S&C Power Fuses
Types SM, SML, SME, SMD-20, and SMD-40
Indoor and Outdoor Distribution
(4.16 kV through 34.5 kV)

Continuous, Daily, and Emergency Peak-Load Capability, Preloading Adjustment Factors, and Ambient Temperature Adjustment Factors

In accordance with procedures described in IEEE Standard C37.41, minimum melting time-current characteristic curves for S&C power fuses are based on tests starting at no initial load. When in service, every fuse will be carrying a load that may approach or even exceed the ampere rating. This preloading reduces the heat-dissipating ability of the fusible element, reducing its melting time. This effect has been minimized in S&C power fuses by designing their fusible elements to melt at current levels not less than 200% of rating.

Nonetheless, precise coordination of power fuses—with other power fuses or with circuit breakers or automatic circuit reclosers—requires adjusting the published melting times for the most severe anticipated condition of preload. These preloading adjustment factors are to be used with S&C power fuses only, because the derivation of these factors is dependent upon not only the element construction but also the relationship of the minimum melting current to the ampere rating of the fuse. See Figures 1 and 2 on page 5.

The excessive preloading produced by peak loads approaching the values listed in Tables 1 through 7 causes a reduction in melting time by as much as 60% of the published values. In transformer-primary fusing applications where the principal objectives are maximum transformer protection and maximum backup protection for secondary-side equipment and circuits, it may be expedient to forego complete coordination with other protective devices for the duration of such peak-load conditions.

Tables 1 through 7 on pages 2 through 4 list the peak-load capabilities of SM-4® and SM-5® Refill Units and SMU-20® and SMU-40® Fuse Units. Although higher peak-load values than those shown in italics could have been listed, such extreme overloading—while not damaging to the fuses—should be avoided to ensure against unnecessary fuse blowing due to momentary surges during such overload conditions. A transformer primary fuse is selected to accommodate—*not to interrupt*—peak loads.

All peak-load capability values are based on 70% preload and 30°C (86°F) ambient temperature. Peak-load capability is increased 0.5% for each degree of ambient temperature below 30°C (86°F), and decreased 0.5% for each degree of ambient temperature above 30°C (86°F). See Figures 3 and 4 on page 6.

The emergency peak-load capability values not shown in italics represent the maximum nonrepetitive load the fuse will carry without impairing its ability to perform properly. In no event should the fuse be subjected to this level of load more than twice a year.

Supersedes Data Bulletins 240-190 dated September 20, 2015, 240-195 and 240-200, each dated June 20, 2005

June 3, 2019

Continuous, Daily, and Emergency Peak-Load Capability

Table 1. SM-4® Refill Units—S&C Standard Speed and S&C Slow Speed (TCC No. 153-4 and 119-4)

Rating Amperes ↓	Peak-Load Capability, Amperes										
Time, Hours →	Continuous	Daily					Emergency				
		½	1	2	4	8	½	1	2	4	8
3E	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*
5E	*7.5*	*8.2*	*8.0*	*7.8*	*7.7*	*7.6*	*8.2*	*8.0*	*7.8*	*7.7*	*7.6*
7E	*10.5*	*11.5*	*11.2*	*11.0*	*10.8*	*10.6*	*11.5*	*11.2*	*11.0*	*10.8*	*10.6*
10E	*15.0*	*16.5*	*16.1*	*15.7*	*15.5*	*15.2*	*16.5*	*16.1*	*15.7*	*15.5*	*15.2*
13E	*19.5*	*21.4*	*21.0*	*20.6*	*20.2*	*19.6*	*21.4*	*21.0*	*20.6*	*20.2*	*19.6*
15E	*22.5*	*24.7*	*24.2*	*23.6*	*23.2*	*22.8*	*24.7*	*24.2*	*23.6*	*23.2*	*22.8*
20E	*30.0*	*33.0*	*32.2*	*31.4*	*31.0*	*30.4*	*33.0*	*32.2*	*31.4*	*31.0*	*30.4*
25E	*37.5*	*41.0*	*40.0*	*40.0*	*39.0*	*38.0*	*41.0*	*40.0*	*40.0*	*39.0*	*38.0*
30E	*45.0*	*49.0*	*48.0*	*47.0*	*46.0*	*46.0*	*49.0*	*48.0*	*47.0*	*46.0*	*46.0*
40E	57.0	63.0	61.0	60.0	59.0	58.0	66.0	64.0	63.0	62.0	61.0
50E	70.0	78.0	76.0	74.0	73.0	72.0	82.0	81.0	79.0	78.0	76.0
65E	90.0	100.0	98.0	96.0	94.0	92.0	107.0	105.0	102.0	100.0	98.0
80E	110.0	124.0	120.0	118.0	116.0	114.0	130.0	128.0	125.0	124.0	122.0
100E	118.0	136.0	129.0	126.0	123.0	121.0	160.0	150.0	142.0	137.0	132.0
125E	137.0	156.0	148.0	143.0	140.0	138.0	200.0	175.0	162.0	152.0	148.0
150E	158.0	180.0	174.0	167.0	162.0	160.0	225.0	200.0	185.0	175.0	168.0
175E	180.0	203.0	195.0	187.0	184.0	182.0	250.0	227.0	208.0	197.0	190.0
200E	200.0	210.0	204.0	200.0	200.0	200.0	260.0	240.0	226.0	216.0	210.0

