

Altitude Limits (Installed)

Double-Pane: 2.2 / 6.5 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	5,000	0.03	7,000	0.05	5,000	0.04	10,000	0.09
11	5,000	0.04	8,000	0.07	6,000	0.05	10,000	0.10
12	6,000	0.05	9,000	0.09	6,000	0.05	10,000	0.10
13	6,000	0.06	10,000	0.10	7,000	0.07	10,000	0.11
14	7,000	0.07	10,000	0.11	8,000	0.08	10,000	0.11
15	7,000	0.07	10,000	0.11	8,000	0.08	10,000	0.11
16	8,000	0.09	10,000	0.12	9,000	0.10	10,000	0.12
17	8,000	0.09	10,000	0.12	10,000	0.12	10,000	0.12
18	9,000	0.10	10,000	0.12	10,000	0.12	10,000	0.12
19	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
>20	10,000	0.12	10,000	0.12	10,000	0.12	10,000	0.12

Double-Pane: 2.2 / 8.0 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	5,000	0.04	7,000	0.06	5,000	0.04	10,000	0.11
11	5,000	0.04	7,000	0.07	5,000	0.05	10,000	0.12
12	5,000	0.05	8,000	0.09	6,000	0.06	10,000	0.12
13	5,000	0.05	9,000	0.11	6,000	0.07	10,000	0.13
14	6,000	0.07	10,000	0.13	7,000	0.08	10,000	0.13
15	6,000	0.07	10,000	0.13	7,000	0.08	10,000	0.14
16	7,000	0.09	10,000	0.14	8,000	0.10	10,000	0.14
17	7,000	0.09	10,000	0.14	8,000	0.10	10,000	0.14
18	8,000	0.11	10,000	0.14	9,000	0.12	10,000	0.14
19	8,000	0.11	10,000	0.14	9,000	0.12	10,000	0.14
20	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
21	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
>22	10,000	0.15	10,000	0.15	10,000	0.15	10,000	0.15

Double-Pane: 2.2 / 9.8 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.03	6,000	0.06	4,000	0.04	9,000	0.11
11	4,000	0.04	7,000	0.08	4,000	0.04	10,000	0.13
12	4,000	0.04	7,000	0.08	5,000	0.06	10,000	0.14
13	5,000	0.06	8,000	0.11	5,000	0.06	10,000	0.15
14	5,000	0.06	9,000	0.13	6,000	0.08	10,000	0.16
15	5,000	0.07	10,000	0.15	6,000	0.08	10,000	0.16
16	6,000	0.09	10,000	0.16	7,000	0.10	10,000	0.17
17	6,000	0.09	10,000	0.16	7,000	0.10	10,000	0.17
18	7,000	0.11	10,000	0.17	8,000	0.12	10,000	0.17
19	7,000	0.11	10,000	0.17	8,000	0.13	10,000	0.17
20	8,000	0.13	10,000	0.17	9,000	0.15	10,000	0.17
21	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
22	8,000	0.13	10,000	0.18	10,000	0.18	10,000	0.18
23	9,000	0.16	10,000	0.18	10,000	0.18	10,000	0.18
24	9,000	0.16	10,000	0.18	10,000	0.18	10,000	0.18
>25	10,000	0.18	10,000	0.18	10,000	0.18	10,000	0.18

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 2.2 / 11.5 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.04	5,000	0.05	4,000	0.04	8,000	0.10
11	4,000	0.04	6,000	0.07	4,000	0.05	9,000	0.13
12	4,000	0.05	7,000	0.09	4,000	0.05	10,000	0.16
13	4,000	0.05	7,000	0.10	5,000	0.07	10,000	0.17
14	5,000	0.07	8,000	0.13	5,000	0.07	10,000	0.18
15	5,000	0.07	9,000	0.15	5,000	0.07	10,000	0.19
16	5,000	0.08	10,000	0.18	6,000	0.10	10,000	0.19
17	6,000	0.10	10,000	0.18	6,000	0.10	10,000	0.19
18	6,000	0.10	10,000	0.19	7,000	0.12	10,000	0.20
19	6,000	0.10	10,000	0.19	7,000	0.12	10,000	0.20
20	7,000	0.13	10,000	0.20	8,000	0.15	10,000	0.20
21	7,000	0.13	10,000	0.20	8,000	0.15	10,000	0.20
22	7,000	0.13	10,000	0.20	9,000	0.17	10,000	0.20
23	8,000	0.15	10,000	0.20	9,000	0.18	10,000	0.20
24	8,000	0.15	10,000	0.20	10,000	0.20	10,000	0.20
25	9,000	0.18	10,000	0.21	10,000	0.21	10,000	0.21
26	9,000	0.18	10,000	0.21	10,000	0.21	10,000	0.21
27	9,000	0.18	10,000	0.21	10,000	0.21	10,000	0.21
>28	10,000	0.21	10,000	0.21	10,000	0.21	10,000	0.21

Triple-Pane: 2.2 / 6.5 / 2.2 / 6.5 / 2.2

Double-Pane: 2.2 / 13.0 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.04	5,000	0.05	4,000	0.04	7,000	0.09
11	4,000	0.05	6,000	0.08	4,000	0.05	8,000	0.12
12	4,000	0.05	6,000	0.08	4,000	0.06	9,000	0.15
13	4,000	0.06	7,000	0.11	4,000	0.06	10,000	0.19
14	4,000	0.06	8,000	0.14	5,000	0.08	10,000	0.20
15	4,000	0.06	8,000	0.14	5,000	0.08	10,000	0.20
16	5,000	0.09	9,000	0.17	5,000	0.08	10,000	0.21
17	5,000	0.09	10,000	0.20	6,000	0.11	10,000	0.22
18	5,000	0.09	10,000	0.21	6,000	0.11	10,000	0.22
19	6,000	0.11	10,000	0.21	7,000	0.14	10,000	0.22
20	6,000	0.11	10,000	0.22	7,000	0.14	10,000	0.22
21	6,000	0.12	10,000	0.22	8,000	0.16	10,000	0.23
22	7,000	0.14	10,000	0.22	8,000	0.16	10,000	0.23
23	7,000	0.14	10,000	0.22	8,000	0.17	10,000	0.23
24	8,000	0.17	10,000	0.23	9,000	0.20	10,000	0.23
25	8,000	0.17	10,000	0.23	9,000	0.20	10,000	0.23
26	8,000	0.17	10,000	0.23	10,000	0.23	10,000	0.23
27	9,000	0.20	10,000	0.23	10,000	0.23	10,000	0.23
28	9,000	0.20	10,000	0.23	10,000	0.23	10,000	0.23
29	9,000	0.20	10,000	0.23	10,000	0.23	10,000	0.23
>30	10,000	0.23	10,000	0.23	10,000	0.23	10,000	0.23

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 2.2 / 14.5 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.03	5,000	0.05	3,000	0.03	7,000	0.10
11	3,000	0.03	5,000	0.06	3,000	0.04	8,000	0.13
12	4,000	0.06	6,000	0.09	4,000	0.06	9,000	0.17
13	4,000	0.06	6,000	0.10	4,000	0.06	10,000	0.20
14	4,000	0.06	7,000	0.13	4,000	0.07	10,000	0.21
15	4,000	0.07	8,000	0.15	5,000	0.09	10,000	0.22
16	4,000	0.07	8,000	0.16	5,000	0.09	10,000	0.23
17	5,000	0.10	9,000	0.19	5,000	0.10	10,000	0.24
18	5,000	0.10	10,000	0.22	6,000	0.12	10,000	0.24
19	5,000	0.10	10,000	0.23	6,000	0.12	10,000	0.24
20	6,000	0.13	10,000	0.23	7,000	0.15	10,000	0.25
21	6,000	0.13	10,000	0.24	7,000	0.15	10,000	0.25
22	6,000	0.13	10,000	0.24	7,000	0.15	10,000	0.25
23	7,000	0.16	10,000	0.24	8,000	0.19	10,000	0.25
24	7,000	0.16	10,000	0.25	8,000	0.19	10,000	0.25
25	7,000	0.16	10,000	0.25	9,000	0.22	10,000	0.26
26	8,000	0.19	10,000	0.25	9,000	0.22	10,000	0.26
27	8,000	0.19	10,000	0.25	9,000	0.22	10,000	0.26
28	8,000	0.19	10,000	0.25	10,000	0.26	10,000	0.26
29	9,000	0.22	10,000	0.25	10,000	0.26	10,000	0.26
30	9,000	0.22	10,000	0.26	10,000	0.26	10,000	0.26
31	9,000	0.22	10,000	0.26	10,000	0.26	10,000	0.26
>32	10,000	0.26	10,000	0.26	10,000	0.26	10,000	0.26

Triple-Pane: 2.2 / 8.0 / 2.2 / 8.0 / 2.2

Double-Pane: 2.2 / 16.0 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.03	5,000	0.06	3,000	0.04	7,000	0.11
11	3,000	0.04	5,000	0.07	3,000	0.04	7,000	0.12
12	3,000	0.04	6,000	0.09	3,000	0.04	8,000	0.15
13	3,000	0.04	6,000	0.10	4,000	0.07	9,000	0.19
14	4,000	0.07	7,000	0.13	4,000	0.07	10,000	0.23
15	4,000	0.07	7,000	0.14	4,000	0.07	10,000	0.24
16	4,000	0.08	8,000	0.17	5,000	0.10	10,000	0.25
17	4,000	0.08	8,000	0.18	5,000	0.10	10,000	0.26
18	5,000	0.11	9,000	0.21	5,000	0.11	10,000	0.26
19	5,000	0.11	10,000	0.24	6,000	0.13	10,000	0.27
20	5,000	0.11	10,000	0.25	6,000	0.14	10,000	0.27
21	6,000	0.14	10,000	0.25	7,000	0.17	10,000	0.27
22	6,000	0.14	10,000	0.26	7,000	0.17	10,000	0.27
23	6,000	0.14	10,000	0.26	7,000	0.17	10,000	0.28
24	6,000	0.14	10,000	0.27	8,000	0.20	10,000	0.28
25	7,000	0.17	10,000	0.27	8,000	0.20	10,000	0.28
26	7,000	0.17	10,000	0.27	8,000	0.20	10,000	0.28
27	7,000	0.18	10,000	0.27	9,000	0.24	10,000	0.28
28	8,000	0.21	10,000	0.27	9,000	0.24	10,000	0.28
29	8,000	0.21	10,000	0.28	10,000	0.28	10,000	0.28
30	8,000	0.21	10,000	0.28	10,000	0.28	10,000	0.28
31	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
32	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
33	9,000	0.25	10,000	0.28	10,000	0.28	10,000	0.28
>34	10,000	0.28	10,000	0.28	10,000	0.29	10,000	0.29

