Tilterkningskraft fra tiltrekningsmoment iht. sb-Skrueforbindelser 2016

M27
DIN 976

$F := 136.6 \text{ kN}$

$D\_min := 41.44 \text{ mm}$

$D_1 := 24.8 \text{ mm}$

$P := 3 \text{ mm}$

Nominal	Pitch of thread P	Thread Length b	Major Diameter (D)	Pitch Diameter (D1)	Minor Diameter (D2)

$\alpha := 30 \text{ deg}$ halve gjengevinkelen

$r_m := \dfrac{D_1}{2} = 12.4 \text{ mm}$

$\varphi := \text{atan}\left(\dfrac{P}{\pi \cdot D\_min}\right) = 1.3201 \text{ deg}$

$\mu := 0.10$ friksjonskoeffisient gjenge

$\mu' := 0.10$ friksjonsfaktor mellom skruehode / mutter og underlag

$\varepsilon_1 := \text{atan}\left(\dfrac{\mu}{\cos(\alpha)}\right) = 0.115$

$M_V := F \cdot \tan\left(\varphi + \varepsilon_1\right) \cdot r_m = 235.246 \text{ N m}$

$Key\_Width := 41 \text{ mm}$ nøkkelvidde

$Normal\_Fit\_Hole := 30 \text{ mm}$

$r'_m := \dfrac{Key\_Width + Normal\_Fit\_Hole}{4} = 17.75 \text{ mm}$

$M_s := \mu' \cdot F \cdot r'_m = 242.465 \text{ N m}$

$M := M_s + M_V = 477.711 \text{ N m}$

$M_s = F_F \cdot r'_m = \mu' F \cdot r'_m$

hvor: F_F = friksjonskraft
F = aksialkraften
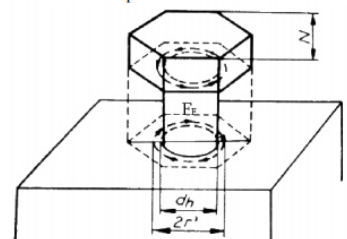μ' = friksjonskoeffisienten mellom skruehode / mutter og underlag
r'_m = den radius som friksjonskraften antas å virke på

$r'_m = \dfrac{N + d_h}{4}$

hvor: N = nøkkelvidde
d_h = hullets diameter

N og d_h finner du i skruetabeller.

Figur 4.8
Ved tiltrekking oppstår friksjonskraft F_F mellom skruehode og underlag.

Nominal	Pitch of thread P	Thread Length b	Major Diameter (D)		Pitch Diameter (D1)		Minor Diameter (D2)
	MM		Min.	Min.	Min.	Max.	Max.
M-16	2.0	Full Thread	15.68	15.96	14.50	14.60	13.80
M-18	2.5	Full Thread	17.62	17.96	16.15	16.25	15.25
M-20	2.5	Full Thread	19.62	19.96	18.15	18.25	17.25
M-22	2.5	Full Thread	21.62	21.96	20.15	20.25	19.25
M-24	3.0	Full Thread	23.58	23.95	21.80	21.90	20.70
M-27	3.0	Full Thread	26.58	26.95	24.80	24.90	23.70
M-30	3.5	Full Thread	29.52	29.95	27.50	27.60	26.16
M-33	3.5	Full Thread	32.52	32.95	30.50	30.60	29.16
M-36	4.0	Full Thread	35.46	35.94	33.15	33.25	31.61
M-39	4.0	Full Thread	38.46	38.94	36.20	36.30	34.61
M-42	4.5	Full Thread	41.44	41.94	38.80	38.90	37.07
M-45	4.5	Full Thread	44.44	44.94	41.80	41.90	40.07
M-48	5.0	Full Thread	47.40	47.93	44.50	44.60	42.52
M-52	5.0	Full Thread	51.40	51.93	48.50	48.60	46.52
M-56	5.5	Full Thread	55.36	55.92	52.10	52.20	49.97
M-60	5.5	Full Thread	59.36	59.92	57.85	57.95	53.97
M-64	6.0	Full Thread	63.32	63.92	59.80	59.90	57.42

Torque to Force calculation

M27
DIN 976

$M := 200$ N m

$D\_min := 41.44$ mm

$D_1 := 24.8$ mm

$P := 3$ mm

a) The Stud Bolt will be according to DIN 976.
b) Threads will be F.T & conform to Class 2A.
c) Material High grade carbon/alloy steel & stainless steel.
d) Heat Treatment Property Class Grade A2, A4, B, B7, B7M, B8, B8M, B8T, L7, L7M, L43.
e) Coating & Marking will be done as per requirement.
f) Tolerance of Total Length of Stud Bolt is -0.0/+3.0 In required length.
g) Chemical & Mechanical Properties as per ISO 898-1 or DIN 267.

Nominal	Pitch of thread P	Thread Length b	Major Diameter (D)	Pitch Diameter (D1)	Minor Diameter (D2)

$\alpha := 30$ deg   halve gjengevinkelen

$r_m := \dfrac{D_1}{2} = 12.4$ mm

$\varphi := \text{atan}\left(\dfrac{P}{\pi \cdot D\_min}\right) = 1.3201$ deg

$\mu := 0.10$ friksjonskoeffisient gjenge

$\mu' := 0.10$ friksjonsfaktor mellom skruehode / mutter og underlag

$\varepsilon_1 := \text{atan}\left(\dfrac{\mu}{\cos(\alpha)}\right) = 0.115$

$Key\_Width := 41$ mm   nøkkelvidde

$Normal\_Fit\_Hole := 30$ mm

$r'_m := \dfrac{Key\_Width + Normal\_Fit\_Hole}{4} = 17.75$ mm

$\boxed{M_s = F_F \cdot r'_m = \mu' F \cdot r'_m}$

hvor: F_F = friksjonskraft
F = aksialkraften
μ' = friksjonskoeffisienten mellom skruehode / mutter og underlag
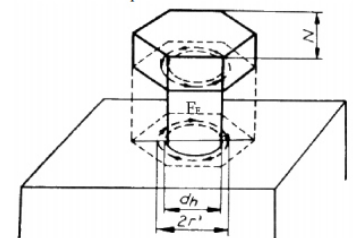r'_m = den radius som friksjonskraften antas å virke på

$r'_m = \dfrac{N + d_h}{4}$

hvor: N = nøkkelvidde
d_h = hullets diameter

N og d_h finner du i skruetabeller.

$F := \dfrac{M}{\mu' \cdot r'_m + 1 \cdot \tan(\varphi + \varepsilon_1) \cdot r_m} = 57.1894$ kN

$M_s := \mu' \cdot F \cdot r'_m = 101.5112$ N m

$M_V := F \cdot \tan(\varphi + \varepsilon_1) \cdot r_m = 98.4888$ N m

Figur 4.8
Ved tiltrekking oppstår friksjonskraft F_F
mellom skruehode og underlag.