VARIABLE SPRING SIZING

- START BY FINDING HOT LOAD (HL) IN LOAD TABLE
- APPLY MOVEMENT (MVT) (+ FOR UP MVT / - FOR DOWN MVT)
- SPRING RATE (SR): LBS/IN BASED ON SIZE & SERIES
- COLD LOAD (CL) = HL +/- (MVT x SR)
- CONFIRM HL/CL ARE WITHIN WORKING RANGE
- VARIABILITY = (MVT x SR) / HOT LOAD

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BUILDING CONNECTIONS THAT LAST

VARIABLE SPRING SIZING

(Pages 140 & 141)

Working Range (inches) Unshaded

Shaded Rows Show Overtravel

LOAD TABLE (LBS) FOR SELECTION OF HANGER SIZE (sizes 10 through 22 on next page)

Working Range (in) unshaded Shaded Rows Show Overtravel					Hanger size											
Figure No.					B-268 Only		Fig. 82, Fig. B-268, Fig. 98, Triple & Quadruple Spring									
Quad.	Triple	98	B-268	82	000	00	0	1	2	3	4	5	6	7	8	9
2	1½	1	½	¼	7	19	43	63	81	105	141	189	252	336	450	600
					7	20	44	66	84	109	147	197	263	350	469	625
					8	22	46	68	88	114	153	206	273	364	488	650
					9	24	48	71	91	118	159	213	284	378	506	675
0	0	0	0	0	10	26	50	74	95	123	165	221	294	392	525	700
					11	28	52	76	98	127	170	228	305	406	544	725
					12	30	54	79	101	131	176	236	315	420	563	750
					12	31	56	81	105	136	182	244	326	434	581	775
2	1½	1	½	¼	14	34	58	84	108	140	188	252	336	448	600	800
					14	35	59	87	111	144	194	260	347	462	619	825
					15	38	61	89	115	149	200	268	357	476	638	850
					16	40	63	92	118	153	206	276	368	490	656	875
4	3	2	1	½	17	41	65	95	122	158	212	284	378	504	675	900
					18	43	67	97	125	162	217	291	389	518	694	925
					19	45	69	100	128	166	223	299	399	532	713	950
					20	47	71	102	132	171	229	307	410	546	731	975
6	4½	3	1½	¾	21	49	73	105	135	175	235	315	420	560	750	1,000
					21	50	74	108	138	179	241	323	431	574	769	1,025
					22	53	76	110	142	184	247	331	441	588	788	1,050
					23	55	78	113	145	188	253	339	452	602	806	1,075
8	6	4	2	1	24	56	80	116	149	193	258	347	462	616	825	1,100
					25	58	82	118	152	197	264	354	473	630	844	1,125
					26	60	84	121	155	201	270	362	483	644	863	1,150
					27	62	86	123	159	206	276	370	494	658	881	1,175
10	7½	5	2½	1¼	28	64	88	126	162	210	282	378	504	672	900	1,200
2	1½	1	½	¼	28	66	89	129	165	214	288	386	515	686	919	1,225
					29	68	91	131	169	219	294	394	525	700	938	1,250
					30	70	93	134	172	223	300	402	536	714	956	1,275
					31	72	95	137	176	228	306	410	546	728	975	1,300
					Spring Rate (lbs/in)											
				82	–	–	30	42	54	70	94	126	168	224	300	400
			B-268		7	15	15	21	27	35	47	63	84	112	150	200
		98			–	–	7	10	13	17	23	31	42	56	75	100
	Triple				–	–	5	7	9	12	16	21	28	37	50	67
Quadruple					–	–	4	5	7	9	12	16	21	28	38	50

Note: General rule for series selection use Fig. 82 for up to ½" of movement up to 1" use Fig. B-268, up to 2" use Fig. 98, up to 3" use a Triple, up to 4" use a Quadruple. Double check to assure desired variability is achieved.

VARIABLE SPRING SIZING

SPRING RATE (SR): LBS/IN BASED ON SIZE & SERIES

(Pages 140 & 141)

Spring Rate & Variability Decrease From Fig.82 to B-268, etc.

	Spring Rate (lbs/in)										Spring Rate (lbs/in)											
82	30	42	54	70	94	126	168	224	300	400	520	680	900	1,200	1,600	2,160	3,000	4,000	5,320	7,080	9,400	12,500
B-268	15	21	27	35	47	63	84	112	150	200	260	340	450	600	800	1,080	1,500	2,000	2,660	3,540	4,700	6,250
98	7	10	13	17	23	31	42	56	75	100	130	170	225	300	400	540	750	1,000	1,330	1,770	2,350	3,125
Triple	5	7	9	12	16	21	28	37	50	67	87	113	150	200	267	360	500	667	887	1,180	1,567	2,083
Quadruple	4	5	7	9	12	16	21	28	38	50	65	85	113	150	200	270	375	500	665	885	1,175	1,563
SIZE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Variable Spring Type Selection
(General Rule of thumb)

- Fig. 82 for movement up to ½”
- Fig. B268 for movement up to 1”
- Fig. 98 for movement up to 2”
- Triple for movement up to 3”
- Quadruple for movement up to 4”

Variable Spring Problem #1

Hot Load = 410#

Movement = 1/4”up

Maximum Variability = 25%

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BUILDING CONNECTIONS THAT LAST

Variable Spring Problem #1 (cont.)