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 2.2 / 9.8 / 2.2 / 9.8 / 2.2
 Double-Pane: 2.2 / 19.5 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.03	4,000	0.05	3,000	0.04	6,000	0.10
11	3,000	0.04	5,000	0.08	3,000	0.05	7,000	0.14
12	3,000	0.05	5,000	0.09	3,000	0.05	7,000	0.15
13	3,000	0.05	5,000	0.10	3,000	0.06	8,000	0.19
14	3,000	0.06	6,000	0.13	3,000	0.06	9,000	0.23
15	3,000	0.06	6,000	0.14	4,000	0.09	10,000	0.28
16	4,000	0.09	7,000	0.17	4,000	0.09	10,000	0.29
17	4,000	0.09	7,000	0.18	4,000	0.09	10,000	0.30
18	4,000	0.09	8,000	0.21	5,000	0.13	10,000	0.31
19	4,000	0.10	8,000	0.22	5,000	0.13	10,000	0.31
20	5,000	0.13	9,000	0.25	5,000	0.13	10,000	0.32
21	5,000	0.13	9,000	0.26	6,000	0.16	10,000	0.32
22	5,000	0.13	10,000	0.30	6,000	0.16	10,000	0.33
23	5,000	0.13	10,000	0.30	6,000	0.17	10,000	0.33
24	6,000	0.17	10,000	0.31	7,000	0.20	10,000	0.33
25	6,000	0.17	10,000	0.31	7,000	0.20	10,000	0.33
26	6,000	0.17	10,000	0.32	7,000	0.20	10,000	0.33
27	6,000	0.17	10,000	0.32	8,000	0.25	10,000	0.33
28	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.33
29	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.34
30	7,000	0.21	10,000	0.33	9,000	0.29	10,000	0.34
31	8,000	0.25	10,000	0.33	9,000	0.29	10,000	0.34
32	8,000	0.25	10,000	0.33	9,000	0.29	10,000	0.34
33	8,000	0.25	10,000	0.33	10,000	0.34	10,000	0.34
34	8,000	0.25	10,000	0.33	10,000	0.34	10,000	0.34
35	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
36	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
37	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
38	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
>39	**	**	10,000	0.34	10,000	0.34	10,000	0.34

Notes:

** Size limitations based on safe handling and manufacturing tolerances.

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 2.2 / 11.5 / 2.2 / 11.5 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.04	4,000	0.05	3,000	0.05	5,000	0.09
11	3,000	0.04	4,000	0.06	3,000	0.05	6,000	0.13
12	3,000	0.05	5,000	0.09	3,000	0.06	7,000	0.17
13	3,000	0.06	5,000	0.11	3,000	0.06	7,000	0.18
14	3,000	0.06	5,000	0.12	3,000	0.07	8,000	0.23
15	3,000	0.07	6,000	0.15	3,000	0.07	9,000	0.28
16	3,000	0.07	6,000	0.16	4,000	0.10	9,000	0.29
17	3,000	0.07	7,000	0.20	4,000	0.11	10,000	0.34
18	4,000	0.11	7,000	0.20	4,000	0.11	10,000	0.35
19	4,000	0.11	8,000	0.24	4,000	0.11	10,000	0.36
20	4,000	0.11	8,000	0.25	5,000	0.15	10,000	0.36
21	4,000	0.11	8,000	0.26	5,000	0.15	10,000	0.37
22	4,000	0.12	9,000	0.30	5,000	0.15	10,000	0.38
23	5,000	0.15	9,000	0.30	6,000	0.19	10,000	0.38
24	5,000	0.15	10,000	0.35	6,000	0.19	10,000	0.38
25	5,000	0.16	10,000	0.35	6,000	0.19	10,000	0.39
26	5,000	0.16	10,000	0.36	6,000	0.19	10,000	0.39
27	6,000	0.20	10,000	0.36	7,000	0.24	10,000	0.39
28	6,000	0.20	10,000	0.36	7,000	0.24	10,000	0.39
29	6,000	0.20	10,000	0.37	7,000	0.24	10,000	0.39
30	6,000	0.20	10,000	0.37	8,000	0.29	10,000	0.39
31	7,000	0.24	10,000	0.37	8,000	0.29	10,000	0.39
32	7,000	0.24	10,000	0.37	8,000	0.29	10,000	0.40
33	7,000	0.24	10,000	0.37	9,000	0.34	10,000	0.40
34	7,000	0.24	10,000	0.38	9,000	0.35	10,000	0.40
35	8,000	0.29	10,000	0.38	9,000	0.35	10,000	0.40
36	8,000	0.29	10,000	0.38	9,000	0.35	10,000	0.40
37	8,000	0.29	10,000	0.38	10,000	0.40	10,000	0.40
38	8,000	0.29	10,000	0.38	10,000	0.40	10,000	0.40
>39	**	**	10,000	0.38	10,000	0.40	10,000	0.40

Notes:

** Size limitations based on safe handling and manufacturing tolerances.

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 2.2 / 13.0 / 2.2 / 13.0 / 2.2

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.04	4,000	0.05	3,000	0.05	5,000	0.09
11	3,000	0.05	4,000	0.07	3,000	0.06	6,000	0.14
12	3,000	0.05	4,000	0.08	3,000	0.06	6,000	0.15
13	3,000	0.06	5,000	0.11	3,000	0.07	7,000	0.20
14	3,000	0.07	5,000	0.12	3,000	0.07	7,000	0.21
15	3,000	0.07	5,000	0.13	3,000	0.08	8,000	0.26
16	3,000	0.08	6,000	0.17	3,000	0.08	9,000	0.31
17	3,000	0.08	6,000	0.18	3,000	0.08	9,000	0.33
18	3,000	0.08	7,000	0.22	4,000	0.12	10,000	0.38
19	3,000	0.08	7,000	0.23	4,000	0.12	10,000	0.39
20	4,000	0.12	7,000	0.23	4,000	0.12	10,000	0.40
21	4,000	0.13	8,000	0.28	5,000	0.17	10,000	0.41
22	4,000	0.13	8,000	0.28	5,000	0.17	10,000	0.42
23	4,000	0.13	8,000	0.29	5,000	0.17	10,000	0.42
24	5,000	0.17	9,000	0.33	5,000	0.17	10,000	0.42
25	5,000	0.17	9,000	0.34	6,000	0.22	10,000	0.43
26	5,000	0.17	10,000	0.39	6,000	0.22	10,000	0.43
27	5,000	0.17	10,000	0.39	6,000	0.22	10,000	0.44
28	5,000	0.18	10,000	0.40	7,000	0.27	10,000	0.44
29	6,000	0.22	10,000	0.40	7,000	0.27	10,000	0.44
30	6,000	0.22	10,000	0.40	7,000	0.27	10,000	0.44
31	6,000	0.22	10,000	0.41	7,000	0.27	10,000	0.44
32	6,000	0.22	10,000	0.41	8,000	0.32	10,000	0.44
33	7,000	0.27	10,000	0.41	8,000	0.32	10,000	0.45
34	7,000	0.27	10,000	0.41	8,000	0.33	10,000	0.45
35	7,000	0.27	10,000	0.42	8,000	0.33	10,000	0.45
36	7,000	0.27	10,000	0.42	9,000	0.38	10,000	0.45
37	7,000	0.27	10,000	0.42	9,000	0.39	10,000	0.45
38	8,000	0.32	10,000	0.42	9,000	0.39	10,000	0.45
>39	**	**	10,000	0.42	10,000	0.45	10,000	0.45

Notes:

** Size limitations based on safe handling and manufacturing tolerances.

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 6.5 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	5,000	0.02	5,000	0.02	5,000	0.03	7,000	0.05
11	5,000	0.03	5,000	0.03	5,000	0.03	8,000	0.06
12	6,000	0.04	6,000	0.04	6,000	0.05	9,000	0.08
13	6,000	0.05	7,000	0.06	6,000	0.05	10,000	0.10
14	6,000	0.05	8,000	0.07	6,000	0.05	10,000	0.10
15	6,000	0.05	8,000	0.08	7,000	0.07	10,000	0.11
16	7,000	0.07	9,000	0.09	7,000	0.07	10,000	0.11
17	7,000	0.07	10,000	0.11	8,000	0.08	10,000	0.11
18	8,000	0.09	10,000	0.11	8,000	0.09	10,000	0.11
19	8,000	0.09	10,000	0.12	9,000	0.10	10,000	0.12
20	8,000	0.09	10,000	0.12	10,000	0.12	10,000	0.12
21	9,000	0.10	10,000	0.12	10,000	0.12	10,000	0.12
22	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
>23	10,000	0.12	10,000	0.12	10,000	0.12	10,000	0.12

Double-Pane: 3.0 / 7.0 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.02	4,000	0.02	5,000	0.03	7,000	0.05
11	5,000	0.03	5,000	0.03	5,000	0.04	8,000	0.06
12	5,000	0.03	6,000	0.04	5,000	0.04	9,000	0.08
13	6,000	0.05	6,000	0.05	6,000	0.05	10,000	0.10
14	6,000	0.05	7,000	0.06	6,000	0.06	10,000	0.11
15	6,000	0.06	8,000	0.08	7,000	0.07	10,000	0.11
16	6,000	0.06	9,000	0.10	7,000	0.07	10,000	0.12
17	7,000	0.07	10,000	0.12	8,000	0.09	10,000	0.12
18	7,000	0.08	10,000	0.12	8,000	0.09	10,000	0.12
19	8,000	0.09	10,000	0.12	9,000	0.11	10,000	0.12
20	8,000	0.09	10,000	0.13	9,000	0.11	10,000	0.13
21	8,000	0.10	10,000	0.13	10,000	0.13	10,000	0.13
22	9,000	0.11	10,000	0.13	10,000	0.13	10,000	0.13
23	9,000	0.11	10,000	0.13	10,000	0.13	10,000	0.13
>24	10,000	0.13	10,000	0.13	10,000	0.13	10,000	0.13

Double-Pane: 3.0 / 8.0 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.02	4,000	0.02	4,000	0.03	6,000	0.04
11	5,000	0.03	5,000	0.03	5,000	0.04	7,000	0.06
12	5,000	0.04	5,000	0.04	5,000	0.04	8,000	0.08
13	5,000	0.04	6,000	0.05	5,000	0.05	9,000	0.10
14	5,000	0.05	7,000	0.07	6,000	0.06	10,000	0.12
15	6,000	0.06	7,000	0.08	6,000	0.06	10,000	0.13
16	6,000	0.07	8,000	0.09	6,000	0.07	10,000	0.13
17	6,000	0.07	9,000	0.11	7,000	0.08	10,000	0.13
18	7,000	0.09	10,000	0.13	7,000	0.09	10,000	0.14
19	7,000	0.09	10,000	0.14	8,000	0.10	10,000	0.14
20	7,000	0.09	10,000	0.14	8,000	0.10	10,000	0.14
21	8,000	0.11	10,000	0.14	9,000	0.12	10,000	0.14
22	8,000	0.11	10,000	0.15	9,000	0.12	10,000	0.15
23	8,000	0.11	10,000	0.15	10,000	0.14	10,000	0.15
24	9,000	0.13	10,000	0.15	10,000	0.14	10,000	0.15
25	9,000	0.13	10,000	0.15	10,000	0.14	10,000	0.15
26	9,000	0.13	10,000	0.15	10,000	0.14	10,000	0.15
>27	10,000	0.15	10,000	0.15	10,000	0.15	10,000	0.15

