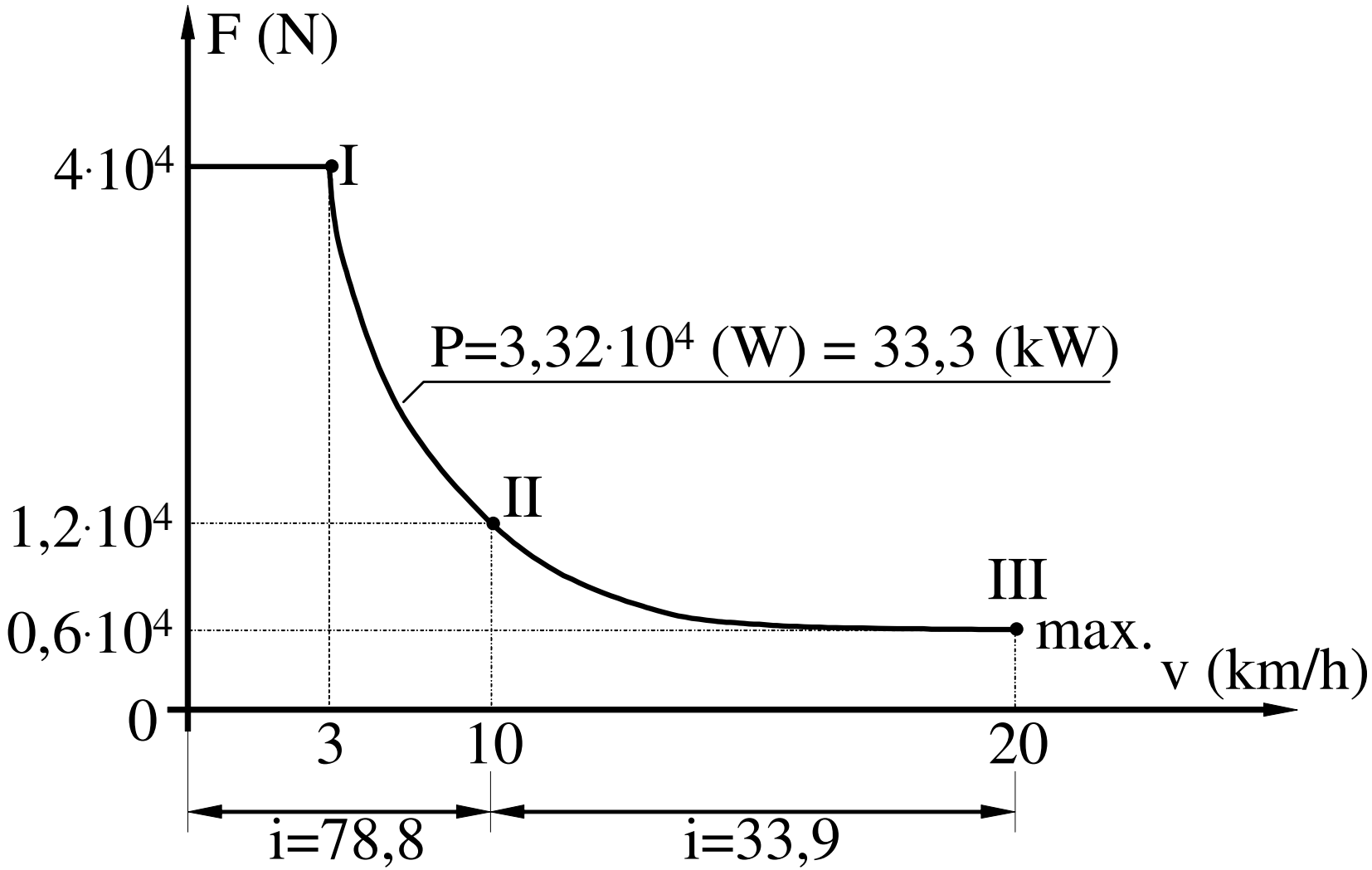
