

Teamwork & Teamplay

Building Unity, Community, Connection and Teamwork
Through Active Learning

Musical Pipe Chimes, made from 1/2" standard electrical steel conduit (outside diameter = 1 1/16").
Equal tempered chromatic scale - American Standard Pitch A4 = 440Hz
Calculated from Free Vibration Theory by Dr. Jim Cain, January 2004.

Note	Length (inches)	Node (inch)	#	Length (mm)	Node (mm)
A5	13.86	3.10	0	352	79
A#	13.46	3.02	1	342	77
B	13.08	2.93	2	332	74
C	12.71	2.85	3	323	72
C#	12.35	2.77	4	314	70
D	11.99	2.69	5	305	68
D#	11.65	2.61	6	296	66
E	11.32	2.54	7	288	64
F	11.00	2.46	8	279	63
F#	10.69	2.39	9	271	61
G	10.38	2.33	10	264	59
G#	10.09	2.26	11	256	57
A6	9.80	2.19	12	249	56
A#	9.52	2.13	13	242	54
B	9.25	2.07	14	235	53
C	8.99	2.01	15	228	51
C#	8.73	1.96	16	222	50
D	8.48	1.90	17	215	48
D#	8.24	1.85	18	209	47
E	8.01	1.79	19	203	46
F	7.78	1.74	20	198	44
F#	7.56	1.69	21	192	43
G	7.34	1.64	22	186	42
G#	7.13	1.60	23	181	41
A7	6.93	1.55	24	176	39
A#	6.73	1.51	25	171	38
B	6.54	1.46	26	166	37
C	6.35	1.42	27	161	36

Tolerance Analysis

For a 1.0 Hz variation, the change in length
at the following octave levels is:

A4 = +/- 0.022" (0.60 mm) A5 = +/- 0.008" (0.20 mm)
A6 = +/- 0.003" (0.07 mm) A7 = +/- 0.001" (0.03 mm)

The total length of conduit required for the 37
A5 through A7+ pipe chimes is 270 inches , or a total
of three 10 foot long sections of 1/2" electrical conduit.
Start with the longest chimes first, and use the
'leftover' pieces for the best length shorter chimes.

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You can get copies of all of Jim's books:
Teamwork & Teamplay
A Teachable Moment
The Book on Raccoon Circles
Teambuilding Puzzles
From the ACA bookstore (1-800-428-CAMP)

By drilling a hole through each pipe length at the 'node
point' (through which a support string is tied) the
maximum free vibration is maintained, and so is the best
sound quality. The node position for the primary
(fundamental) vibration frequency is 22.4% of the
length of each pipe.

These higher octave pipe chimes require less steel
conduit to make, but require a closer tolerance to be
accurately tuned (which can be pretty difficult given
that the base material is not all that accurate in density,
diameter and wall thickness to begin with). Good luck.

Here is a song to play.

3 3 5 3 8 7	3 3 5 3 10 8	3 3 15 12 8 7 5	13 13 12 8 10 8
3 1	1 3 3	12 8 3 3 1	8 8 8 3 7 3
		8 3	5 5 3 3