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 9.8 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.02	4,000	0.02	4,000	0.03	6,000	0.05
11	4,000	0.03	4,000	0.03	4,000	0.03	6,000	0.06
12	5,000	0.04	5,000	0.04	5,000	0.04	7,000	0.08
13	5,000	0.05	5,000	0.05	5,000	0.05	8,000	0.10
14	5,000	0.05	6,000	0.07	5,000	0.06	9,000	0.12
15	5,000	0.06	7,000	0.09	5,000	0.06	10,000	0.15
16	5,000	0.06	7,000	0.09	6,000	0.08	10,000	0.15
17	5,000	0.06	8,000	0.11	6,000	0.08	10,000	0.16
18	6,000	0.08	9,000	0.14	6,000	0.08	10,000	0.16
19	6,000	0.08	9,000	0.14	7,000	0.10	10,000	0.17
20	6,000	0.09	10,000	0.17	7,000	0.10	10,000	0.17
21	7,000	0.11	10,000	0.17	8,000	0.13	10,000	0.17
22	7,000	0.11	10,000	0.17	8,000	0.13	10,000	0.17
23	7,000	0.11	10,000	0.18	8,000	0.13	10,000	0.18
24	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
25	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
26	8,000	0.13	10,000	0.18	10,000	0.18	10,000	0.18
27	9,000	0.16	10,000	0.18	10,000	0.18	10,000	0.18
28	9,000	0.16	10,000	0.18	10,000	0.18	10,000	0.18
29	9,000	0.16	10,000	0.18	10,000	0.18	10,000	0.18
>30	10,000	0.19	10,000	0.19	10,000	0.19	10,000	0.19

Double-Pane: 3.0 / 11.5 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.02	4,000	0.02	4,000	0.03	5,000	0.04
11	4,000	0.03	4,000	0.03	4,000	0.04	6,000	0.06
12	4,000	0.04	4,000	0.04	4,000	0.04	7,000	0.08
13	4,000	0.04	5,000	0.05	4,000	0.05	7,000	0.09
14	4,000	0.05	5,000	0.06	4,000	0.05	8,000	0.12
15	4,000	0.05	6,000	0.08	5,000	0.07	9,000	0.15
16	5,000	0.07	7,000	0.10	5,000	0.07	10,000	0.17
17	5,000	0.07	7,000	0.11	5,000	0.07	10,000	0.18
18	5,000	0.07	8,000	0.13	6,000	0.09	10,000	0.19
19	5,000	0.08	8,000	0.14	6,000	0.10	10,000	0.19
20	6,000	0.10	9,000	0.16	6,000	0.10	10,000	0.19
21	6,000	0.10	10,000	0.19	7,000	0.12	10,000	0.20
22	6,000	0.10	10,000	0.20	7,000	0.12	10,000	0.20
23	7,000	0.13	10,000	0.20	8,000	0.15	10,000	0.20
24	7,000	0.13	10,000	0.20	8,000	0.15	10,000	0.20
25	7,000	0.13	10,000	0.20	8,000	0.15	10,000	0.20
26	8,000	0.15	10,000	0.21	9,000	0.18	10,000	0.21
27	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
28	8,000	0.16	10,000	0.21	10,000	0.21	10,000	0.21
29	9,000	0.18	10,000	0.21	10,000	0.21	10,000	0.21
30	9,000	0.18	10,000	0.21	10,000	0.21	10,000	0.21
31	9,000	0.18	10,000	0.21	10,000	0.21	10,000	0.21
32	9,000	0.19	10,000	0.21	10,000	0.21	10,000	0.21
>33	10,000	0.21	10,000	0.21	10,000	0.21	10,000	0.21

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.0 / 6.5 / 3.0 / 6.5 / 3.0

Double-Pane: 3.0 / 13.0 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	4,000	0.02	4,000	0.02	4,000	0.03	5,000	0.04
11	4,000	0.03	4,000	0.03	4,000	0.04	5,000	0.05
12	4,000	0.04	4,000	0.04	4,000	0.05	6,000	0.08
13	4,000	0.04	5,000	0.06	4,000	0.05	7,000	0.10
14	4,000	0.05	5,000	0.06	4,000	0.05	8,000	0.13
15	4,000	0.05	5,000	0.07	4,000	0.06	8,000	0.14
16	4,000	0.06	6,000	0.09	5,000	0.08	9,000	0.17
17	4,000	0.06	7,000	0.12	5,000	0.08	10,000	0.20
18	5,000	0.08	7,000	0.12	5,000	0.08	10,000	0.21
19	5,000	0.09	8,000	0.15	5,000	0.08	10,000	0.21
20	5,000	0.09	8,000	0.16	6,000	0.11	10,000	0.22
21	5,000	0.09	9,000	0.18	6,000	0.11	10,000	0.22
22	6,000	0.11	9,000	0.19	7,000	0.14	10,000	0.22
23	6,000	0.12	10,000	0.22	7,000	0.14	10,000	0.22
24	6,000	0.12	10,000	0.22	7,000	0.14	10,000	0.23
25	7,000	0.14	10,000	0.23	8,000	0.17	10,000	0.23
26	7,000	0.15	10,000	0.23	8,000	0.17	10,000	0.23
27	7,000	0.15	10,000	0.23	8,000	0.17	10,000	0.23
28	8,000	0.17	10,000	0.23	9,000	0.20	10,000	0.23
29	8,000	0.17	10,000	0.23	9,000	0.20	10,000	0.23
30	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
31	8,000	0.18	10,000	0.24	10,000	0.23	10,000	0.24
32	9,000	0.21	10,000	0.24	10,000	0.23	10,000	0.24
33	9,000	0.21	10,000	0.24	10,000	0.23	10,000	0.24
34	9,000	0.21	10,000	0.24	10,000	0.23	10,000	0.24
>35	10,000	0.24	10,000	0.24	10,000	0.24	10,000	0.24

Double-Pane: 3.0 / 14.5 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.02	3,000	0.02	3,000	0.02	5,000	0.05
11	4,000	0.03	4,000	0.03	4,000	0.03	5,000	0.06
12	4,000	0.04	4,000	0.04	4,000	0.04	6,000	0.08
13	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.09
14	4,000	0.05	4,000	0.07	4,000	0.06	7,000	0.12
15	4,000	0.06	5,000	0.08	4,000	0.06	8,000	0.15
16	4,000	0.06	5,000	0.10	4,000	0.06	9,000	0.18
17	4,000	0.06	6,000	0.11	4,000	0.07	9,000	0.19
18	4,000	0.07	7,000	0.13	5,000	0.09	10,000	0.22
19	4,000	0.09	7,000	0.14	5,000	0.09	10,000	0.23
20	5,000	0.10	8,000	0.17	5,000	0.10	10,000	0.24
21	5,000	0.10	8,000	0.17	6,000	0.12	10,000	0.24
22	5,000	0.10	9,000	0.20	6,000	0.12	10,000	0.24
23	6,000	0.13	9,000	0.21	6,000	0.13	10,000	0.25
24	6,000	0.13	10,000	0.24	7,000	0.15	10,000	0.25
25	6,000	0.13	10,000	0.25	7,000	0.15	10,000	0.25
26	6,000	0.13	10,000	0.25	7,000	0.15	10,000	0.25
27	7,000	0.16	10,000	0.25	8,000	0.19	10,000	0.25
28	7,000	0.16	10,000	0.25	8,000	0.19	10,000	0.25
29	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
30	7,000	0.16	10,000	0.26	9,000	0.22	10,000	0.26
31	8,000	0.19	10,000	0.26	9,000	0.22	10,000	0.26
32	8,000	0.20	10,000	0.26	9,000	0.22	10,000	0.26
33	8,000	0.20	10,000	0.26	10,000	0.26	10,000	0.26
34	9,000	0.23	10,000	0.26	10,000	0.26	10,000	0.26
35	9,000	0.23	10,000	0.26	10,000	0.26	10,000	0.26
36	9,000	0.23	10,000	0.26	10,000	0.26	10,000	0.26
>37	10,000	0.26	10,000	0.26	10,000	0.26	10,000	0.26

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.0 / 8.0 / 3.0 / 8.0 / 3.0

Double-Pane: 3.0 / 16.0 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.04
11	4,000	0.03	4,000	0.03	4,000	0.03	5,000	0.06
12	4,000	0.04	4,000	0.04	4,000	0.04	5,000	0.07
13	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.10
14	4,000	0.06	4,000	0.06	4,000	0.06	7,000	0.13
15	4,000	0.06	5,000	0.08	4,000	0.07	7,000	0.14
16	4,000	0.07	5,000	0.09	4,000	0.07	8,000	0.17
17	4,000	0.07	6,000	0.11	4,000	0.07	9,000	0.20
18	4,000	0.07	6,000	0.12	4,000	0.07	10,000	0.24
19	4,000	0.08	7,000	0.15	5,000	0.10	10,000	0.25
20	4,000	0.08	7,000	0.15	5,000	0.10	10,000	0.26
21	5,000	0.11	8,000	0.19	5,000	0.11	10,000	0.26
22	5,000	0.11	8,000	0.19	6,000	0.13	10,000	0.27
23	5,000	0.11	9,000	0.22	6,000	0.14	10,000	0.27
24	5,000	0.11	9,000	0.23	6,000	0.14	10,000	0.27
25	6,000	0.14	10,000	0.26	7,000	0.17	10,000	0.27
26	6,000	0.14	10,000	0.27	7,000	0.17	10,000	0.28
27	6,000	0.14	10,000	0.27	7,000	0.17	10,000	0.28
28	6,000	0.15	10,000	0.27	8,000	0.20	10,000	0.28
29	7,000	0.18	10,000	0.28	8,000	0.20	10,000	0.28
30	7,000	0.18	10,000	0.28	8,000	0.21	10,000	0.28
31	7,000	0.18	10,000	0.28	8,000	0.21	10,000	0.28
32	8,000	0.21	10,000	0.28	9,000	0.25	10,000	0.28
33	8,000	0.21	10,000	0.28	9,000	0.25	10,000	0.28
34	8,000	0.21	10,000	0.29	10,000	0.28	10,000	0.29
35	8,000	0.22	10,000	0.29	10,000	0.28	10,000	0.29
36	9,000	0.25	10,000	0.29	10,000	0.28	10,000	0.29
37	9,000	0.25	10,000	0.29	10,000	0.28	10,000	0.29
38	9,000	0.25	10,000	0.29	10,000	0.28	10,000	0.29
39	9,000	0.25	10,000	0.29	10,000	0.28	10,000	0.29
>40	10,000	0.29	10,000	0.29	10,000	0.29	10,000	0.29