Table 2. SM-5® Refill Units—S&C Standard Speed and S&C Slow Speed (TCC No. 153-4 and 119-4)

Rating Amperes ↓	Peak-Load Capability, Amperes										
Time, Hours →	Continuous	Daily					Emergency				
		½	1	2	4	8	½	1	2	4	8
3E	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*
5E	*8.0*	*8.5*	*8.0*	*8.0*	*8.0*	*8.0*	*8.5*	*8.0*	*8.0*	*8.0*	*8.0*
7E	*11.2*	*11.5*	*11.4*	*11.3*	*11.2*	*11.2*	*11.5*	*11.4*	*11.3*	*11.2*	*11.2*
10E	*16.0*	*16.5*	*16.4*	*16.2*	*16.1*	*16.0*	*16.5*	*16.4*	*16.2*	*16.1*	*16.0*
13E	*20.8*	*21.4*	*21.3*	*21.2*	*21.0*	*20.9*	*21.4*	*21.3*	*21.2*	*21.0*	*20.9*
15E	*24.0*	*25.5*	*25.0*	*24.7*	*24.4*	*24.2*	*25.5*	*25.0*	*24.7*	*24.4*	*24.2*
20E	*32.0*	*34.0*	*33.5*	*33.0*	*32.6*	*32.3*	*34.0*	*33.5*	*33.0*	*32.6*	*32.3*
25E	*40.0*	*42.5*	*42.0*	*41.2*	*40.8*	*40.4*	*42.5*	*42.0*	*41.2*	*40.8*	*40.4*
30E	*48.0*	*51.0*	*50.2*	*49.5*	*49.0*	*48.5*	*51.0*	*50.2*	*49.5*	*49.0*	*48.5*
40E	*64.0*	*68.0*	*67.0*	*66.0*	*65.0*	*65.0*	*68.0*	*67.0*	*66.0*	*65.0*	*65.0*
50E	*80.0*	*85.0*	*84.0*	*83.0*	*82.0*	*81.0*	*85.0*	*84.0*	*83.0*	*82.0*	*81.0*
65E	*104.0*	*111.0*	*109.0*	*108.0*	*107.0*	*106.0*	*111.0*	*109.0*	*108.0*	*107.0*	*106.0*
80E	120.0	128.0	125.0	124.0	123.0	122.0	130.0	128.0	126.0	125.0	124.0
100E	150.0	160.0	156.0	154.0	153.0	152.0	163.0	159.0	158.0	157.0	157.0
125E	175.0	197.0	190.0	186.0	183.0	180.0	204.0	198.0	194.0	191.0	189.0
150E	187.0	225.0	212.0	204.0	200.0	195.0	231.0	217.0	208.0	204.0	202.0
175E	205.0	250.0	234.0	224.0	217.0	213.0	260.0	240.0	228.0	222.0	221.0
200E	225.0	270.0	254.0	244.0	238.0	234.0	280.0	260.0	250.0	246.0	243.0
250E	250.0	290.0	270.0	260.0	257.0	255.0	300.0	280.0	267.0	264.0	260.0
300E	300.0	375.0	330.0	320.0	310.0	306.0	390.0	350.0	335.0	330.0	320.0
400E	400.0	440.0	410.0	407.0	403.0	400.0	460.0	427.0	425.0	424.0	422.0

Table 3. SMU-20® Fuse Units—S&C "K" Speed (TCC No. 165-2)

