

A Leading Manufacturer of Quality Thermocouple and RTD Assemblies Since 1972

Thermowells

Thermowells are used to provide an isolation between a temperature sensor and the environment, either liquid, gas or slurry. A thermowell allows the temperature sensor to be removed and replaced without compromising either the ambient region or the process.

Care must be taken in determining the material used for the thermowell as well as other factors. Thermo Sensors offers design assistance that includes pressure, temperature and or corrosion as well as vibration effects of the fluids. This vibration can cause well stem failure.



Thermo Sensors thermowell materials include:

- Carbon Steel
- 304 & 316 Stainless Steel
- Monel
- Brass

Please refer to our order guide to assist in determining your needs. We can also provide technical design assistance and application suggestions. Give us a call.

Velocity Ratings of Thermowells

In some cases, well failures are due, not to the effect of pressure, temperature, or corrosion, but to the vibrational effects to which they are subjected. Fluid, flowing by the well, forms a turbulent wake (the Von Karman Trail) with a definite frequency based on well dimensions and fluid velocity. If the natural frequency of the well equals the wake frequency, the well stem will vibrate to destruction and break off in the piping. It is, therefore, important that the well have sufficient design to prevent a frequency equality condition.

In the following tables, a recommended maximum velocity rating can be found for several standard well lengths and materials. To simplify the information, ratings given are based on operating temperatures of 1000° F. for wells made of Carbon Steel (C-1018) and Stainless Steel (304 and 316). Values for brass wells are based on 350° F. Operation limits for Monel wells are based on 900° F service. Slightly higher velocity is possible at lower temperatures. Single values appearing in the velocity tables may be considered safe for water, steam, air or gas. In shorter insertion lengths, consideration is given to the velocity pressure effect of water flowing at higher velocities. The values in parenthesis, therefore, represent safe values for water flow while the unbracketted value may be used for steam, air, gas and similar density fluids.

Maximum Fluid Velocity Feet per Second								
Well Type	Material	Insertion Length -"U"						
		2	4	7	10	13	16	22
1V & 3V 1G & 3G and 1F	Carbon Steel	404 (129)	184 (71.2)	67.0 (42.7)	34.0	20.6	13.7	7.4
	304 & 316 SS	430 (179)	192 (99.3)	69.7 (59.6)	35.4	21.5	14.3	7.7
	Monel	350 (143)	168 (79.8)	61 (47.7)	31.0	18.8	12.5	6.7
2V & 4V	Carbon Steel	410	248	91.3	45.7	27.6	18.5	10.0

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2G & 4G and 2F	304 & 316 SS	(152) 444	(84.3) 285	(50.6) 95.2	47.6	28.8	19.3	10.4
	Monel	(211) 338 (168)	(117) 226 (93.3)	(70.3) 83.3 (56.0)	41.6	25.2	16.9	9.1

Maximum Fluid Velocity Feet per Second									
Well Type	Material	Insertion Length -"U"							
		2 1/2	4 1/2	7 1/2	10 1/2	13 1/2	16 1/2	19 1/2	22 1/2
1A and 1B	Brass	207 (59.3)	89.1 (39.8)	32.2 (23.9)	16.4	9.9	6.6	4.8	3.6
	Carbon Steel	290 (106)	123 (71.2)	44.9 (42.7)	22.8	13.8	9.3	6.7	4.9
	304 & 316 SS	300 (148)	128 (99.3)	46.4	23.6	14.3	9.6	6.9	5.1
	Monel	261 (118)	112 (79.8)	40.6	20.7	12.4	8.3	6.1	4.5
3A and 3B	Brass	207 (59.3)	102 (47.6)	37.0 (28)	18.8	11.4	7.6	5.5	4.1
	Carbon Steel	290 (106)	143 (84.3)	51.6 (50.6)	26.2	15.9	10.6	7.6	5.7
	304 & 316 SS	300 (148)	148 (117)	53.5 (117)	27.2	16.5	11.0	7.9	5.9
	Monel	261 (118)	128 (93.3)	46.7	23.7	14.4	9.5	6.9	5.1