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.0 / 9.8 / 3.0 / 9.8 / 3.0

Double-Pane: 3.0 / 19.5 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.04
11	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.05
12	3,000	0.03	3,000	0.03	3,000	0.04	5,000	0.08
13	3,000	0.04	4,000	0.05	3,000	0.05	5,000	0.09
14	3,000	0.04	4,000	0.06	3,000	0.05	6,000	0.12
15	3,000	0.05	4,000	0.07	3,000	0.05	7,000	0.16
16	3,000	0.05	5,000	0.10	3,000	0.06	7,000	0.17
17	3,000	0.06	5,000	0.11	4,000	0.08	8,000	0.20
18	4,000	0.08	6,000	0.14	4,000	0.09	8,000	0.21
19	4,000	0.09	6,000	0.14	4,000	0.09	9,000	0.26
20	4,000	0.09	6,000	0.15	4,000	0.09	10,000	0.30
21	4,000	0.09	7,000	0.18	5,000	0.12	10,000	0.31
22	4,000	0.10	7,000	0.19	5,000	0.13	10,000	0.31
23	4,000	0.10	8,000	0.23	5,000	0.13	10,000	0.32
24	5,000	0.13	8,000	0.23	5,000	0.13	10,000	0.32
25	5,000	0.13	9,000	0.27	6,000	0.17	10,000	0.33
26	5,000	0.13	9,000	0.27	6,000	0.17	10,000	0.33
27	5,000	0.14	9,000	0.28	6,000	0.17	10,000	0.33
28	6,000	0.17	10,000	0.32	7,000	0.20	10,000	0.33
29	6,000	0.17	10,000	0.32	7,000	0.21	10,000	0.34
30	6,000	0.18	10,000	0.33	7,000	0.21	10,000	0.34
31	6,000	0.18	10,000	0.33	7,000	0.21	10,000	0.34
32	6,000	0.18	10,000	0.33	8,000	0.25	10,000	0.34
33	7,000	0.21	10,000	0.33	8,000	0.25	10,000	0.34
34	7,000	0.21	10,000	0.34	8,000	0.25	10,000	0.35
35	7,000	0.22	10,000	0.34	8,000	0.25	10,000	0.35
36	7,000	0.22	10,000	0.34	9,000	0.30	10,000	0.35
37	8,000	0.26	10,000	0.34	9,000	0.30	10,000	0.35
38	8,000	0.26	10,000	0.34	9,000	0.30	10,000	0.35
39	8,000	0.26	10,000	0.35	10,000	0.35	10,000	0.35
40	8,000	0.26	10,000	0.35	10,000	0.35	10,000	0.35
41	9,000	0.30	10,000	0.35	10,000	0.35	10,000	0.35
42	9,000	0.30	10,000	0.35	10,000	0.35	10,000	0.35
43	9,000	0.30	10,000	0.35	10,000	0.35	10,000	0.35
44	9,000	0.30	10,000	0.35	10,000	0.35	10,000	0.35
>45	10,000	0.35	10,000	0.35	10,000	0.35	10,000	0.35

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Heat strengthened glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.0 / 11.5 / 3.0 / 11.5 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.04
11	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.05
12	3,000	0.03	3,000	0.03	3,000	0.04	5,000	0.09
13	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.10
14	3,000	0.05	4,000	0.07	3,000	0.06	5,000	0.11
15	3,000	0.05	4,000	0.08	3,000	0.06	6,000	0.14
16	3,000	0.06	4,000	0.08	3,000	0.06	6,000	0.15
17	3,000	0.06	5,000	0.12	3,000	0.07	7,000	0.20
18	3,000	0.07	5,000	0.12	3,000	0.07	8,000	0.24
19	3,000	0.07	5,000	0.13	4,000	0.10	8,000	0.25
20	3,000	0.07	6,000	0.17	4,000	0.11	9,000	0.30
21	4,000	0.11	6,000	0.17	4,000	0.11	9,000	0.30
22	4,000	0.11	7,000	0.21	4,000	0.11	10,000	0.36
23	4,000	0.11	7,000	0.22	4,000	0.11	10,000	0.36
24	4,000	0.11	7,000	0.22	5,000	0.15	10,000	0.37
25	4,000	0.11	8,000	0.26	5,000	0.15	10,000	0.38
26	5,000	0.15	8,000	0.27	5,000	0.15	10,000	0.38
27	5,000	0.16	8,000	0.27	6,000	0.19	10,000	0.38
28	5,000	0.16	9,000	0.32	6,000	0.19	10,000	0.39
29	5,000	0.16	9,000	0.32	6,000	0.19	10,000	0.39
30	5,000	0.16	9,000	0.33	6,000	0.19	10,000	0.39
31	6,000	0.20	10,000	0.37	7,000	0.24	10,000	0.39
32	6,000	0.20	10,000	0.38	7,000	0.24	10,000	0.40
33	6,000	0.20	10,000	0.38	7,000	0.24	10,000	0.40
34	6,000	0.20	10,000	0.38	7,000	0.24	10,000	0.40
35	6,000	0.20	10,000	0.38	8,000	0.29	10,000	0.40
36	7,000	0.25	10,000	0.39	8,000	0.29	10,000	0.40
37	7,000	0.25	10,000	0.39	8,000	0.29	10,000	0.40
38	7,000	0.25	10,000	0.39	8,000	0.30	10,000	0.40
39	7,000	0.25	10,000	0.39	9,000	0.35	10,000	0.40
40	8,000	0.29	10,000	0.39	9,000	0.35	10,000	0.40
41	8,000	0.30	10,000	0.40	9,000	0.35	10,000	0.40
42	8,000	0.30	10,000	0.40	9,000	0.35	10,000	0.40
43	8,000	0.30	10,000	0.40	10,000	0.40	10,000	0.40
44	8,000	0.30	10,000	0.40	10,000	0.40	10,000	0.40
45	9,000	0.35	10,000	0.40	10,000	0.40	10,000	0.40
46	9,000	0.35	10,000	0.40	10,000	0.41	10,000	0.41
47	**	**	10,000	0.40	**	**	10,000	0.41
48	**	**	10,000	0.40	**	**	10,000	0.41
49	**	**	10,000	0.40	**	**	10,000	0.41
50	**	**	10,000	0.40	**	**	10,000	0.41
51	**	**	10,000	0.40	**	**	10,000	0.41
52	**	**	10,000	0.40	**	**	10,000	0.41
53	**	**	10,000	0.40	**	**	10,000	0.41
>54	**	**	10,000	0.40	**	**	10,000	0.41

Notes:

** Size limitations based on safe handling and manufacturing tolerances.

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.0 / 13.0 / 3.0 / 13.0 / 3.0

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.05
11	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
12	3,000	0.03	3,000	0.03	3,000	0.05	4,000	0.07
13	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.10
14	3,000	0.05	4,000	0.07	3,000	0.06	5,000	0.12
15	3,000	0.06	4,000	0.08	3,000	0.07	6,000	0.16
16	3,000	0.06	4,000	0.09	3,000	0.07	6,000	0.17
17	3,000	0.07	4,000	0.10	3,000	0.07	7,000	0.21
18	3,000	0.07	5,000	0.13	3,000	0.07	7,000	0.22
19	3,000	0.08	5,000	0.14	3,000	0.08	8,000	0.27
20	3,000	0.08	5,000	0.15	3,000	0.08	8,000	0.28
21	3,000	0.08	6,000	0.19	4,000	0.12	9,000	0.34
22	3,000	0.08	6,000	0.19	4,000	0.12	9,000	0.34
23	4,000	0.12	6,000	0.20	4,000	0.12	10,000	0.40
24	4,000	0.13	7,000	0.24	4,000	0.13	10,000	0.41
25	4,000	0.13	7,000	0.25	5,000	0.17	10,000	0.42
26	4,000	0.13	7,000	0.25	5,000	0.17	10,000	0.42
27	4,000	0.13	8,000	0.30	5,000	0.17	10,000	0.43
28	5,000	0.17	8,000	0.30	5,000	0.17	10,000	0.43
29	5,000	0.18	8,000	0.31	6,000	0.22	10,000	0.43
30	5,000	0.18	9,000	0.36	6,000	0.22	10,000	0.44
31	5,000	0.18	9,000	0.36	6,000	0.22	10,000	0.44
32	5,000	0.18	9,000	0.36	6,000	0.22	10,000	0.44
33	5,000	0.18	10,000	0.42	6,000	0.22	10,000	0.44
34	6,000	0.23	10,000	0.42	7,000	0.27	10,000	0.44
35	6,000	0.23	10,000	0.42	7,000	0.27	10,000	0.45
36	6,000	0.23	10,000	0.43	7,000	0.27	10,000	0.45
37	6,000	0.23	10,000	0.43	7,000	0.28	10,000	0.45
38	6,000	0.23	10,000	0.43	8,000	0.33	10,000	0.45
39	7,000	0.28	10,000	0.43	8,000	0.33	10,000	0.45
40	7,000	0.28	10,000	0.43	8,000	0.33	10,000	0.45
41	7,000	0.28	10,000	0.44	8,000	0.33	10,000	0.45
42	7,000	0.28	10,000	0.44	9,000	0.39	10,000	0.45
43	7,000	0.28	10,000	0.44	9,000	0.39	10,000	0.45
44	8,000	0.33	10,000	0.44	9,000	0.39	10,000	0.45
45	8,000	0.33	10,000	0.44	9,000	0.40	10,000	0.45
46	8,000	0.33	10,000	0.44	9,000	0.40	10,000	0.46
47	**	**	10,000	0.44	**	**	10,000	0.46
48	**	**	10,000	0.44	**	**	10,000	0.46
49	**	**	10,000	0.44	**	**	10,000	0.46
50	**	**	10,000	0.44	**	**	10,000	0.46
51	**	**	10,000	0.45	**	**	10,000	0.46
52	**	**	10,000	0.45	**	**	10,000	0.46
53	**	**	10,000	0.45	**	**	10,000	0.46
>54	**	**	10,000	0.45	**	**	10,000	0.46

Notes:

** Size limitations based on safe handling and manufacturing tolerances.

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 6.5 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	5,000	0.02	5,000	0.02
11	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
12	4,000	0.02	4,000	0.02	5,000	0.03	6,000	0.04
13	4,000	0.02	4,000	0.02	6,000	0.04	7,000	0.05
14	5,000	0.03	5,000	0.03	6,000	0.05	8,000	0.07
15	5,000	0.03	5,000	0.03	6,000	0.05	9,000	0.08
16	6,000	0.05	6,000	0.05	6,000	0.05	10,000	0.10
17	7,000	0.06	7,000	0.06	7,000	0.06	10,000	0.10
18	7,000	0.07	7,000	0.07	7,000	0.07	10,000	0.11
19	7,000	0.07	8,000	0.08	8,000	0.08	10,000	0.11
20	7,000	0.07	9,000	0.10	8,000	0.08	10,000	0.11
21	8,000	0.09	10,000	0.11	9,000	0.10	10,000	0.11
22	8,000	0.09	10,000	0.12	9,000	0.10	10,000	0.12
23	8,000	0.09	10,000	0.12	9,000	0.10	10,000	0.12
24	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
25	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
>26	10,000	0.12	10,000	0.12	10,000	0.12	10,000	0.12