Rating Amperes ↓	Peak-Load Capability, Amperes									
Time, Hours →	Continuous	Daily					Emergency			
		½	1	2	4	8	½	1	2	4	8
3K	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
6K	9.7	10.2	10.1	10.0	9.9	9.8	10.2	10.1	10.0	9.9	9.8
8K	13.0	13.5	13.4	13.3	13.2	13.1	13.5	13.4	13.3	13.2	13.1
10K	16.2	17.0	16.8	16.6	16.4	16.2	17.0	16.8	16.6	16.4	16.2
12K	19.4	20.4	20.2	20.0	19.8	19.6	20.4	20.2	20.0	19.8	19.6
15K	24.3	25.5	25.2	24.9	24.6	24.3	25.5	25.2	24.9	24.6	24.3
20K	32.4	34.0	33.6	33.2	32.8	32.4	34.0	33.6	33.2	32.8	32.4
25K	40.5	42.5	42.0	41.5	41.0	40.5	42.5	42.0	41.5	41.0	40.5
30K	48.6	51.0	50.5	50.0	49.5	49.0	51.0	50.5	50.0	49.5	49.0
40K	54.0	63.0	61.0	59.0	57.0	55.0	65.0	63.0	61.0	59.0	57.0
50K	80.0	85.0	84.0	83.0	82.0	81.0	85.0	84.0	83.0	82.0	81.0
65K	92.0	106.0	103.0	100.0	97.0	94.0	110.0	107.0	104.0	101.0	98.0
80K	114.0	132.0	128.0	124.0	120.0	116.0	136.0	132.0	128.0	124.0	120.0
100K	126.0	144.0	140.0	136.0	132.0	128.0	150.0	146.0	142.0	138.0	134.0
140K	160.0	186.0	180.0	174.0	168.0	162.0	190.0	185.0	180.0	175.0	170.0
200K	212.0	248.0	240.0	232.0	224.0	216.0	250.0	245.0	240.0	235.0	230.0

Table 4. SMU-20® Fuse Units—S&C Standard Speed and S&C Slow Speed (TCC No. 153-2 and 119-2)

Rating Amperes ↓	Peak-Load Capability, Amperes									
Time, Hours →	Continuous	Daily					Emergency			
		½	1	2	4	8	½	1	2	4	8
5E	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
7E	11.3	11.9	11.8	11.7	11.6	11.5	11.9	11.8	11.7	11.6	11.5
10E	16.2	17.0	16.8	16.6	16.4	16.2	17.0	16.8	16.6	16.4	16.2
13E	21.1	22.1	21.8	21.5	21.2	21.1	22.1	21.8	21.5	21.2	21.1
15E	24.0	25.5	25.2	24.9	24.6	24.3	25.5	25.2	24.9	24.6	24.3
20E	32.0	34.0	33.6	33.2	32.8	32.4	34.0	33.6	33.2	32.8	32.4
25E	40.0	42.5	42.0	41.5	41.0	40.5	42.5	42.0	41.5	41.0	40.5
30E	46.0	51.0	50.0	49.0	48.0	47.0	51.0	50.0	49.0	48.0	47.0
40E	54.0	63.0	61.0	59.0	57.0	55.0	65.0	63.0	61.0	59.0	57.0
50E	78.0	85.0	84.0	83.0	82.0	81.0	85.0	84.0	83.0	82.0	81.0
65E	90.0	105.0	102.0	99.0	96.0	93.0	110.0	107.0	104.0	101.0	98.0
80E	112.0	130.0	126.0	122.0	118.0	114.0	136.0	132.0	128.0	124.0	120.0
100E	126.0	144.0	140.0	136.0	132.0	128.0	151.0	147.0	143.0	139.0	135.0
125E	148.0	172.0	167.0	162.0	157.0	152.0	180.0	175.0	170.0	165.0	160.0
150E	175.0	203.0	197.0	191.0	185.0	179.0	211.0	205.0	199.0	193.0	187.0
175E	192.0	220.0	214.0	208.0	202.0	196.0	225.0	220.0	215.0	210.0	205.0
200E	202.0	230.0	224.0	218.0	212.0	206.0	241.0	235.0	229.0	223.0	217.0

Table 5. SMU-20® Fuse Units—S&C Very Slow Speed (TCC No. 176-2)