Maximum Fluid Velocity Feet per Second								
Well Type	Material	Insertion Length -"U"						
		2 1/2	4 1/2	7 1/2	10 1/2	13 1/2	16 1/2	22 1/2
1S	Carbon Steel	290 (106)	123 (71.2)	44.9 (42.7)	22.8	13.8	9.3	4.9
	304 & 316 SS	300 (148)	128 (99.3)	46.4	23.6	14.3	9.6	5.1
3S	Carbon Steel	290 (106)	143 (84.3)	51.6 (50.6)	26.2	15.9	10.6	5.7
	304 & 316 SS	300 (148)	148 (117)	53.5 (117)	27.2	16.5	11.0	5.9
2S and 4S	Carbon Steel	426 (260)	192 (144)	69.5	35.4	20.5	14.3	7.7
	304 & 316 SS	449 (360)	199	71.9	36.6	21.2	14.8	8.0

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Well Type	Material	Insertion Length -"U"							
		2 1/2	4 1/2	7 1/2	10 1/2	13 1/2	16 1/2	19 1/2	22 1/2
1C and 1D	Brass	305 (97.5)	93.8 (54.1)	33.9	17.1	10.5	7.0	5.0	3.7
	Carbon Steel	386 (175)	180 (97.2)	65.3 (58.3)	33.0	20.1	13.4	9.6	7.1
	304 & 316 SS	440 (243)	197 (135)	71.2	36.0	22.0	14.7	10.5	7.8
	Monel	354 (195)	155 (108)	56.1	28.4	17.3	11.6	7.5	5.6
3C and 3D	Brass	354 (161)	108 (89.5)	39.4	19.8	12.2	8.1	5.8	4.3
	Carbon Steel	448 (289)	209 (161)	75.7	38.4	23.3	15.5	11.1	8.2
	304 & 316 SS	490 (403)	228 (225)	82.5	41.8	25.5	17.1	12.2	9.1
	Monel	410 (322)	179 (178)	65.1	33.0	20.1	13.5	8.7	6.5

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Well Type	Material	Insertion Length -"U"							
		2 1/2	4 1/2	7 1/2	10 1/2	13 1/2	16 1/2	19 1/2	22 1/2
2A & 4A and 2B & 4B	Brass	290 (145)	150 (80)	54.1 (48)	27.6	16.7	11.1	8.0	6.0
	Carbon Steel	326 (260)	192 (144)	69.5	35.4	20.5	14.3	10.3	7.7
	304 & 316 SS	349 (360)	199	71.9	36.6	21.2	14.8	10.7	8.0
	Monel	316 (320)	189 (178)	68.1	34.8	20.8	14.0	10.0	7.5

Maximum Fluid Velocity Feet per Second									
Well Type	Material	Insertion Length -"U"							
		2 1/2	4 1/2	7 1/2	10 1/2	13 1/2	16 1/2	19 1/2	22 1/2
4C and 4D	Brass	321 (150)	129 (83.5)	46.8	23.6	14.5	9.6	6.9	5.1
	Carbon Steel	410 (270)	249 (150)	90.3	45.6	27.8	18.5	13.2	9.8
	304 & 316 SS	483 (350)	272 (208)	97.3	49.7	30.4	20.3	14.5	10.7
	Monel	396 (300)	214 (167)	77.5	39.2	23.8	16.0	10.3	7.7

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		2 1/2	4 1/2	7 1/2	10 1/2	13 1/2	16 1/2	19 1/2	22 1/2
2C and 2D	Brass	319 (148)	141 (82)	51.0	25.0	15.6	10.4	7.0	5.3
	Carbon Steel	358 (264)	234 (146)	84.5	43.0	26.0	17.4	12.0	9.0
	304 & 316 SS	390 (355)	248 (203)	89.0	45.0	27.5	18.0	13.2	9.9
	Monel	347 (315)	209 (165)	75.0	38.0	22.0	15.0	10.0	7.6