Double-Pane: 3.9 / 8.0 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
11	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
12	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
13	4,000	0.02	4,000	0.02	5,000	0.04	6,000	0.05
14	4,000	0.03	4,000	0.03	5,000	0.04	7,000	0.06
15	5,000	0.04	5,000	0.04	5,000	0.04	8,000	0.08
16	5,000	0.04	5,000	0.04	6,000	0.06	8,000	0.09
17	6,000	0.06	6,000	0.06	6,000	0.06	9,000	0.11
18	6,000	0.06	6,000	0.06	6,000	0.06	10,000	0.13
19	6,000	0.07	7,000	0.08	7,000	0.08	10,000	0.13
20	6,000	0.07	8,000	0.10	7,000	0.08	10,000	0.13
21	7,000	0.09	8,000	0.10	7,000	0.09	10,000	0.14
22	7,000	0.09	9,000	0.12	8,000	0.10	10,000	0.14
23	7,000	0.09	10,000	0.12	8,000	0.10	10,000	0.14
24	8,000	0.11	10,000	0.14	9,000	0.12	10,000	0.14
25	8,000	0.11	10,000	0.15	9,000	0.12	10,000	0.15
26	8,000	0.11	10,000	0.15	9,000	0.12	10,000	0.15
27	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
28	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
29	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
>30	10,000	0.15	10,000	0.15	10,000	0.15	10,000	0.15

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 9.8 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
11	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
12	3,000	0.01	3,000	0.01	4,000	0.03	5,000	0.04
13	3,000	0.02	3,000	0.02	4,000	0.03	5,000	0.04
14	4,000	0.03	4,000	0.03	4,000	0.04	6,000	0.06
15	4,000	0.03	4,000	0.03	5,000	0.05	7,000	0.08
16	5,000	0.05	5,000	0.05	5,000	0.06	7,000	0.09
17	5,000	0.05	5,000	0.05	5,000	0.06	8,000	0.11
18	5,000	0.06	6,000	0.07	5,000	0.06	9,000	0.13
19	5,000	0.06	6,000	0.08	6,000	0.08	10,000	0.15
20	6,000	0.08	7,000	0.10	6,000	0.08	10,000	0.16
21	6,000	0.08	7,000	0.10	6,000	0.08	10,000	0.16
22	6,000	0.08	8,000	0.12	7,000	0.10	10,000	0.17
23	6,000	0.09	9,000	0.14	7,000	0.10	10,000	0.17
24	7,000	0.11	9,000	0.15	8,000	0.12	10,000	0.17
25	7,000	0.11	10,000	0.17	8,000	0.13	10,000	0.17
26	7,000	0.11	10,000	0.18	8,000	0.13	10,000	0.18
27	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
28	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
29	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
30	8,000	0.14	10,000	0.18	10,000	0.18	10,000	0.18
31	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
32	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
33	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
>34	10,000	0.19	10,000	0.19	10,000	0.19	10,000	0.19

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. **Above limits do not take into account aesthetics.**

Altitude Limits (Installed)

Double-Pane: 3.9 / 11.5 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
11	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
12	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
13	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
14	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
15	4,000	0.04	4,000	0.04	4,000	0.04	6,000	0.07
16	4,000	0.04	4,000	0.04	4,000	0.05	7,000	0.10
17	5,000	0.06	5,000	0.06	5,000	0.07	7,000	0.10
18	5,000	0.07	5,000	0.07	5,000	0.07	8,000	0.13
19	5,000	0.07	6,000	0.09	5,000	0.07	9,000	0.15
20	5,000	0.07	6,000	0.09	5,000	0.07	10,000	0.18
21	5,000	0.07	7,000	0.11	6,000	0.09	10,000	0.19
22	5,000	0.08	7,000	0.12	6,000	0.10	10,000	0.19
23	6,000	0.10	8,000	0.14	6,000	0.10	10,000	0.19
24	6,000	0.10	8,000	0.14	7,000	0.12	10,000	0.20
25	6,000	0.10	9,000	0.17	7,000	0.12	10,000	0.20
26	6,000	0.10	9,000	0.17	7,000	0.12	10,000	0.20
27	7,000	0.13	10,000	0.20	8,000	0.15	10,000	0.20
28	7,000	0.13	10,000	0.21	8,000	0.15	10,000	0.21
29	7,000	0.13	10,000	0.21	8,000	0.15	10,000	0.21
30	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
31	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
32	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
33	8,000	0.16	10,000	0.21	10,000	0.21	10,000	0.21
34	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
35	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
36	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
37	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
>38	10,000	0.22	10,000	0.22	10,000	0.22	10,000	0.22

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.9 / 6.5 / 3.9 / 6.5 / 3.9

Double-Pane: 3.9 / 13.0 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
11	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
12	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
13	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
14	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.06
15	4,000	0.04	4,000	0.04	4,000	0.05	6,000	0.08
16	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.09
17	4,000	0.05	4,000	0.05	4,000	0.05	7,000	0.11
18	4,000	0.05	5,000	0.07	4,000	0.06	7,000	0.12
19	4,000	0.06	5,000	0.07	5,000	0.08	8,000	0.14
20	5,000	0.08	6,000	0.10	5,000	0.08	9,000	0.17
21	5,000	0.08	6,000	0.10	5,000	0.08	10,000	0.21
22	5,000	0.08	7,000	0.13	6,000	0.11	10,000	0.21
23	5,000	0.09	7,000	0.13	6,000	0.11	10,000	0.21
24	5,000	0.09	8,000	0.16	6,000	0.11	10,000	0.22
25	5,000	0.09	8,000	0.16	6,000	0.11	10,000	0.22
26	6,000	0.11	9,000	0.19	7,000	0.14	10,000	0.22
27	6,000	0.12	9,000	0.19	7,000	0.14	10,000	0.23
28	6,000	0.12	10,000	0.23	7,000	0.14	10,000	0.23
29	7,000	0.15	10,000	0.23	8,000	0.17	10,000	0.23
30	7,000	0.15	10,000	0.23	8,000	0.17	10,000	0.23
31	7,000	0.15	10,000	0.23	8,000	0.17	10,000	0.23
32	7,000	0.15	10,000	0.24	9,000	0.20	10,000	0.24
33	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
34	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
35	8,000	0.18	10,000	0.24	10,000	0.24	10,000	0.24
36	8,000	0.18	10,000	0.24	10,000	0.24	10,000	0.24
37	9,000	0.21	10,000	0.24	10,000	0.24	10,000	0.24
38	9,000	0.21	10,000	0.24	10,000	0.24	10,000	0.24
39	9,000	0.21	10,000	0.24	10,000	0.24	10,000	0.24
>40	10,000	0.25	10,000	0.25	10,000	0.25	10,000	0.25

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9/14.5/3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
12	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
13	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
14	3,000	0.02	3,000	0.02	4,000	0.05	5,000	0.06
15	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
16	4,000	0.05	4,000	0.05	4,000	0.06	6,000	0.09
17	4,000	0.05	4,000	0.05	4,000	0.06	6,000	0.10
18	4,000	0.06	4,000	0.06	4,000	0.06	7,000	0.13
19	4,000	0.06	5,000	0.08	4,000	0.06	8,000	0.16
20	4,000	0.06	5,000	0.09	5,000	0.09	8,000	0.16
21	4,000	0.07	6,000	0.11	5,000	0.09	9,000	0.19
22	5,000	0.09	6,000	0.12	5,000	0.09	10,000	0.23
23	5,000	0.09	7,000	0.14	5,000	0.09	10,000	0.23
24	5,000	0.10	7,000	0.15	6,000	0.12	10,000	0.24
25	5,000	0.10	8,000	0.18	6,000	0.12	10,000	0.24
26	5,000	0.10	8,000	0.18	6,000	0.12	10,000	0.25
27	6,000	0.13	8,000	0.18	6,000	0.13	10,000	0.25
28	6,000	0.13	9,000	0.22	7,000	0.15	10,000	0.25
29	6,000	0.13	9,000	0.22	7,000	0.15	10,000	0.25
30	6,000	0.13	10,000	0.25	7,000	0.15	10,000	0.25
31	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
32	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
33	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
34	7,000	0.16	10,000	0.26	9,000	0.22	10,000	0.26
35	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
36	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
37	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
38	8,000	0.20	10,000	0.27	10,000	0.27	10,000	0.27
39	9,000	0.23	10,000	0.27	10,000	0.27	10,000	0.27
40	9,000	0.24	10,000	0.27	10,000	0.27	10,000	0.27
41	9,000	0.24	10,000	0.27	10,000	0.27	10,000	0.27
42	9,000	0.26	10,000	0.27	10,000	0.27	10,000	0.27
>43	10,000	0.27	10,000	0.27	10,000	0.27	10,000	0.27

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.9 / 8.0 / 3.9 / 8.0 / 3.9

Double-Pane: 3.9/16.0/3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
12	3,000	0.02	3,000	0.02	3,000	0.02	4,000	0.04
13	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.04
14	3,000	0.03	3,000	0.03	3,000	0.03	4,000	0.05
15	3,000	0.03	3,000	0.03	3,000	0.04	5,000	0.07
16	4,000	0.05	4,000	0.05	4,000	0.06	5,000	0.08
17	4,000	0.06	4,000	0.06	4,000	0.06	6,000	0.11
18	4,000	0.06	4,000	0.06	4,000	0.07	7,000	0.14
19	4,000	0.07	5,000	0.09	4,000	0.07	7,000	0.14
20	4,000	0.07	5,000	0.09	4,000	0.07	8,000	0.18
21	4,000	0.07	5,000	0.10	5,000	0.10	8,000	0.18
22	4,000	0.07	6,000	0.12	5,000	0.10	9,000	0.22
23	5,000	0.10	6,000	0.13	5,000	0.10	10,000	0.25
24	5,000	0.11	7,000	0.16	5,000	0.10	10,000	0.26
25	5,000	0.11	7,000	0.16	6,000	0.13	10,000	0.26
26	5,000	0.11	7,000	0.17	6,000	0.13	10,000	0.27
27	5,000	0.11	8,000	0.20	6,000	0.14	10,000	0.27
28	6,000	0.14	8,000	0.20	6,000	0.14	10,000	0.27
29	6,000	0.14	9,000	0.24	7,000	0.17	10,000	0.28
30	6,000	0.14	9,000	0.24	7,000	0.17	10,000	0.28
31	6,000	0.15	10,000	0.28	7,000	0.17	10,000	0.28
32	6,000	0.15	10,000	0.28	7,000	0.17	10,000	0.28
33	7,000	0.18	10,000	0.28	8,000	0.20	10,000	0.28
34	7,000	0.18	10,000	0.28	8,000	0.20	10,000	0.28
35	7,000	0.18	10,000	0.29	8,000	0.21	10,000	0.29
36	7,000	0.18	10,000	0.29	9,000	0.24	10,000	0.29
37	8,000	0.22	10,000	0.29	9,000	0.24	10,000	0.29
38	8,000	0.22	10,000	0.29	9,000	0.24	10,000	0.29
39	8,000	0.22	10,000	0.29	9,000	0.25	10,000	0.29
40	8,000	0.22	10,000	0.29	10,000	0.29	10,000	0.29
41	9,000	0.26	10,000	0.29	10,000	0.29	10,000	0.29
42	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
43	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
44	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
45	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
>46	10,000	0.30	10,000	0.30	10,000	0.30	10,000	0.30