Rating Amperes ↓	Peak-Load Capability, Amperes									
Time, Hours →	Continuous	Daily					Emergency			
		½	1	2	4	8	½	1	2	4	8
50E	81	85	84	83	82	81	85	84	83	82	81
65E	98	108	106	104	102	100	110	109	108	107	106
80E	110	128	124	120	116	112	134	130	126	122	118
100E	118	136	132	128	124	120	142	138	134	130	126
125E	158	180	175	170	165	160	190	185	180	175	170
150E	178	200	195	190	185	180	210	205	200	195	190
175E	196	220	215	210	205	200	230	225	220	215	210
200E	200	220	215	210	205	200	235	230	225	220	215

Table 6. SMU-20® Fuse Units—S&C "DR" Speed (TCC No. 175-2)

Rating Amperes ↓	Peak-Load Capability, Amperes										
Time, Hours →	Continuous	Daily					Emergency				
		½	1	2	4	8	½	1	2	4	8
3 DR	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*	*3.9*
4 DR	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*	*5.2*
5 DR	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*	*6.5*
7 DR	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*
10 DR	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*
15 DR	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*	*20.0*
20 DR	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*	*26.0*

Table 7. SMU®-40 Fuse Units—S&C Standard Speed and S&C Slow Speed (TCC No. 153-2 and 119-2)

Rating Amperes ↓	Peak-Load Capability, Amperes										
Time, Hours →	Continuous	Daily					Emergency				
		½	1	2	4	8	½	1	2	4	8
3E	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*
5E	*8.1*	*8.5*	*8.4*	*8.3*	*8.2*	*8.1*	*8.5*	*8.4*	*8.3*	*8.2*	*8.1*
7E	*11.3*	*11.9*	*11.8*	*11.7*	*11.6*	*11.5*	*11.9*	*11.8*	*11.7*	*11.6*	*11.5*
10E	*16.2*	*17.0*	*16.8*	*16.6*	*16.4*	*16.2*	*17.0*	*16.8*	*16.6*	*16.4*	*16.2*
13E	*21.1*	*22.0*	*21.8*	*21.6*	*21.4*	*21.2*	*22.0*	*21.8*	*21.6*	*21.4*	*21.2*
15E	*24.3*	*25.5*	*25.2*	*24.9*	*24.6*	*24.3*	*25.5*	*25.2*	*24.9*	*24.6*	*24.3*
20E	*32.4*	*34.0*	*33.6*	*33.2*	*32.8*	*32.4*	*34.0*	*33.6*	*33.2*	*32.8*	*32.4*
25E	*40.5*	*42.5*	*42.0*	*41.5*	*41.0*	*40.5*	*42.5*	*42.0*	*41.5*	*41.0*	*40.5*
30E	*48.6*	*51.0*	*50.5*	*50.0*	*49.5*	*49.0*	*51.0*	*50.5*	*50.0*	*49.5*	*49.0*
40E	*64.0*	*68.0*	*67.0*	*66.0*	*65.0*	*64.0*	*68.0*	*67.0*	*66.0*	*65.0*	*64.0*
50E	*80.0*	*85.0*	*84.0*	*83.0*	*82.0*	*81.0*	*85.0*	*84.0*	*83.0*	*82.0*	*81.0*
65E	*105.0*	*110.0*	*109.0*	*108.0*	*107.0*	*106.0*	*110.0*	*109.0*	*108.0*	*107.0*	*106.0*
80E	118.0	133.0	130.0	127.0	124.0	121.0	136.0	133.0	130.0	127.0	124.0
100E	130.0	145.0	142.0	139.0	136.0	133.0	150.0	147.0	144.0	141.0	138.0
125E	190.0	213.0	208.0	203.0	198.0	193.0	213.0	210.0	207.0	204.0	201.0
150E	230.0	256.0	250.0	244.0	238.0	232.0	255.0	252.0	249.0	246.0	243.0
175E	235.0	269.0	262.0	255.0	248.0	241.0	279.0	272.0	265.0	258.0	251.0
200E	256.0	293.0	285.0	277.0	269.0	261.0	304.0	296.0	288.0	280.0	272.0
250E	263.0	300.0	292.0	284.0	276.0	268.0	312.0	304.0	296.0	288.0	280.0
300E	305.0	346.0	337.0	328.0	319.0	310.0	359.0	350.0	341.0	332.0	323.0
400E	400.0	420.0	416.0	412.0	408.0	404.0	435.0	431.0	427.0	423.0	419.0

