

MACHINE DESIGN DATA HANDBOOK

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MACHINE DESIGN DATA HANDBOOK

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This book is printed on acid-free paper.

To Professor B. R. Narayana Iyengar
To my parents: Kenchaiah and Madamma
To my wife: M. P. Madamma
and my children: L. Susheela,
L. Nagarathna, L. Vasanth Kumar,
L. Suma, and L. Vivekananda

Particular	Formula	
The axial stress in the sleeve	$\sigma = \frac{F}{\frac{\pi}{4} (d_3^2 - d_2^2) - (d_3 - d_2)d_m}$	(17-41)
TORQUE. The shear due to twisting moment applied	$\tau = \frac{M_t}{\frac{\pi}{4} d_m^2 d_2}$	(17-42)
For the design of hollow shaft subjected to torsion	Refer to Chap. 14.	
Taper joint and nut		
The tensile stress in the threaded portion of the rod (Fig. 17-8) without taking into consideration stress concentration	$\sigma_t = \frac{F}{\frac{\pi}{4} d_c^2}$	(17-43)

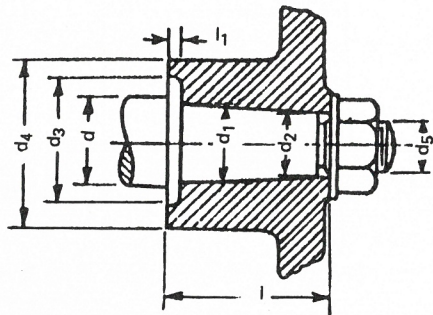


FIGURE 17-8 Tapered joint and nut.

The bearing resistance offered by the collar	$\sigma_c = \frac{F}{\frac{\pi}{4} (d_3^2 - d_2^2)}$	(17-44)
The diameter of the taper d_2 Provide a taper of 1 in 50 for the length $(l - l_1)$	$d_2 > d_{nom}$	(17-45)
Knuckle joint		
The tensile stress in the rod (Fig. 17-9)	$\sigma_t = \frac{4F}{\pi d^2}$	(17-46)
The tensile stress in the net area of the eye	$\sigma_t = \frac{F}{(d_4 - d_2)b}$	(17-47)
Shear stress in the eye	$\tau = \frac{F}{b(d_4 - d_2)}$	(17-48)

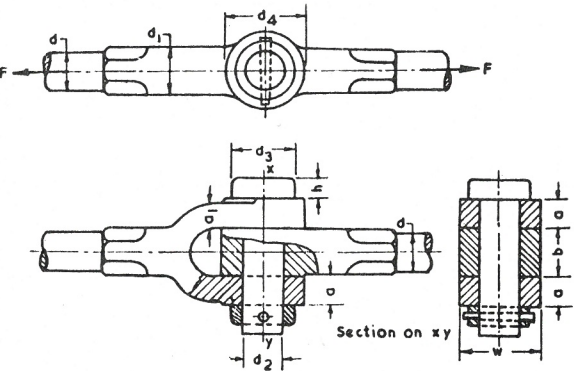
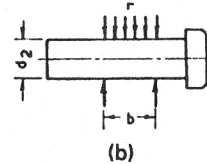
Particular	Formula
 (a)	 (b)

FIGURE 17-9 Knuckle joint for round rods.

Tensile stress in the net area of the fork ends	$\sigma_t = \frac{F}{2a(d_4 - d_2)}$	(17-49)
Shear stress in the fork ends due to tear of	$\tau = \frac{F}{2a(d_4 - d_2)}$	(17-50)
Compressive stress in the eye due to bearing pressure of the pin	$\sigma_c = \frac{F}{d_2 b}$	(17-51)
Compressive stress in the fork due to the bearing pressure of the pin	$\sigma_c = \frac{F}{2d_2 a}$	(17-52)
Shear stress in the knuckle pin	$\tau = \frac{2F}{\pi d_2^2}$	(17-53)
The maximum bending moment, Fig. 17-9 (panel b)	$M_b = \frac{Fb}{8}$	(17-54)
The maximum bending stress in the pin, based on the assumption that the pin is supported and loaded as shown in Fig. 17-9b and that the maximum bending moment M_b occurs at the center of the pin	$\sigma_b = \frac{4Fb}{\pi d_2^3}$	(17-55)
The maximum bending moment on the pin based on the assumption that the pin supported and loaded as shown in Fig. 17-10b, which occurs at the center of the pin	$M_b = \frac{F}{2} \left(\frac{b}{4} + \frac{a}{3} \right) \text{ (approx.)}$	(17-56)
The maximum bending stress in the pin based on the assumption that the pin is supported and loaded as shown in Fig. 17-10b	$\sigma_b = \frac{4(3b + 4a)F}{3\pi d_2^3}$	(17-57)

Mechanical Engineering

*The formulas and
data required to solve virtually
any machine design problem*

MACHINE DESIGN DATA HANDBOOK

Here, in one complete reference, is the latest and most accurate technical information for solving various types of machine design problems—quickly and easily. Included are hundreds of charts on material properties, as well as the necessary equations, formulas (empirical, semi-empirical, and otherwise), calculations, graphs, and data you need in your day-to-day design work.

Providing information in both SI and Customary units and featuring 1200 helpful illustrations, *Machine Design Data Handbook* gives you authoritative coverage of gear ... bearings ... shafts ... couplings, clutches, and brakes ... flexible machine elements ... springs ... threaded fasteners and screws ... cams ... cylinders, pipes, and tubes ... plates, shells, and pressure vessel heads ... boilers and boiler tubes ... welded and riveted joints ... flywheels ... packing and seals ... metal fits and tolerances ... keys, cot-
ters, splines, and pins ... mechanisms ... vibrations ... and much more.

You'll also find detailed information on engineering materials, the nature of stress in machine elements, the design of components for strength, vehicle mechanics, friction gearing, and other essential topics.

The format of this handbook is quite different from other handbooks. Each chapter begins with symbol definitions followed by formulas, charts, graphs, and tables containing data for solving machine design problems in classrooms, examinations, and design offices. Equations are cross-referenced to tables, figures, and charts.

A "must" for engineers, designers, and technicians, this invaluable working tool places at your fingertips up-to-date information and data for the design of machines and their components.

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