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Estimation of screw diameters (according to VDI* 2230)

The following procedure enables an estimation of screw diameter depending on the operating force at temperature of 20°C (15° - 25°C) and on tightening method.

The result has to be double checked by either exact calculation or testing the joint.

Special conditions as mentioned e.g. on page T 10, are not taken into consideration for this estimation.

1	2	3	4
Force in N	Nominal diameter in mm		
	Property class		
	12.9	10.9	8.8
250			
400			
630			
1 000			
1 600	3	3	3
2 500	3	3	4
4 000	4	4	5
6 300	4	5	5
10 000	5	6	8
16 000	6	8	8
25 000	8	10	10
40 000	10	12	14
63 000	12	14	16
100 000	16	16	20
160 000	20	20	24
250 000	24	27	30
400 000	30	36	
630 000	36		

Example:

A joint is dynamically and eccentrically loaded by the axial force F_A = 5800 N.
A screw with property class 8.8 is to be assembled using a manual torque wrench.

A 6300 N is the next higher force to F_A in column 1.

B 2 steps for "eccentric and dynamic axial force" add up to $F_{M\ min}$ = 16000 N.

C 1 step for "tightening with manual torque wrench" adds up to $F_{M\ max}$ = 25000 N.

D For the force $F_{M\ max}$ = 25000 N, you will find thread size M 10 in column 4 (property class 8.8)

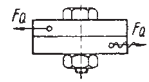
* VDI = Association of German Engineers

A Choose the next higher force value to *operating force* $F_{A,\ Q}$ acting on the bolted joint.

B The required *minimum preload force* $F_{M\ min}$ is found by proceeding from this force with:

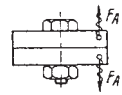
- 4 steps for static or dynamic transverse shear force,

  or



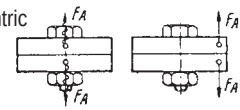
- 2 steps for dynamic and eccentric axial force,

  or

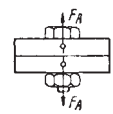


- 1 step for either dynamic and concentric or static and eccentric axial force,

  or



- 0 step for static and concentric axial force.



C The required *maximum preload force* $F_{M\ max}$ is found by proceeding from force $F_{M\ min}$ *with:*

- 2 steps for tightening the screw with a simple mechanical, motorized or pneumatic screw driver, which is set for a certain tightening torque,

  or

- 1 step for tightening with a torque wrench or precision screw driver, which is set and checked by means of the dynamic torque measurement or elongation of the screw.

  or

- 0 step for tightening by angle control or by computerized yield point control.

D Once the maximum preload force is estimated, the correct *screw size in mm* is found next to it in column 2 to 4 underneath the appropriate property class.