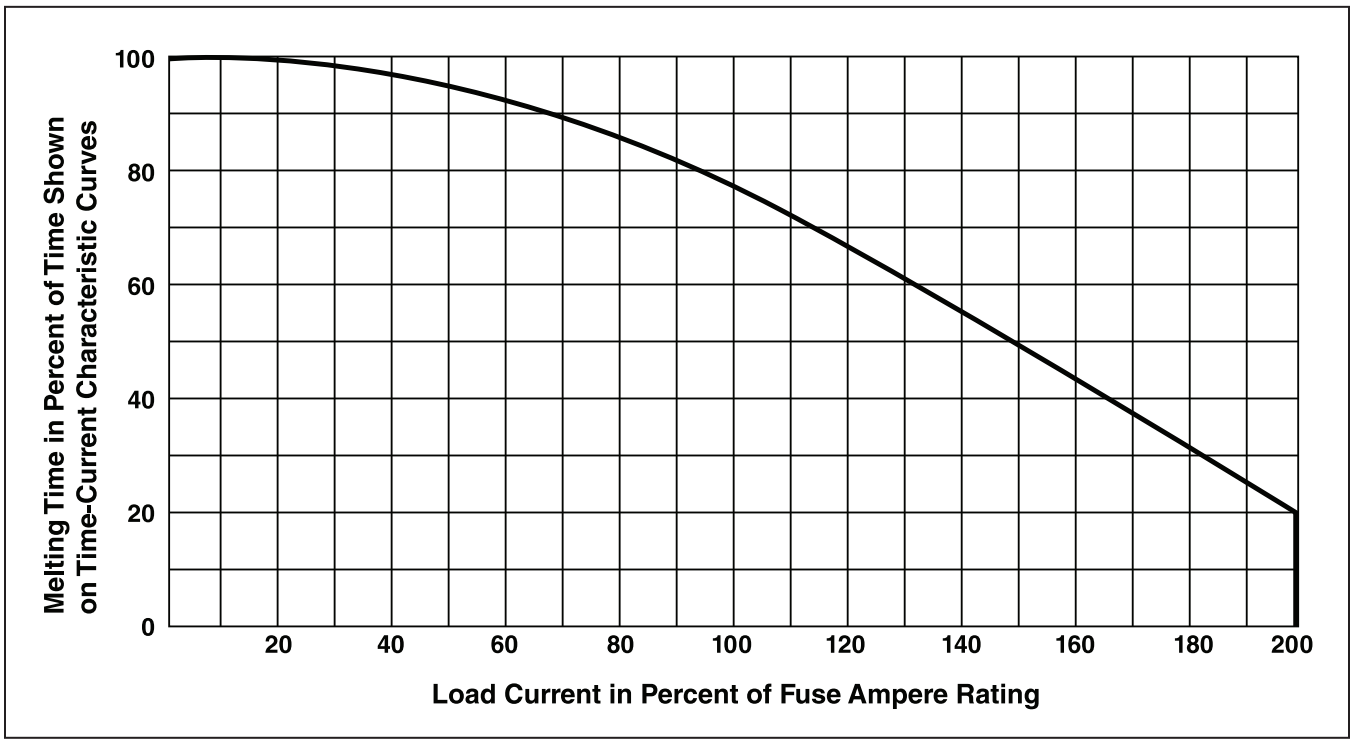

Figure 1. Preloading adjustment factors for S&C "K", Standard, Slow, and Very Slow Speeds (TCC Nos. 165-2, 153-2, 119-2, and 176-2)

