * 2 = 22{,}6\,cm$