Calculation of pinned couplings

1.0 Loading and basic parameters of the coupling

1.1 Calculation units

1.2 Coupling type: Clevis pin for rotating rod-clevis connection. Loading with transversal bending force.

1.3 Connection loading

1.4 Transferred power

1.5 Shaft speed

1.6 Torque

1.7 Acting force

1.8 Operational and mounting parameters of the coupling

1.9 Type of loading

1.10 Type of pin

1.11 Type of fit

1.12 Desired safety

1.13 Clevis material (min. tensile strength)

1.14 Structural steel (50)

1.15 Ultimate tensile strength $S_{\text{min}}$ 50,0 [ksi]

1.16 Permissible pressure (fixed fit) $p_A$ 13,0 [ksi]

1.17 Permiss. pressure (running fit) $p_B$ 4,5 [ksi]

1.18 Rod material (min. tensile strength)

1.19 F-High-grade and alloy steel (100)

1.20 Ultimate tensile strength $S_{\text{min}}$ 29,0 [ksi]

1.21 Permissible pressure (fixed fit) $p_A$ 29,0 [ksi]

1.22 Permiss. pressure (running fit) $p_B$ 5,0 [ksi]

2.0 Design of coupling dimensions

2.1 Pin selection, coupling parameters

2.2 ANSI B18.8.1  Clevis pins with head and split pin hole

2.3 Allowable range of pin diameters

2.4 Number of pins in connection

2.5 Reduction factors

2.6 Load distribution factor

2.7 Service factor (pressure)

2.8 Service factor (bending, shearing)

2.9 Pin material (min. tensile strength)

2.10 Surface-hardened steel (95) [HRC 45-53]

2.11 Ultimate tensile strength $S_{\text{min}}$ 95,0 [ksi]

2.12 Permissible pressure (fixed fit) $p_A$ 32,0 [ksi]

2.13 Permiss. pressure (running fit) $p_B$ 6,0 [ksi]

2.14 Permissible shear stress $\tau_A$ 14,5 [ksi]

2.15 Permissible bending stress $\sigma_A$ 23,0 [ksi]

2.16 Coupling dimensions

2.17 Rod width

2.18 Clevis width

2.19 Recommended pin diameter

2.20 Searching for a suitable pin

2.21 Pin diameter

2.22 Allowable range of pin lengths

2.23 Pin length

2.24 Min. functional length of pin

2.25 Functional length of pin

2.26 $K_{t}$ 1,00

2.27 $K_{s}$ 1,00

3.0 Strength checks of the coupling

3.1 Pin check for shearing

3.2 Permissible shear stress $\tau_A$ 14,5 [ksi]

3.3 Comparative stress $\tau$ 0,6 [ksi]

3.4 Safety $22,78$

3.5 Pin check for bending

3.6 Permissible bending stress $\sigma_A$ 23,0 [ksi]

3.7 Comparative stress $\sigma$ 5,1 [ksi]

3.8 Safety $4,52$

3.9 Check of contact pressure: Pin - Clevis

3.10 Permissible pressure $p_A$ 4,5 [ksi]

3.11 Comparative pressure $p$ 0,5 [ksi]

3.12 Safety $9,00$

3.13 Check of contact pressure: Pin - Rod

3.14 Permissible pressure $p_A$ 5,0 [ksi]

3.15 Comparative pressure $p$ 0,5 [ksi]

3.16 Safety $10,00$

4.0 Graphical output, CAD systems

4.1 2D drawing output to: Dxf File

4.2 2D Drawing scale Automatic