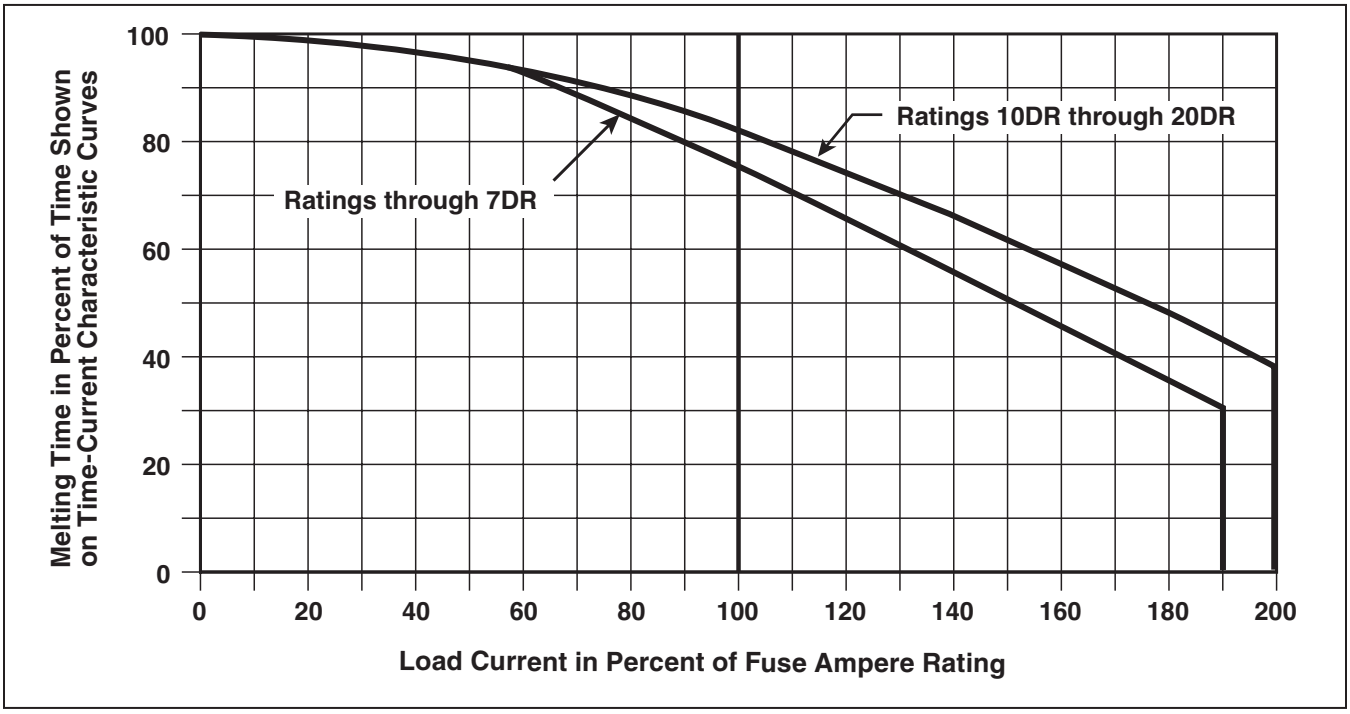

Figure 2. Preloading adjustment factors for S&C "DR" Speed (TCC No. 175-2)