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9/17.5/3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
11	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
12	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.04
13	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.05
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.05
15	3,000	0.03	3,000	0.03	3,000	0.04	5,000	0.08
16	3,000	0.04	3,000	0.04	3,000	0.04	5,000	0.09
17	4,000	0.06	4,000	0.06	4,000	0.06	6,000	0.11
18	4,000	0.06	4,000	0.06	4,000	0.07	6,000	0.12
19	4,000	0.07	4,000	0.07	4,000	0.07	7,000	0.15
20	4,000	0.07	5,000	0.10	4,000	0.08	7,000	0.16
21	4,000	0.08	5,000	0.10	4,000	0.08	8,000	0.19
22	4,000	0.08	5,000	0.11	4,000	0.08	8,000	0.20
23	4,000	0.08	6,000	0.14	5,000	0.11	9,000	0.24
24	4,000	0.08	6,000	0.14	5,000	0.11	10,000	0.28
25	5,000	0.11	7,000	0.17	5,000	0.11	10,000	0.28
26	5,000	0.12	7,000	0.18	5,000	0.12	10,000	0.29
27	5,000	0.12	7,000	0.18	6,000	0.15	10,000	0.29
28	5,000	0.12	8,000	0.22	6,000	0.15	10,000	0.30
29	5,000	0.12	8,000	0.22	6,000	0.15	10,000	0.30
30	6,000	0.16	9,000	0.26	6,000	0.16	10,000	0.30
31	6,000	0.16	9,000	0.26	7,000	0.18	10,000	0.30
32	6,000	0.16	9,000	0.26	7,000	0.19	10,000	0.31
33	6,000	0.16	10,000	0.30	7,000	0.19	10,000	0.31
34	6,000	0.16	10,000	0.31	8,000	0.22	10,000	0.31
35	7,000	0.20	10,000	0.31	8,000	0.23	10,000	0.31
36	7,000	0.20	10,000	0.31	8,000	0.23	10,000	0.31
37	7,000	0.20	10,000	0.31	8,000	0.23	10,000	0.31
38	7,000	0.20	10,000	0.31	9,000	0.27	10,000	0.31
39	8,000	0.24	10,000	0.31	9,000	0.27	10,000	0.31
40	8,000	0.24	10,000	0.32	9,000	0.27	10,000	0.32
41	8,000	0.24	10,000	0.32	9,000	0.27	10,000	0.32
42	8,000	0.24	10,000	0.32	10,000	0.31	10,000	0.32
43	8,000	0.24	10,000	0.32	10,000	0.31	10,000	0.32
44	9,000	0.28	10,000	0.32	10,000	0.31	10,000	0.32
45	9,000	0.28	10,000	0.32	10,000	0.32	10,000	0.32
46	9,000	0.28	10,000	0.32	10,000	0.32	10,000	0.32
47	9,000	0.28	10,000	0.32	10,000	0.32	10,000	0.32
>48	10,000	0.32	10,000	0.32	10,000	0.32	10,000	0.32

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.9 / 9.8 / 3.9 / 9.8 / 3.9

Double-Pane: 3.9 / 19.5 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
11	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
12	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
13	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.05
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
15	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
16	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.09
17	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.10
18	3,000	0.05	4,000	0.07	3,000	0.05	6,000	0.13
19	3,000	0.05	4,000	0.07	4,000	0.08	6,000	0.14
20	4,000	0.08	4,000	0.08	4,000	0.08	7,000	0.17
21	4,000	0.08	5,000	0.11	4,000	0.09	7,000	0.18
22	4,000	0.09	5,000	0.11	4,000	0.09	8,000	0.22
23	4,000	0.09	5,000	0.12	4,000	0.09	8,000	0.22
24	4,000	0.09	6,000	0.15	5,000	0.12	9,000	0.27
25	4,000	0.09	6,000	0.16	5,000	0.13	10,000	0.31
26	4,000	0.10	7,000	0.19	5,000	0.13	10,000	0.32
27	5,000	0.13	7,000	0.20	5,000	0.13	10,000	0.32
28	5,000	0.13	7,000	0.20	5,000	0.13	10,000	0.33
29	5,000	0.13	8,000	0.24	6,000	0.16	10,000	0.33
30	5,000	0.14	8,000	0.25	6,000	0.17	10,000	0.33
31	5,000	0.14	8,000	0.25	6,000	0.17	10,000	0.33
32	6,000	0.17	9,000	0.29	6,000	0.17	10,000	0.34
33	6,000	0.17	9,000	0.29	7,000	0.21	10,000	0.34
34	6,000	0.18	9,000	0.29	7,000	0.21	10,000	0.34
35	6,000	0.18	10,000	0.34	7,000	0.21	10,000	0.34
36	6,000	0.18	10,000	0.34	7,000	0.21	10,000	0.34
37	7,000	0.22	10,000	0.34	8,000	0.25	10,000	0.34
38	7,000	0.22	10,000	0.34	8,000	0.25	10,000	0.34
39	7,000	0.22	10,000	0.35	8,000	0.25	10,000	0.35
40	7,000	0.22	10,000	0.35	8,000	0.25	10,000	0.35
41	7,000	0.22	10,000	0.35	9,000	0.30	10,000	0.35
42	8,000	0.26	10,000	0.35	9,000	0.30	10,000	0.35
43	8,000	0.26	10,000	0.35	9,000	0.30	10,000	0.35
44	8,000	0.26	10,000	0.35	9,000	0.30	10,000	0.35
45	8,000	0.26	10,000	0.35	10,000	0.35	10,000	0.35
46	8,000	0.27	10,000	0.35	10,000	0.36	10,000	0.36
47	9,000	0.31	10,000	0.35	10,000	0.36	10,000	0.36
48	9,000	0.31	10,000	0.35	10,000	0.36	10,000	0.36
49	9,000	0.31	10,000	0.36	10,000	0.36	10,000	0.36
50	9,000	0.31	10,000	0.36	10,000	0.36	10,000	0.36
51	9,000	0.31	10,000	0.36	10,000	0.36	10,000	0.36
>52	10,000	0.36	10,000	0.36	10,000	0.36	10,000	0.36

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.9 / 11.5 / 3.9 / 11.5 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
11	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
12	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
13	3,000	0.02	3,000	0.02	3,000	0.04	3,000	0.04
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
15	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.07
16	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.08
17	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.11
18	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.20
19	3,000	0.06	4,000	0.08	3,000	0.06	6,000	0.15
20	3,000	0.06	4,000	0.09	3,000	0.06	6,000	0.16
21	3,000	0.06	4,000	0.09	3,000	0.07	7,000	0.20
22	3,000	0.07	5,000	0.13	4,000	0.10	7,000	0.21
23	4,000	0.10	5,000	0.13	4,000	0.10	8,000	0.25
24	4,000	0.11	5,000	0.14	4,000	0.11	8,000	0.26
25	4,000	0.11	6,000	0.18	4,000	0.11	9,000	0.31
26	4,000	0.11	6,000	0.18	4,000	0.11	9,000	0.31
27	4,000	0.11	6,000	0.19	5,000	0.15	10,000	0.37
28	4,000	0.11	7,000	0.23	5,000	0.15	10,000	0.37
29	4,000	0.12	7,000	0.23	5,000	0.15	10,000	0.38
30	5,000	0.16	7,000	0.23	5,000	0.16	10,000	0.38
31	5,000	0.16	8,000	0.28	5,000	0.16	10,000	0.39
32	5,000	0.16	8,000	0.28	6,000	0.20	10,000	0.39
33	5,000	0.16	8,000	0.29	6,000	0.20	10,000	0.39
34	5,000	0.16	9,000	0.33	6,000	0.20	10,000	0.39
35	5,000	0.16	9,000	0.34	6,000	0.20	10,000	0.40
36	6,000	0.20	9,000	0.34	7,000	0.24	10,000	0.40
37	6,000	0.21	9,000	0.34	7,000	0.24	10,000	0.40
38	6,000	0.21	10,000	0.39	7,000	0.25	10,000	0.40
39	6,000	0.21	10,000	0.39	7,000	0.25	10,000	0.40
40	6,000	0.21	10,000	0.40	8,000	0.29	10,000	0.41
41	7,000	0.25	10,000	0.40	8,000	0.29	10,000	0.41
42	7,000	0.25	10,000	0.40	8,000	0.30	10,000	0.41
43	7,000	0.26	10,000	0.40	8,000	0.30	10,000	0.41
44	7,000	0.26	10,000	0.40	8,000	0.30	10,000	0.41
45	7,000	0.26	10,000	0.41	9,000	0.35	10,000	0.41
46	7,000	0.26	10,000	0.41	9,000	0.35	10,000	0.41
47	8,000	0.30	10,000	0.41	9,000	0.35	10,000	0.41
48	8,000	0.31	10,000	0.41	9,000	0.35	10,000	0.41
49	8,000	0.31	10,000	0.41	9,000	0.36	10,000	0.41
50	8,000	0.31	10,000	0.41	10,000	0.41	10,000	0.41
51	8,000	0.31	10,000	0.41	10,000	0.41	10,000	0.41
52	9,000	0.36	10,000	0.41	10,000	0.41	10,000	0.41
53	9,000	0.36	10,000	0.41	10,000	0.41	10,000	0.41
54	9,000	0.36	10,000	0.41	10,000	0.42	10,000	0.42
55	9,000	0.36	10,000	0.41	10,000	0.42	10,000	0.42
56	9,000	0.36	10,000	0.42	10,000	0.42	10,000	0.42
>57	10,000	0.42	10,000	0.42	10,000	0.42	10,000	0.42

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 3.9 / 13.0 / 3.9 / 13.0 / 3.9