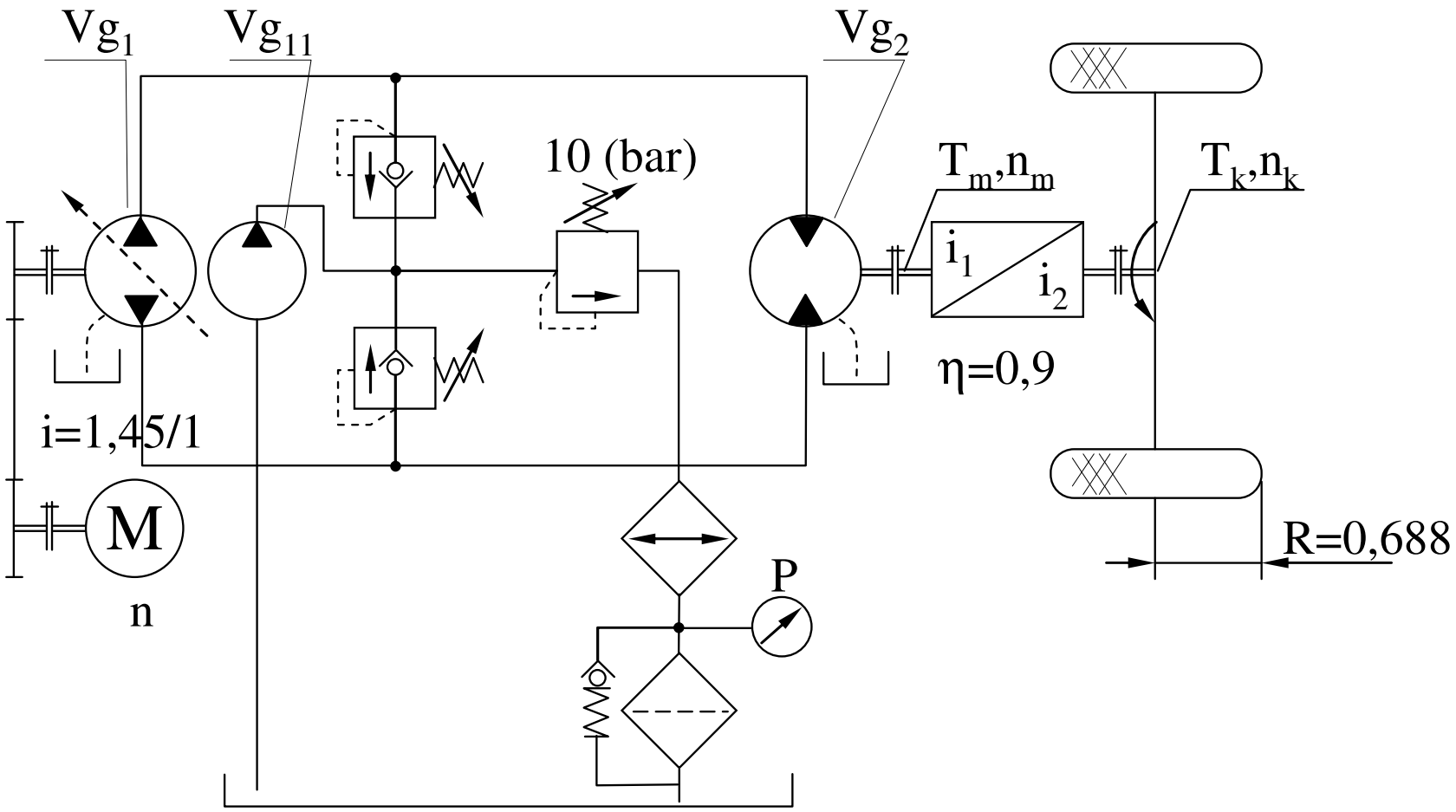