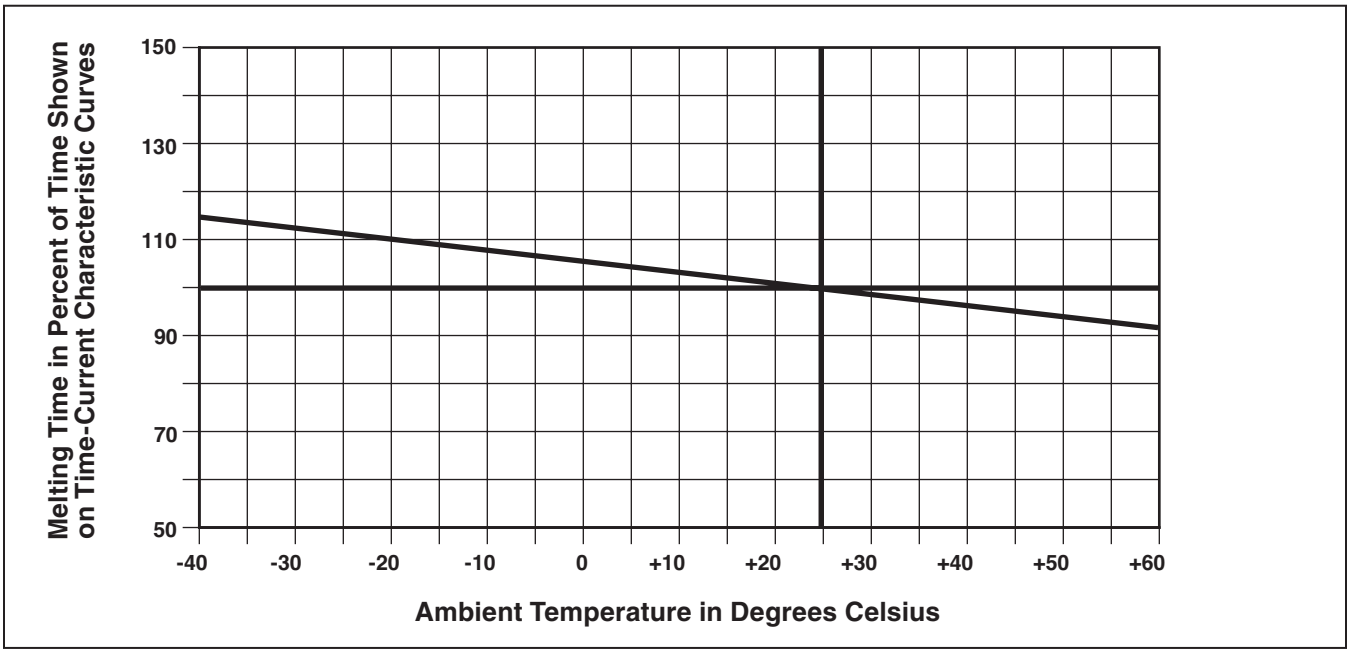

Figure 3. Ambient temperature adjustment factors for S&C "K", Standard, Slow, and Very Slow Speeds (TCC Nos. 165-2, 153-2, 119-2, and 176-2)

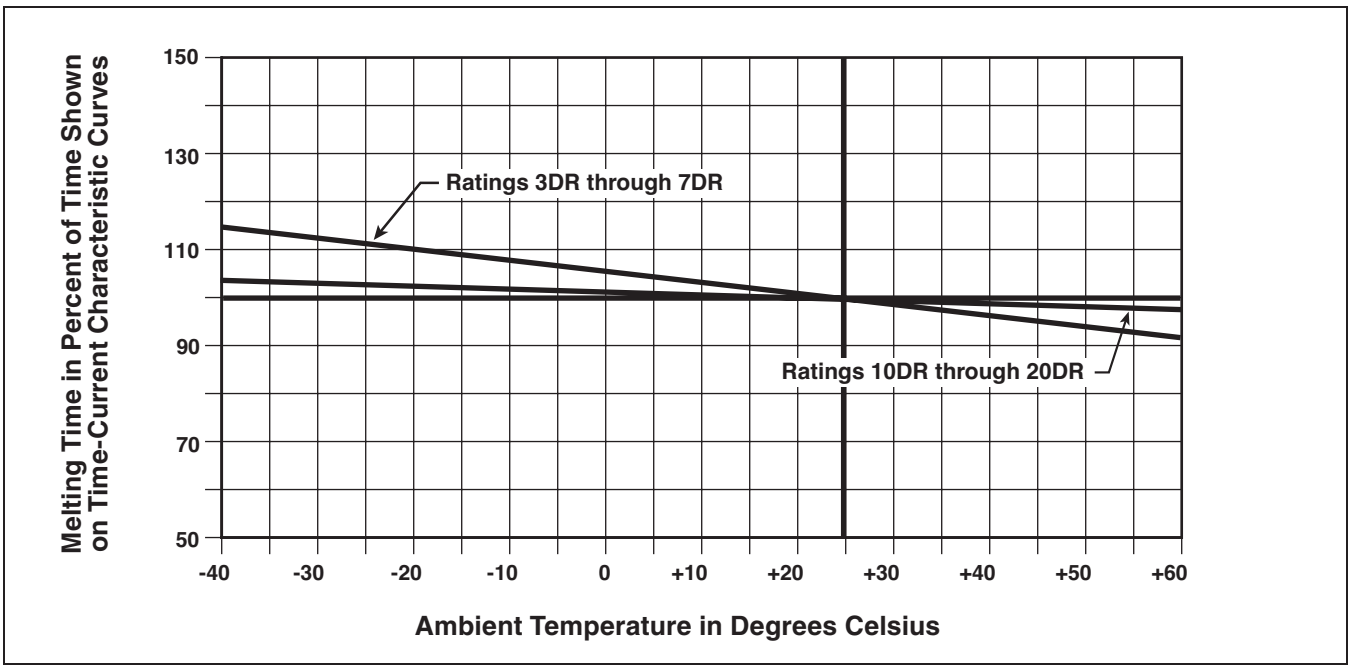

Figure 4. Ambient temperature adjustment factors for S&C "DR" Speed (TCC No. 175-2)