Minimum Length of Thread Engagement Formula an Calculations Per FED-STD-H28/2B

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Screw Thread Strength Calculations FED-STD-H28/2B, 1991 and Machinery's Handbook twenty fourth Edition.

These calculations strictly apply to UN thread series however, may be used metric series threads. In practice when the values are calculated the value f the screw shear strength is similar to the very convenient formula provided above.

Length of Thread

$$L_e = \frac{2 \times A_t}{K_n max \ \pi \left(\frac{1}{2} + 0.57735 \ n \left(E_s \ min - K_n \ max \right) \right)}$$

Where:

L_e = Fastener thread engagement
A_t = Tensile Stress Area
$K_n max$ = Maximum minor diameter of internal thread.
$E_s min$ = Minimum pitch diameter of external thread.
n = Number of threads per inch

If material in which the female thread is tapped is significantly weaker that t screw material then J must be evaluated.

$$J = \frac{A_S \times \text{tensile strength of external thread material}}{A_n \times \text{tensile strength of internal thread material}}$$

Where;

A_s = Shear area of the external thread (screw or fastener)
A_n = Shear area of the internal thread (hole)

If the value of J is greater than 1 then the length of engagement must be increased to at least

$$L_{e2} = J \times L_e$$

Where:

Le = Fastener Thread Engagement