

## GAFFER® *NON-LEAD* CRYSTAL ANNEALING SCHEDULES. SEMI-OPEN AND OPEN FORMS \*

Thickness inches mm	Anneal Soak Time @ 895°F @ 480°C	Initial Cooling Rate °F/Hr °C/Hr	Initial Cooling Range °F °C	Second Cooling Rate °F/Hr °C/Hr	Second Cooling Range °F °C	Final Cooling Rate** °F/Hr °C/Hr	Final Cooling Range °F °C	Total Elapsed Time
0.5 in 12 mm	2 hr	120 67	895 - 770 480 - 410	240 133	770 - 680 410 - 360	720 402	680 - 70 360 - 21	4 hours 25 mins
0.75 in 19 mm	3 hr	52 29	895 - 770 480 - 410	104 58	770 - 680 410 - 360	312 174	680 - 70 360 - 21	8 hours 15 mins
1.0 in 25 mm	4 hr	29 16	895 - 770 480 - 410	58 32	770 - 680 410 - 360	174 96	680 - 70 360 - 21	13 hours 30 mins
1.5 in 38 mm	6 hr	13 7.2	895 - 770 480 - 410	26 14.4	770 - 680 410 - 360	78 43	680 - 70 360 - 21	27 hours
2.0 in 50 mm	8 hr	7.8 4.3	895 - 770 480 - 410	15.6 8.6	770 - 680 410 - 360	46.8 25.8	680 - 70 360 - 21	43 hours 20 mins
2.5 in 60 mm	10 hr	5.2 2.9	895 - 734 480 - 390	10.4 5.8	734 - 644 390 - 340	31.2 17.4	644 - 70 340 - 21	2 days 20 hours
3.0 in 75 mm	12 hr	3.3 1.8	895 - 734 480 - 390	6.6 3.6	734 - 644 390 - 340	19.8 10.8	644 - 70 340 - 21	4 days 9 hours
3.5 in 88 mm	14 hr	2.5 1.4	895 - 734 480 - 390	5.0 2.8	734 - 644 390 - 340	15 8.4	644 - 70 340 - 21	5 days 14 hours
4.0 in 100 mm	16 hr	1.8 1.0	895 - 734 480 - 390	3.6 2.0	734 - 644 390 - 340	10.8 6	644 - 70 340 - 21	7 days 16 hours
4.5 in 113 mm	18 hr	1.6 0.9	895 - 734 480 - 390	3.2 1.8	734 - 644 390 - 340	9.6 5.4	644 - 70 340 - 21	8 days 13 hours
5.0 in 125 mm	20 hr	1.3 0.7	895 - 734 480 - 390	2.6 1.4	734 - 644 390 - 340	7.8 4.2	644 - 70 340 - 21	10 days 20 hours
5.5 in 138 mm	22 hr	1.1 0.6	895 - 734 480 - 390	2.2 1.2	734 - 644 390 - 340	6.6 3.6	644 - 70 340 - 21	12 days 14 hours
6.0 in 150 mm	24 hr	0.9 0.5	895 - 698 480 - 370	1.8 1.0	698 - 608 370 - 320	5.4 3	608 - 70 320 - 21	16 days 10 hours
6.5 in 165 mm	26 hr	0.7 0.4	895 - 698 480 - 370	1.4 0.8	698 - 608 370 - 320	4.2 2.4	608 - 70 320 - 21	20 days 8 hours
7.0 in 175 mm	28 hr	0.6 0.33	895 - 698 480 - 370	1.2 0.66	698 - 608 370 - 320	3.6 2	608 - 70 320 - 21	24 days 11 hours
7.5 in 190 mm	30 hr	0.5 0.3	895 - 698 480 - 370	1.0 0.6	698 - 608 370 - 320	3 1.8	608 - 70 320 - 21	26 days 23 hours
8.0 in 200 mm	32 hr	0.47 0.26	895 - 698 480 - 370	0.94 0.52	698 - 608 370 - 320	2.8 1.56	608 - 70 320 - 21	31 days
8.5 in 215 mm	34 hr	0.41 0.23	895 - 698 480 - 370	0.8 0.46	698 - 608 370 - 320	2.4 1.4	608 - 70 320 - 21	34 days 19 hours
9.0 in 225 mm	36 hr	0.35 0.2	895 - 698 480 - 370	0.7 0.4	698 - 608 370 - 320	2.1 1.2	608 - 70 320 - 21	40 days
9.5 in 242 mm	38 hr	0.32 0.18	895 - 698 480 - 370	0.64 0.36	698 - 608 370 - 320	1.9 1.1	608 - 70 320 - 21	44 days 5 hours
10.0 in 254 mm	40 hr	0.29 0.16	895 - 698 480 - 370	0.58 0.32	698 - 608 370 - 320	1.74 0.96	608 - 70 320 - 21	49 days 20 hours

\* Loosely based on: *Schedules for commercial annealing of ordinary ware*. Corning Glassworks, Corning N.Y.1950. **For forms that are able to cool reasonably equally on all sides.**

\*\* Obviously cooling rates of thinner pieces are faster than ordinary kilns lose heat. In those cases the kiln can be allowed to cool at its natural rate.

Revised schedules August 2010