Employment and Social Development Canada
Emploi et Développement social Canada

Atlantic Workforce Partnership
Partenariat pour la main-d'œuvre de l'Atlantique

Formula Sheet

Sheet Metal Worker

FORMULAS

1. $\frac{degrees}{360°}\ x\ \pi\ x\ Diameter + allowances =$ *Elbow Runner Length*

2. $\frac{Large\ Diameter\ x\ Vertical\ Height}{Large\ Diameter\ - Small\ Diameter} = Apex\ Height$

3. $a^2 + b^2 = c^2$

4. $CFM = Area\ x\ FPM$

5. $Angle\ of\ Bend\ x\ (0.01743R + 0.0078t) = Bend\ Allowance$
   R= radius t= Metal thickness

6. $\frac{Offset^2\ + Length^2}{4\ x\ Offset} = Swing\ Point\ Radius$

7. $A = \pi r^2$

8. $\frac{(4x\sqrt{(offset^2 + length^2)} - length)}{3} = Runner\ Length$

9. $1.08\ x\ CFM\ x\ \Delta T\ =\ BTU/hr$

10. $\pi r^2 h = Volume\ of\ a\ cylinder$

11. $RPM\ x\ Percent\ Increase = New\ RPM$

12. $\frac{180\ x\ Diameter\ of\ Cone\ Base}{Slant\ height} = Pattern\ Angle$

13. $\sqrt{Apex^2\ + Radius^2} = Slant\ Length$

14. $\frac{Angle\ of\ Elbow}{2\ x\ \#\ of\ Gores - 2} = Mitre\ Angle$

15. $\sin\left(\frac{Pattern\ Angle}{2}\right)\ x\ Slant\ Height\ x\ 2 = Chord\ \ Length$

16. $\mathrm{Tan}(Mitre\ Angle)\ x\ Centerline\ Radius\ x\ (2\ x\ \#of\ gores - 2) =$
    $Cut\ Size\ for\ \emptyset\ Elbow$

17. $\frac{Offset}{\sin(Elbow\ Angle)} - 2\ x\ \left[\tan\left(\frac{Elbow\ Angle}{2}\right)\ x\ Centerline\ Radius\right] =$
$Offset\ Pipe\ Length$

18. $\Delta H\ x\ CFM\ x\ 4.5 =$ BTU/hr

19. $4005\sqrt{Velocity\ Pressure} = Air\ velocity$ $\qquad Velocity\ Pressure =$
(Velocity÷4005)²

20. $(\%\ of\ Outside\ Air\ x\ Outside\ Air\ Temp.) +$
$(\%\ of\ Return\ Air\ x\ Return\ Air\ Temp.) = Mixed\ Air\ Temperature$

21. $\frac{Left\ Angle}{360°}\ x\ \pi\ x\ 2(Left\ Heel\ Radius) + \frac{Right\ Angle}{360°}\ x\ \pi\ x\ 2(Right\ Heel\ Radius) =$
$Heel\ Stretchout\ for\ Y - Branch$

22. $\frac{1}{2}h\ (B_1 + B_2) = Area\ of\ Trapezoid$

23. $\frac{CFM_{new}}{CFM_{old}} = \frac{RPM_{new}}{RPM_{old}}$ **or** $\frac{Diameter_{new}}{Diameter_{old}} = \frac{RPM_{old}}{RPM_{new}}$

24. $(Diameter\ of\ first\ pulley\ x\ 1.57) + (Diameter\ of\ second\ pulley\ x\ 1.57) +$
$(Centerline\ distance\ between\ pulleys\ x\ 2) = Fan\ Belt\ Length$

25. $\frac{Offset\ x\ Height}{Length\ of\ Duct} = Duct\ Miter$

26. $\sqrt{\frac{4\ x\ a\ x\ b}{\pi}} = Round\ Duct\ Equivalent$

27. $°F\ =\ °C\ x\ 1.8 + 32$ **or** $°C\ =\ °F - 32\ \div 1.8$

28. $\frac{Volume\ of\ Room\ x\ \#\ of\ Air\ Changes}{60} = Required\ cfm$

29. *Heat Loss =* $\frac{\Delta T\ x\ Area}{R-Value}$

30. *Outside Pulley Velocity =* $\frac{\pi\ x\ Diameter}{12}$ *x RPM*

31. $E = I\ x\ \mathrm{R}$ *(E= Voltage I= Amps R= Ohms)*

32. $P = E\ x\ I$ (P= Watts E= Voltage I= Amps)

33. *Friction Loss =* $\frac{length\ of\ duct\ (ft)}{100}$ *x inches of wc per 100ft*

34. $New\ External\ Static\ Pressure = Existing\ ESP\ x\ (new\ rpm\ \div existing\ rpm)^2$

35. $New\ horsepower = Existing\ hp\ x\ (new\ rpm\ \div\ existing\ rpm)^3$

36. *Velocity (FPM) = 4005 X* $\sqrt{}$ *IN. W.C.*

CONVERSIONS

1. $1\ ft^3\ = 1728\ in^3$
2. $1\ ft^2\ = 144\ in^2$
3. $1\ ft\ = 12\ in$
4. $1\ ft^3\ = 6.22\ imp.gal.$
5. $1\ ft^3\ = 7.48\ US\ gal.$
6. $1\ imp.gal. = 277.4\ in^3$
7. $1\ US\ gal. = 231\ in^3$
8. $1\ in\ = 25.4\ mm$
9. $1\ ft\ = 30.48\ cm$
10. $1\ meter\ = 39.37\ in$
11. $1\ m\ = 1000\ mm\ \boldsymbol{or}\ 100\ cm$
12. $1\ cm\ = 10\ mm$
13. $1\ Km\ = 1000\ m$
14. $1\ Kg\ = 2.2\ lbs$
15. $1\ m^3\ = 1\ 000\ 000\ cm^3$
16. $1\ m^2\ = 10\ 000\ cm^2$
17. $1\ imp.gal.of\ Water\ = 10.05\ lbs.$
18. $1\ US\ gal.of\ Water\ = 8.35\ lbs.$
19. $1\ ft^3\ of\ Water\ = 62.5\ lbs$
20. $1\ lb.of\ Air\ = 13.33\ ft^3$
21. $Specific\ Heat\ of\ Air\ = 0.24\ Btu$
22. $1\ ft^2\ of\ 10\ gauge\ Mild\ Steel\ = 5\ lbs.$
23. $Calorific\ Value\ of\ Natural\ Gas\ = 1000\ Btu/hr$
24. $Calorific\ Value\ of\ Propane\ Gas\ = 2500\ Btu/hr$
25. *1 psi = 6.895 kPa*
26. *1 psi = 27.7 " wc*
27. *1 Btu (Does the following):*
    - *Raises 1 lb. of water by 1°F*
    - *Raises 1 ft^3 of air by 55°F*
    - *Raises 55 ft^3 of air by 1°F*