An experiment to determine the Effective Volume of a Classical Alto Sax Mouthpiece

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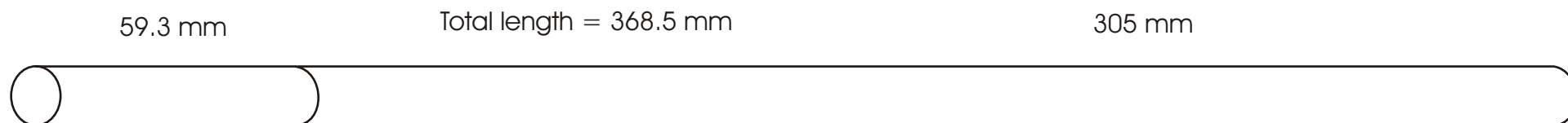
Cork

Brass tube   305 mm

D = 14 mm
r = 7 mm
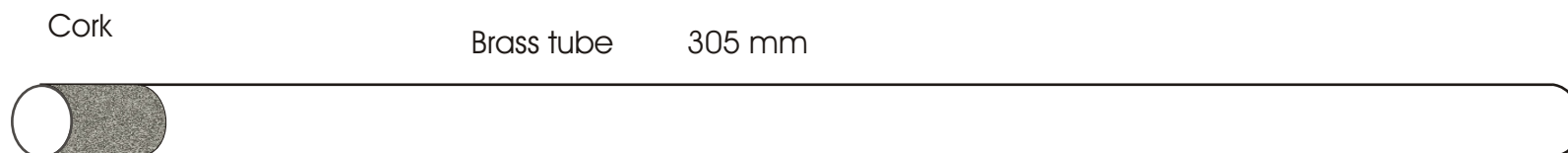
Resonant Frequency slightly sharp C#4
Pitch 282.8 vps   Wavelength   1220 mm

Length of closed cylinder = wavelength/4
Length of cylinder 305 mm

Pitch of cylinder with mouthpiece 28.2 mm on to cork   A#3 +7 = 234 vps wavelength 1474 mm
Length of cylinder having this resonant frequency 1474/4 = 368.5 mm

59.3 mm   Total length = 368.5 mm   305 mm

End correction of cylinder = .6 X 7mm = 4.2 mm   368.5 - 4.2 = 364.3 mm   364.3 - 305 = 59.3 mm

Volume of 59.3 mm cylinder = 59.3 x 3.14 x 49 = 9.13 ml

Mouthpiece (Rousseau 4R) physical volume   12.4 cc   shank diameter 15.8 mm radius 7.9 mm

Volume displaced by insertion on to cork 28.2 mm   3.14 X 62.41X 28.2 = 5.53 cc

Physical mouthpiece volume used 12.4 - 5.53 = 6.87 cc

Volume of added cylinder 9.13 ml   Volume of mouthpiece used 6.87 cc   Difference 2.26 cc

Conclusion

The **effective volume** of Rousseau 4R mouthpiece is **2.26 ml** or 33 % larger than its measured **physical volume**
when inserted 28.2 mm on to a tube with the length of 305 mm

*A previous study with the mouthpiece 10 mm on to the cork showed an increase of **2.38 ml** which amounted to a 23 % increase.*