

Layout and Scaling Threads for SketchUp

Four Helix Deformation

One-half inch Diameter 13 TPI UNC—26-count Coarse Threads

One-half inch Diameter 20 TPI UNF—40-count Fine Threads

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Coarse Thread Dimensions (Scale: 4800mm = 1 inch):

Crest Diameter:	CD = 2400mm (using 24 line segment circle)
Pitch:	P = 369.2307692307mm (4800 / 13 rounded to 10 decimal places) $P_1 = P/2 = 184.6153846154\text{mm}$ $P_2 = P_1 \times .625 = 115.384615384625\text{mm}$
Crest:	C = P x .125 = 46.15384615mm
Root:	R = C x 2 = 92.3076923mm (unused value for calculation)
Thread Depth:	TD = $P_2 \times 1.732051 = 199.8520384616\text{mm}$ (1.732051 derived from a 100,000mm rectangular measurement at 30 Degrees)
Root Diameter:	RD = CD – (TD x 2) = 2,000.2959230768mm. Used to Calculate Thread Scaling*
Thread Profile Info.	
Helixes:	H1 = 0.0mm H2 = P_2 Duplicate and move beneath H1 H3 = C Duplicate and move beneath H2 H4 = P_2 Duplicate and move beneath H3 R = Area Beneath H4 (Selected area to be Scaled/Deformed)
*Scaling the Root:	Apply Pythagorean Theorem Hypotenuse (Scaling Value) = $\frac{\sqrt{RD^2 + RD^2}}{2} = 1,414.4228\text{mm}$

Fine Thread Dimensions (Scale: 4800mm = 1 inch):

Crest Diameter: $CD = 2400\text{mm}$ (using 24 line segment circle)

Pitch: $P = 240\text{mm}$ (4800 / 20)

$$P_1 = P/2 = 120\text{mm}$$

$$P_2 = P_1 \times .625 = 75\text{mm}$$

Crest: $C = P \times .125 = 30\text{mm}$

Root: $R = C \times 2 = 60\text{mm}$ (unused value for calculation)

Thread Depth: $TD = P_2 \times 1.732051 = 129.903825\text{mm}$
(1.732051 derived from a 100,000mm rectangular measurement at 30 Degrees)

Root Diameter: $RD = CD - (TD \times 2) = 2,140.19235$. Used to Calculate Thread Scaling*

Thread Profile Info.

Helixes: $H1 = 0.0\text{mm}$

$H2 = P_2$ Duplicate and move beneath H1

$H3 = C$ Duplicate and move beneath H2

$H4 = P_2$ Duplicate and move beneath H3

R = Area Beneath H4 (Selected area to be Scaled/Deformed)

*Scaling the Root: Apply Pythagorean Theorem

$$\text{Hypotenuse (Scaling Value)} = \frac{\sqrt{RD^2 + RD^2}}{2} = 1,513.4452\text{mm}$$