F (N)
4·10⁴
I
P=3,32·10⁴ (W) = 33,3 (kW)
II
1,2·10⁴
III
0,6·10⁴
max.
v (km/h)
0
3
10
20
i=78,8
i=33,9



Dízelmotor: $P \leq 120(kW)$

$n \leq 30(1/s)$

Keréknyomatékok

$T_{kI} = F_I \cdot R = 4 \cdot 10^4 \cdot 0{,}688 = \underline{2{,}752} \cdot 10^4 \text{ (Nm)}$

$T_{kII} = F_{II} \cdot R = 1{,}2 \cdot 10^4 \cdot 0{,}688 = \underline{0{,}826} \cdot 10^4 \text{ (Nm)}$

Nyomaték a hidromotorok tengelyein

$$\underline{T_{mI}} = \frac{1}{i_1 \cdot \eta} T_{kI} = \frac{1}{78{,}8 \cdot 0{,}9} \cdot 2{,}752 \cdot 10^4 = \underline{3{,}88 \cdot 10^2} \text{(Nm)}$$

$$\underline{T_{mII}} = \frac{1}{i_2 \cdot \eta} T_{kII} = \frac{1}{33{,}9 \cdot 0{,}9} \cdot 0{,}826 \cdot 10^4 = \underline{2{,}71 \cdot 10^2} \text{(Nm)}$$

Hidromotor választás:

$$\underline{T_{mI}} = \frac{1}{\eta_{mk}} V_{g2} \cdot \Delta p$$

$$V_{g2} = \frac{2\pi \cdot T_{mI}}{\eta_{mk} \Delta p} = \frac{2\pi \cdot 3{,}88 \cdot 10^{2}}{0{,}95 \cdot 320 \cdot 10^{5}} = \underline{8{,}015 \cdot 10^{-5}} \left(m^3\right) \cong \underline{80} \left(cm^3\right)$$

ahol:

η_{mk}0,95; Δp=320 (bar)

A választott hidromotor: A2FM80/61 - WpAB010 ; V_{g2}=80,4 (cm^3)

Nyomáskülönbségek a max. nyomatéknál:

$$\underline{\Delta p_I} = \frac{2\pi \cdot T_{mI}}{\eta_{mk} V_{g2}} = \frac{2\pi \cdot 3{,}88 \cdot 10^2}{0{,}95 \cdot 80{,}4 \cdot 10^{-6}} = 0{,}319 \cdot 10^8 \text{ (Pa)} = \underline{319}\text{(bar)}$$

$$\underline{\Delta p_{II}} = \frac{2\pi \cdot T_{mII}}{\eta_{mk} V_{g2}} = \frac{2\pi \cdot 33{,}9}{0{,}95 \cdot 80{,}4 \cdot 10^{-6}} = \underline{217}\text{(bar)}$$

Szivattyú választás:

A hidromotor folyadéknyelése: $q_{v(m)}=1/\eta_v V_{g2} n_{(m)}$

A hidromotor fordulatszáma: $n_{(m)}=i \cdot n_{(k)}$

A kerék fordulatszáma: $n_{(k)}=2/(2R\pi)$

$$\underline{v_1} = 10\,(\text{km/h}) = 2{,}78\,(\text{m/s})$$

$$\underline{n_{k1}} = \frac{2{,}78}{2\pi \cdot 0{,}688} = 0{,}64\,(1/\text{s})$$

$$\underline{n_{m1}} = i_1 \cdot n_{k1} = 78{,}8 \cdot 0{,}64 = 50{,}7\,(1/\text{s})$$

$$\underline{v_2} = 20\,(\text{km/h}) = 5{,}56\,(\text{m/s})$$

$$\underline{n_{k2}} = \frac{5{,}56}{2\pi \cdot 0{,}688} = 1{,}28\,(1/\text{s})$$

$$\underline{n_{m2}} = i_2 \cdot n_{k2} = 33{,}9 \cdot 1{,}28 = 43{,}39\,(1/\text{s})$$