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
11	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
12	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
13	3,000	0.02	3,000	0.02	3,000	0.04	3,000	0.04
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.07
15	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.07
16	3,000	0.04	3,000	0.04	3,000	0.06	4,000	0.08
17	3,000	0.05	3,000	0.05	3,000	0.06	4,000	0.09
18	3,000	0.06	3,000	0.06	3,000	0.07	5,000	0.13
19	3,000	0.06	3,000	0.06	3,000	0.07	5,000	0.13
20	3,000	0.07	4,000	0.10	3,000	0.07	6,000	0.18
21	3,000	0.07	4,000	0.10	3,000	0.07	6,000	0.18
22	3,000	0.07	4,000	0.11	3,000	0.08	7,000	0.23
23	3,000	0.08	4,000	0.11	4,000	0.12	7,000	0.23
24	3,000	0.08	5,000	0.15	4,000	0.12	7,000	0.24
25	3,000	0.08	5,000	0.16	4,000	0.12	8,000	0.29
26	4,000	0.12	5,000	0.16	4,000	0.12	8,000	0.30
27	4,000	0.12	6,000	0.20	4,000	0.12	9,000	0.35
28	4,000	0.13	6,000	0.21	4,000	0.12	9,000	0.36
29	4,000	0.13	6,000	0.21	5,000	0.17	10,000	0.42
30	4,000	0.13	7,000	0.26	5,000	0.17	10,000	0.42
31	4,000	0.13	7,000	0.26	5,000	0.17	10,000	0.43
32	4,000	0.13	7,000	0.26	5,000	0.17	10,000	0.43
33	5,000	0.18	8,000	0.31	5,000	0.18	10,000	0.44
34	5,000	0.18	8,000	0.32	6,000	0.22	10,000	0.44
35	5,000	0.18	8,000	0.32	6,000	0.22	10,000	0.44
36	5,000	0.18	8,000	0.32	6,000	0.22	10,000	0.44
37	5,000	0.18	9,000	0.37	6,000	0.22	10,000	0.45
38	5,000	0.18	9,000	0.38	6,000	0.22	10,000	0.45
39	6,000	0.23	9,000	0.38	7,000	0.27	10,000	0.45
40	6,000	0.23	10,000	0.44	7,000	0.27	10,000	0.45
41	6,000	0.23	10,000	0.44	7,000	0.27	10,000	0.45
42	6,000	0.23	10,000	0.44	7,000	0.28	10,000	0.45
43	6,000	0.23	10,000	0.44	7,000	0.28	10,000	0.46
44	7,000	0.28	10,000	0.45	8,000	0.33	10,000	0.46
45	7,000	0.29	10,000	0.45	8,000	0.34	10,000	0.46
46	7,000	0.29	10,000	0.45	8,000	0.34	10,000	0.46
47	7,000	0.29	10,000	0.45	8,000	0.34	10,000	0.46
48	7,000	0.29	10,000	0.45	9,000	0.39	10,000	0.46
49	7,000	0.29	10,000	0.45	9,000	0.39	10,000	0.46
50	8,000	0.34	10,000	0.46	9,000	0.39	10,000	0.46
51	8,000	0.34	10,000	0.46	9,000	0.40	10,000	0.47
52	8,000	0.34	10,000	0.46	9,000	0.40	10,000	0.47
53	8,000	0.34	10,000	0.46	10,000	0.47	10,000	0.47
54	8,000	0.34	10,000	0.46	10,000	0.47	10,000	0.47
55	8,000	0.34	10,000	0.46	10,000	0.47	10,000	0.47
56	9,000	0.40	10,000	0.46	10,000	0.47	10,000	0.47
57	9,000	0.40	10,000	0.46	10,000	0.47	10,000	0.47
58	9,000	0.40	10,000	0.46	10,000	0.47	10,000	0.47
59	9,000	0.40	10,000	0.46	10,000	0.47	10,000	0.47
60	**	**	10,000	0.46	**	**	10,000	0.47
61	**	**	10,000	0.46	**	**	10,000	0.47
62	**	**	10,000	0.46	**	**	10,000	0.47
63	**	**	10,000	0.46	**	**	10,000	0.47
64	**	**	10,000	0.46	**	**	10,000	0.47
65	**	**	10,000	0.46	**	**	10,000	0.47
>66	**	**	10,000	0.47	**	**	10,000	0.47

Notes:

** Size limitations based on safe handling and manufacturing tolerances.

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 4.7 / 6.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	4,000	0.01	4,000	0.01
11	3,000	0.00	3,000	0.00	4,000	0.01	4,000	0.01
12	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
13	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
14	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
15	4,000	0.02	4,000	0.02	6,000	0.04	6,000	0.04
16	4,000	0.02	4,000	0.02	6,000	0.05	7,000	0.06
17	4,000	0.03	4,000	0.03	6,000	0.05	8,000	0.07
18	5,000	0.04	5,000	0.04	7,000	0.06	8,000	0.07
19	6,000	0.05	6,000	0.05	7,000	0.06	9,000	0.09
20	6,000	0.05	6,000	0.05	7,000	0.06	10,000	0.11
21	7,000	0.07	7,000	0.07	8,000	0.08	10,000	0.11
22	7,000	0.07	7,000	0.07	8,000	0.08	10,000	0.11
23	8,000	0.08	8,000	0.08	8,000	0.08	10,000	0.11
24	8,000	0.09	9,000	0.10	9,000	0.10	10,000	0.11
25	8,000	0.09	9,000	0.10	9,000	0.10	10,000	0.12
26	9,000	0.10	10,000	0.12	10,000	0.12	10,000	0.12
27	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
28	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
>29	10,000	0.13	10,000	0.13	10,000	0.13	10,000	0.13

Double-Pane: 4.7 / 8.0 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	4,000	0.02	4,000	0.02
12	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
13	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
14	3,000	0.01	3,000	0.01	5,000	0.04	5,000	0.04
15	3,000	0.01	3,000	0.01	5,000	0.04	5,000	0.04
16	4,000	0.03	4,000	0.03	5,000	0.04	6,000	0.05
17	4,000	0.03	4,000	0.03	6,000	0.06	7,000	0.07
18	4,000	0.03	4,000	0.03	6,000	0.06	7,000	0.07
19	5,000	0.05	5,000	0.05	6,000	0.06	8,000	0.09
20	5,000	0.05	5,000	0.05	6,000	0.06	9,000	0.11
21	6,000	0.06	6,000	0.06	7,000	0.08	10,000	0.13
22	7,000	0.08	7,000	0.08	7,000	0.08	10,000	0.13
23	7,000	0.08	7,000	0.08	7,000	0.08	10,000	0.13
24	7,000	0.09	8,000	0.10	8,000	0.10	10,000	0.14
25	7,000	0.09	8,000	0.10	8,000	0.10	10,000	0.14
26	8,000	0.11	9,000	0.12	8,000	0.11	10,000	0.14
27	8,000	0.11	9,000	0.13	9,000	0.12	10,000	0.14
28	8,000	0.11	10,000	0.15	9,000	0.12	10,000	0.15
29	8,000	0.11	10,000	0.15	9,000	0.12	10,000	0.15
30	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
31	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
32	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
>33	10,000	0.15	10,000	0.15	10,000	0.15	10,000	0.15

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 4.7 / 9.8 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
13	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
14	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
15	3,000	0.02	3,000	0.02	5,000	0.04	5,000	0.04
16	3,000	0.02	3,000	0.02	5,000	0.05	5,000	0.05
17	4,000	0.03	4,000	0.03	5,000	0.05	6,000	0.07
18	4,000	0.04	4,000	0.04	5,000	0.05	6,000	0.07
19	4,000	0.04	4,000	0.04	5,000	0.06	7,000	0.09
20	5,000	0.06	5,000	0.06	6,000	0.08	8,000	0.11
21	5,000	0.06	5,000	0.06	6,000	0.08	9,000	0.13
22	6,000	0.08	6,000	0.08	6,000	0.08	9,000	0.14
23	6,000	0.08	6,000	0.08	6,000	0.08	10,000	0.16
24	6,000	0.08	7,000	0.10	7,000	0.10	10,000	0.16
25	6,000	0.08	7,000	0.10	7,000	0.10	10,000	0.17
26	7,000	0.11	8,000	0.13	7,000	0.11	10,000	0.17
27	7,000	0.11	8,000	0.13	8,000	0.12	10,000	0.17
28	7,000	0.11	9,000	0.15	8,000	0.13	10,000	0.17
29	7,000	0.11	9,000	0.15	8,000	0.13	10,000	0.17
30	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
31	8,000	0.13	10,000	0.18	9,000	0.15	10,000	0.18
32	8,000	0.14	10,000	0.18	9,000	0.15	10,000	0.18
33	8,000	0.14	10,000	0.18	10,000	0.18	10,000	0.18
34	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
35	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
36	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
37	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
>38	10,000	0.19	10,000	0.19	10,000	0.19	10,000	0.19

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 4.7 / 11.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
13	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
14	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
15	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
16	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
17	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.06
18	4,000	0.04	4,000	0.04	5,000	0.06	6,000	0.08
19	4,000	0.04	4,000	0.04	5,000	0.06	6,000	0.08
20	4,000	0.05	4,000	0.05	5,000	0.07	7,000	0.10
21	5,000	0.07	5,000	0.07	5,000	0.07	8,000	0.13
22	5,000	0.07	5,000	0.07	5,000	0.07	8,000	0.13
23	5,000	0.07	6,000	0.09	6,000	0.09	9,000	0.16
24	5,000	0.07	6,000	0.09	6,000	0.09	10,000	0.19
25	6,000	0.10	6,000	0.10	6,000	0.10	10,000	0.19
26	6,000	0.10	7,000	0.12	7,000	0.12	10,000	0.19
27	6,000	0.10	7,000	0.12	7,000	0.12	10,000	0.20
28	6,000	0.10	8,000	0.15	7,000	0.12	10,000	0.20
29	7,000	0.13	8,000	0.15	7,000	0.13	10,000	0.20
30	7,000	0.13	9,000	0.18	8,000	0.15	10,000	0.20
31	7,000	0.13	9,000	0.18	8,000	0.15	10,000	0.20
32	7,000	0.13	10,000	0.21	8,000	0.15	10,000	0.21
33	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
34	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
35	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
36	8,000	0.16	10,000	0.22	10,000	0.22	10,000	0.22
37	8,000	0.16	10,000	0.22	10,000	0.22	10,000	0.22
38	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
39	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
40	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
41	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
>42	10,000	0.22	10,000	0.22	10,000	0.22	10,000	0.22

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 4.7 / 6.5 / 4.7 / 6.5 / 4.7