Hot Load = 410#

Movement = 1/4”up

(Pages 140 & 141)

Using Size 6, Fig.82:

Spring Rate = 168 lb/in

Cold Load =

410 + (168)(.25) = 452#

LOAD TABLE (LBS) FOR SELECTION OF HANGER SIZE (sizes 10 through 22 on next page)

Working Range (in) unshaded Shaded Rows Show Overtravel					Hanger size											
Figure No.					B-268 Only		Fig. 82, Fig. B-268, Fig. 98, Triple & Quadruple Spring									
Quad.	Triple	98	B-268	82	000	00	0	1	2	3	4	5	6	7	8	9
2	1½	1	½	¼	7	19	43	63	81	105	141	189	252	336	450	600
					7	20	44	66	84	109	147	197	263	350	469	625
					8	22	46	68	88	114	153	206	273	364	488	650
					9	24	48	71	91	118	159	213	284	378	506	675
0	0	0	0	0	10	26	50	74	95	123	165	221	294	392	525	700
					11	28	52	76	98	127	170	228	305	406	544	725
					12	30	54	79	101	131	176	236	315	420	563	750
					12	31	56	81	105	136	182	244	326	434	581	775
2	1½	1	½	¼	14	34	58	84	108	140	188	252	336	448	600	800
					14	35	59	87	111	144	194	260	347	462	619	825
					15	38	61	89	115	149	200	268	357	476	638	850
					16	40	63	92	118	153	206	276	368	490	656	875
4	3	2	1	½	17	41	65	95	122	158	212	284	378	504	675	900
					18	43	67	97	125	162	217	291	389	518	694	925
					19	45	69	100	128	166	223	299	399	532	713	950
					20	47	71	102	132	171	229	307	410	546	731	975
6	4½	3	1½	¾	21	49	73	105	135	175	235	315	420	560	750	1,000
					21	50	74	108	138	179	241	323	431	574	769	1,025
					22	53	76	110	142	184	247	331	441	588	788	1,050
					23	55	78	113	145	188	253	339	452	602	806	1,075
8	6	4	2	1	24	56	80	116	149	193	258	347	462	616	825	1,100
					25	58	82	118	152	197	264	354	473	630	844	1,125
					26	60	84	121	155	201	270	362	483	644	863	1,150
					27	62	86	123	159	206	276	370	494	658	881	1,175
10	7½	5	2½	1¼	28	64	88	126	162	210	282	378	504	672	900	1,200
2	1½	1	½	¼	28	66	89	129	165	214	288	386	515	686	919	1,225
					29	68	91	131	169	219	294	394	525	700	938	1,250
					30	70	93	134	172	223	300	402	536	714	956	1,275
					31	72	95	137	176	228	306	410	546	728	975	1,300
					Spring Rate (lbs/in)											
				82	–	–	30	42	54	70	94	126	168	224	300	400
			B-268		7	15	15	21	27	35	47	63	84	112	150	200
		98			–	–	7	10	13	17	23	31	42	56	75	100
	Triple				–	–	5	7	9	12	16	21	28	37	50	67
Quadruple					–	–	4	5	7	9	12	16	21	28	38	50

Note: General rule for series selection use Fig. 82 for up to ½" of movement up to 1" use Fig. B-268, up to 2" use Fig. 98, up to 3" use a Triple, up to 4" use a Quadruple. Double check to assure desired variability is achieved.

Variable Spring Problem #1 (cont.)

HL = 410# CL = 452# Mvt. = 1/4”up Size 6 Fig.82

Variability Check

(Mvt.)(Spring Rate) / HL

(0.25)(168) / 410 = 0.10

10% Variability

	Spring Rate (lbs/in)										Spring Rate (lbs/in)											
82	30	42	54	70	94	126	168	224	300	400	520	680	900	1,200	1,600	2,160	3,000	4,000	5,320	7,080	9,400	12,500
B-268	15	21	27	35	47	63	84	112	150	200	260	340	450	600	800	1,080	1,500	2,000	2,660	3,540	4,700	6,250
98	7	10	13	17	23	31	42	56	75	100	130	170	225	300	400	540	750	1,000	1,330	1,770	2,350	3,125
Triple	5	7	9	12	16	21	28	37	50	67	87	113	150	200	267	360	500	667	887	1,180	1,567	2,083
Quadruple	4	5	7	9	12	16	21	28	38	50	65	85	113	150	200	270	375	500	665	885	1,175	1,563
SIZE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Variability

Variability is a measure of the percentage change in supporting force between Hot Load & Cold Load

25% Maximum Variability is a general rule of thumb (15% for critical systems)

Variability

- Due to the proliferation of affordable & user friendly pipe stress analysis programs variability checks are not as critical as they once were.
- Stress analyzed piping systems consider spring rates & hot/cold loads in their calculations
- Pipe stress analysis is being performed on more and more piping systems, not just critical high temperature systems.

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BUILDING CONNECTIONS THAT LAST

Questions? Contact us!

We'd love to work with you!

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