$$\underline{q_{v(m)}} = \frac{1}{\eta_v} V_g n_{(m)1} = \frac{1}{0,95} \cdot 80,4 \cdot 10^{-6} \cdot 50,7 = 4,29 \cdot 10^{-3} \left(\frac{m^3}{s} \right)$$

$$\underline{q_{v(m)}} = \underline{257,4} \left(\frac{dm^3}{min} \right)$$

$$q_{v(m)} = q_{v(sz)} = \eta_v V_{g1(max)} \cdot n_{sz} \rightarrow$$

$$V_{g1(max)} = \frac{q_{v(m)}}{\eta_v \cdot n_{sz}} = \frac{4,29 \cdot 10^{-3}}{0,95 \cdot 43,5} = 0,1038 \cdot 10^{-3} (m^3) = 103,8 (cm^3)$$

Ahol η_v=0,95; n_{sz}=i· n_{dm}= 1,45·30=43,5 (1/s)

A választott szivattyú: A4VSG125E01

$V_{g1} \leq 125$ (cm^3) V_{g11}=26 (cm^3)

$$\frac{V_{g11}}{V_{g1}} = \frac{26}{125} = 0,208 \approx 21(\%)$$

$$\underline{q_{v11}} = q_{g11} n_{sz} = 26 \cdot 43{,}5 = \underline{67{,}86} \left(\frac{dm^3}{min} \right)$$

$$\sum q_{v(R)_{max}} = (1 - \eta_v) V_{g1} n_{(sz)} + (1 - \eta_v) V_{g2} n_{(m)} =$$

$$= (1 - 0{,}9) \cdot 125 \cdot 43{,}5 + (1 - 0{,}9) \cdot 80{,}4 \cdot 50{,}7 =$$

$$= 57{,}05 \left(\frac{dm^3}{min} \right) < 67{,}83 \left(\frac{dm^3}{min} \right)$$

A hajtás összhatásfoka az I pontban:

$$\eta_{ö} = \frac{P_{(k)I}}{P_I}$$

$$\text{ahol} : P_{(k)I} = 3{,}33 \cdot 10^4 (W)$$

$$P_I = \frac{1}{\eta_{ö}} q_{v(1)} \left(\Delta p_{(m)} + \Delta p_{(csőc}\right) + \frac{1}{\eta_{ö}} q_{v(11)} \Delta p_{(11)} =$$

$$= \frac{1}{0{,}9} \cdot 1{,}285 \cdot 10^{-3} \left(319 \cdot 10^5 + 0{,}89 \cdot 10^5\right) + \frac{1}{0{,}9} 1{,}13 \cdot 10^{-3} \cdot 10 \cdot 10^5 =$$

$$= 45{,}673 \cdot 10^3 + 1{,}256 \cdot 10^3 = \underline{46{,}93 \cdot 10^3} (\mathrm{W})$$

Ahol v=3(km/h) = 0,833 (m/s); $\Rightarrow$ $n_{(k)}$=0,19 (1/s); $n_{(m)}$=15,19 (1/s)

$$q_{v(1)} = \frac{1}{\eta_v} V_{g2} n_m = \frac{1}{0{,}95} \cdot 80{,}4 \cdot 10^{-6} \cdot 15{,}19 = 1{,}285 \cdot 10^{-3} \left(\frac{m^3}{s}\right)$$

$$\Delta p_{(m)} = 319(\mathrm{bar}); \Delta p_{(csőc} = 10(\mathrm{bar}); q_v = 4{,}29 \cdot 10^{-3} \left(\frac{m^3}{s}\right)$$

$$\Delta p'_{(cső)} = \Delta p_{(cső)} \left[\frac{1{,}285 \cdot 10^{-3}}{4{,}29 \cdot 10^{-3}}\right]^2 = 10 \cdot 8{,}97 \cdot 10^{-2} = 0{,}89(\mathrm{bar})$$

$$\underline{\eta_{\ddot{o}(I)}} = \frac{3{,}33 \cdot 10^4}{4{,}69 \cdot 10^4} = \underline{0{,}71} \Rightarrow 71(\%)$$