EQUAL LATERAL TEE HEADER HOLE FORMULA

4" Header OD = 114 mm => ½ OD = 57 mm.
4 " Branch ID = 113 mm => ½ ID = 56.5 mm.
CL = 16 Center line => 360° ÷ 16 = 22.5°

Equal Tee Branch Cutting Formula:

$$H\tfrac{1}{2}\,OD - \sqrt{\{H\tfrac{1}{2}\,OD^2 - (B\tfrac{1}{2}ID \times \sin(Degree))^2\}}$$

$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(22.5))^2\}}$ = 04.26 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(45))^2\}}$ = 16.34 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(67.5))^2\}}$ = 34.10 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(90))^2\}}$ = 49.46 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(122.5))^2\}}$ = 34.10 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(135))^2\}}$ = 16.34 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(157.5))^2\}}$ = 04.26 mm
$= 57 - \sqrt{\{57^2 - (56.5 \times \sin(180))^2\}}$ = 00.00 mm

HORIZONTAL LINE DISTANCE FORMULA:

$$\tan^{-1}\{(B\tfrac{1}{2}ID \times \sin(Degree)) \div (H\tfrac{1}{2}\,OD - \text{equal tee Cutback})\} \times H\tfrac{1}{2}\,OD \times \cos 89^\circ$$

22.5° => $\tan^{-1}\{(56.5 \times \sin(22.5)) \div (57 - 4.26)\} \times 57 \times \cos 89^\circ$ = 22.17 mm
45° => $\tan^{-1}\{(56.5 \times \sin(45)) \div (57 - 16.34)\} \times 57 \times \cos 89^\circ$ = 44.25 mm
67.5° => $\tan^{-1}\{(56.5 \times \sin(67.5)) \div (57 - 34.10)\} \times 57 \times \cos 89^\circ$ = 65.96 mm
90° => $\tan^{-1}\{(56.5 \times \sin(90)) \div (57 - 49.46)\} \times 57 \times \cos 89^\circ$ = 81.96 mm

EQUAL LATERAL TEE BRANCH CUTBACK FORMULA:

$$(H\tfrac{1}{2}\,OD - \sqrt{(H\tfrac{1}{2}\,OD^2 - (\sin(D) \times B\tfrac{1}{2}\,ID)^2)}) \div \sin(Y) + B\tfrac{1}{2}\,ID(1-\cos(D)) \div \tan(Y)$$

22.5° = $(57 - \sqrt{(57^2 - (\sin(22.5) \times 56.5)^2)}) \div \sin(45) + 56.5(1-\cos(22.5)) \div \tan(45)$ = 10.32 mm
45° = $(57 - \sqrt{(57^2 - (\sin(45) \times 56.5)^2)}) \div \sin(45) + 56.5(1-\cos(45)) \div \tan(45)$ = 39.66 mm
67.5° = $(57 - \sqrt{(57^2 - (\sin(67.5) \times 56.5)^2)}) \div \sin(45) + 56.5(1-\cos(67.5)) \div \tan(45)$ = 83.10 mm
90° = $(57 - \sqrt{(57^2 - (\sin(90.5) \times 56.5)^2)}) \div \sin(45) + 56.5(1-\cos(90)) \div \tan(45)$ = 126.45 mm
112.5° = $(57 - \sqrt{(57^2 - (\sin(112.5) \times 56.5)^2)}) \div \sin(45) + 56.5(1-\cos(112.5)) \div \tan(45)$ = 119.56 mm
135° = $(57 - \sqrt{(57^2 - (\sin(135) \times 56.5)^2)}) \div \sin(45) + 56.5(1-\cos(135)) \div \tan(45)$ = 119.56 mm

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157.5° = (57 - √(57² - (Sin(22.5) × 56.5)²)) ÷ Sin(45) + 56.5(1-Cos(157.5)) ÷ Tan(45) = 114.72 mm
180° = (57 - √(57² - (Sin(22.5) × 56.5)²)) ÷ Sin(45) + 56.5(1-Cos(180)) ÷ Tan(45) = 113 mm

VERTICAL LINE DISTANCE FORMULA:

(i) √((B½ID × (1-Cos(Degree)))² + Equal Lateral Tee Cutback²) = Ans
(ii) √(Ans² - Equal Tee Cutback²) = Vertical line Distance

for 22.5 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 10.38 mm Vertical line Distance

for 45 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 39.74 mm Vertical line Distance

for 67.5 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 83.41 mm Vertical line Distance

for 90 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 129.35 mm Vertical line Distance

for 112.5 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 144.58 mm Vertical line Distance

for 135 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 152.78 mm Vertical line Distance

for 157.5 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 157.94 mm Vertical line Distance

for 180 degree..
(i) √((56.5 × (1-Cos(22.5)))² + 10.32²) = 11.18
(ii) √(11.18² - 4.26²) = 159 mm Vertical line Distance

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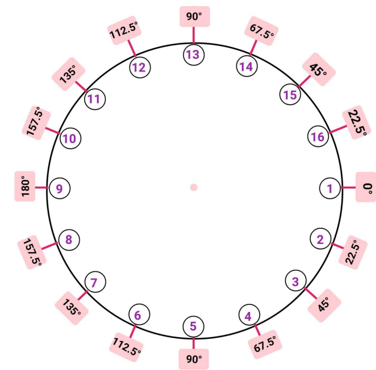
for 135 degree..

(i) $\sqrt{(56.5 \times (1-\cos(22.5)))^2 + 10.32^2} = 11.18$

(ii) $\sqrt{11.18^2 - 4.26^2} =$ 10.38 mm Vertical line Distance

[Watch Video for Marking Process](#) 📺🎬



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