Double-Pane: 4.7 / 13.0 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
14	3,000	0.02	3,000	0.02	4,000	0.03	4,000	0.03
15	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
16	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
17	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.06
18	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
19	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.09
20	4,000	0.05	4,000	0.05	5,000	0.07	7,000	0.12
21	4,000	0.05	4,000	0.05	5,000	0.08	7,000	0.12
22	5,000	0.08	5,000	0.08	5,000	0.08	8,000	0.15
23	5,000	0.08	5,000	0.08	5,000	0.08	8,000	0.15
24	5,000	0.08	6,000	0.10	5,000	0.08	9,000	0.18
25	5,000	0.08	6,000	0.11	6,000	0.11	9,000	0.18
26	5,000	0.09	6,000	0.11	6,000	0.11	10,000	0.21
27	6,000	0.11	7,000	0.14	6,000	0.11	10,000	0.22
28	6,000	0.11	7,000	0.14	7,000	0.14	10,000	0.22
29	6,000	0.12	8,000	0.17	7,000	0.14	10,000	0.22
30	6,000	0.12	8,000	0.17	7,000	0.14	10,000	0.23
31	6,000	0.12	9,000	0.20	7,000	0.14	10,000	0.23
32	7,000	0.15	9,000	0.20	8,000	0.17	10,000	0.23
33	7,000	0.15	9,000	0.20	8,000	0.17	10,000	0.23
34	7,000	0.15	10,000	0.24	8,000	0.17	10,000	0.24
35	7,000	0.15	10,000	0.24	8,000	0.17	10,000	0.24
36	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
37	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
38	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
39	8,000	0.18	10,000	0.24	10,000	0.24	10,000	0.24
40	9,000	0.21	10,000	0.24	10,000	0.24	10,000	0.24
41	9,000	0.21	10,000	0.25	10,000	0.25	10,000	0.25
42	9,000	0.21	10,000	0.25	10,000	0.25	10,000	0.25
43	9,000	0.21	10,000	0.25	10,000	0.25	10,000	0.25
44	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
>45	10,000	0.25	10,000	0.25	10,000	0.25	10,000	0.25

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 4.7 / 14.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
14	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
15	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
16	3,000	0.02	3,000	0.02	4,000	0.05	4,000	0.05
17	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
18	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
19	3,000	0.03	3,000	0.03	4,000	0.06	6,000	0.10
20	4,000	0.06	4,000	0.06	4,000	0.06	6,000	0.10
21	4,000	0.06	4,000	0.06	4,000	0.06	7,000	0.13
22	4,000	0.06	4,000	0.06	5,000	0.09	7,000	0.13
23	5,000	0.09	5,000	0.09	5,000	0.09	8,000	0.16
24	5,000	0.09	5,000	0.09	5,000	0.09	8,000	0.17
25	5,000	0.09	6,000	0.12	5,000	0.09	9,000	0.20
26	5,000	0.09	6,000	0.12	6,000	0.12	9,000	0.20
27	5,000	0.10	6,000	0.12	6,000	0.12	10,000	0.24
28	5,000	0.10	7,000	0.15	6,000	0.12	10,000	0.24
29	6,000	0.13	7,000	0.15	6,000	0.12	10,000	0.25
30	6,000	0.13	8,000	0.18	7,000	0.15	10,000	0.25
31	6,000	0.13	8,000	0.19	7,000	0.15	10,000	0.25
32	6,000	0.13	8,000	0.19	7,000	0.15	10,000	0.25
33	6,000	0.13	9,000	0.22	7,000	0.15	10,000	0.26
34	7,000	0.16	9,000	0.22	8,000	0.19	10,000	0.26
35	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
36	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
37	7,000	0.16	10,000	0.26	8,000	0.19	10,000	0.26
38	7,000	0.17	10,000	0.27	9,000	0.22	10,000	0.27
39	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
40	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
41	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
42	8,000	0.20	10,000	0.27	10,000	0.27	10,000	0.27
43	9,000	0.24	10,000	0.27	10,000	0.27	10,000	0.27
44	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
45	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
46	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
47	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
>48	10,000	0.28	10,000	0.28	10,000	0.28	10,000	0.28

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 4.7 / 8.0 / 4.7 / 8.0 / 4.7

Double-Pane: 4.7 / 16.0 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
14	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
15	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
16	3,000	0.02	3,000	0.02	4,000	0.05	4,000	0.05
17	3,000	0.03	3,000	0.03	4,000	0.05	4,000	0.05
18	3,000	0.03	3,000	0.03	4,000	0.06	5,000	0.08
19	3,000	0.04	3,000	0.04	4,000	0.06	5,000	0.08
20	4,000	0.06	4,000	0.06	4,000	0.07	6,000	0.11
21	4,000	0.06	4,000	0.06	4,000	0.07	6,000	0.12
22	4,000	0.07	4,000	0.07	4,000	0.07	7,000	0.15
23	4,000	0.07	4,000	0.07	4,000	0.07	7,000	0.15
24	4,000	0.07	5,000	0.10	5,000	0.10	8,000	0.18
25	5,000	0.10	5,000	0.10	5,000	0.10	8,000	0.19
26	5,000	0.10	6,000	0.13	5,000	0.10	9,000	0.22
27	5,000	0.10	6,000	0.13	5,000	0.10	9,000	0.23
28	5,000	0.11	6,000	0.13	6,000	0.13	10,000	0.26
29	5,000	0.11	7,000	0.17	6,000	0.13	10,000	0.27
30	5,000	0.11	7,000	0.17	6,000	0.14	10,000	0.27
31	6,000	0.14	7,000	0.17	6,000	0.14	10,000	0.27
32	6,000	0.14	8,000	0.20	7,000	0.17	10,000	0.28
33	6,000	0.14	8,000	0.21	7,000	0.17	10,000	0.28
34	6,000	0.15	9,000	0.24	7,000	0.17	10,000	0.28
35	6,000	0.15	9,000	0.25	7,000	0.17	10,000	0.28
36	7,000	0.18	9,000	0.25	8,000	0.21	10,000	0.28
37	7,000	0.18	10,000	0.29	8,000	0.21	10,000	0.29
38	7,000	0.18	10,000	0.29	8,000	0.21	10,000	0.29
39	7,000	0.18	10,000	0.29	8,000	0.21	10,000	0.29
40	7,000	0.18	10,000	0.29	9,000	0.24	10,000	0.29
41	8,000	0.22	10,000	0.29	9,000	0.25	10,000	0.29
42	8,000	0.22	10,000	0.30	9,000	0.25	10,000	0.30
43	8,000	0.22	10,000	0.30	9,000	0.25	10,000	0.30
44	8,000	0.22	10,000	0.30	10,000	0.30	10,000	0.30
45	8,000	0.22	10,000	0.30	10,000	0.30	10,000	0.30
46	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
47	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
48	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
49	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
50	9,000	0.26	10,000	0.30	10,000	0.30	10,000	0.30
>51	10,000	0.31	10,000	0.31	10,000	0.31	10,000	0.31

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 4.7 / 9.8 / 4.7 / 9.8 / 4.7

Double-Pane: 4.7 / 19.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
14	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
15	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
16	3,000	0.01	3,000	0.01	3,000	0.04	4,000	0.06
17	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
18	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.07
19	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.10
20	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.10
21	3,000	0.05	3,000	0.05	4,000	0.08	5,000	0.11
22	4,000	0.08	4,000	0.08	4,000	0.08	6,000	0.14
23	4,000	0.08	4,000	0.08	4,000	0.08	6,000	0.14
24	4,000	0.08	4,000	0.08	4,000	0.09	7,000	0.18
25	4,000	0.09	5,000	0.12	4,000	0.09	7,000	0.18
26	4,000	0.09	5,000	0.12	4,000	0.09	8,000	0.22
27	4,000	0.09	5,000	0.12	5,000	0.12	8,000	0.23
28	4,000	0.09	6,000	0.16	5,000	0.13	9,000	0.27
29	4,000	0.10	6,000	0.16	5,000	0.13	9,000	0.27
30	5,000	0.13	6,000	0.16	5,000	0.13	10,000	0.32
31	5,000	0.13	7,000	0.20	5,000	0.13	10,000	0.33
32	5,000	0.13	7,000	0.20	6,000	0.16	10,000	0.33
33	5,000	0.14	7,000	0.21	6,000	0.17	10,000	0.33
34	5,000	0.14	8,000	0.25	6,000	0.17	10,000	0.33
35	5,000	0.14	8,000	0.25	6,000	0.17	10,000	0.34
36	6,000	0.18	8,000	0.25	7,000	0.21	10,000	0.34
37	6,000	0.18	9,000	0.30	7,000	0.21	10,000	0.34
38	6,000	0.18	9,000	0.30	7,000	0.21	10,000	0.34
39	6,000	0.18	9,000	0.30	7,000	0.21	10,000	0.34
40	6,000	0.18	9,000	0.30	7,000	0.21	10,000	0.35
41	7,000	0.22	10,000	0.35	8,000	0.25	10,000	0.35
42	7,000	0.22	10,000	0.35	8,000	0.25	10,000	0.35
43	7,000	0.22	10,000	0.35	8,000	0.25	10,000	0.35
44	7,000	0.22	10,000	0.35	8,000	0.25	10,000	0.35
45	7,000	0.22	10,000	0.35	9,000	0.30	10,000	0.35
46	7,000	0.22	10,000	0.36	9,000	0.30	10,000	0.36
47	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
48	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
49	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
50	8,000	0.27	10,000	0.36	10,000	0.36	10,000	0.36
51	8,000	0.27	10,000	0.36	10,000	0.36	10,000	0.36
52	9,000	0.31	10,000	0.36	10,000	0.36	10,000	0.36
53	9,000	0.31	10,000	0.36	10,000	0.36	10,000	0.36
54	9,000	0.32	10,000	0.36	10,000	0.36	10,000	0.36
55	9,000	0.32	10,000	0.36	10,000	0.36	10,000	0.36
56	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
>57	10,000	0.37	10,000	0.37	10,000	0.37	10,000	0.37

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 4.7 / 11.5 / 4.7 / 11.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
14	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
15	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
16	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
17	3,000	0.02	3,000	0.02	3,000	0.05	4,000	0.07
18	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.08
19	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.08
20	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.09
21	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.09
22	3,000	0.06	3,000	0.06	3,000	0.06	5,000	0.13
23	3,000	0.06	4,000	0.09	3,000	0.07	6,000	0.16
24	3,000	0.06	4,000	0.09	4,000	0.10	6,000	0.17
25	4,000	0.10	4,000	0.10	4,000	0.10	7,000	0.21
26	4,000	0.10	4,000	0.10	4,000	0.10	7,000	0.22
27	4,000	0.10	5,000	0.14	4,000	0.11	7,000	0.22
28	4,000	0.11	5,000	0.14	4,000	0.11	8,000	0.27
29	4,000	0.11	5,000	0.15	4,000	0.11	8,000	0.27
30	4,000	0.11	6,000	0.19	5,000	0.15	9,000	0.32
31	4,000	0.11	6,000	0.19	5,000	0.15	9,000	0.32
32	4,000	0.12	6,000	0.19	5,000	0.15	10,000	0.38
33	5,000	0.15	6,000	0.20	5,000	0.15	10,000	0.38
34	5,000	0.16	7,000	0.24	5,000	0.16	10,000	0.39
35	5,000	0.16	7,000	0.24	6,000	0.20	10,000	0.39
36	5,000	0.16	7,000	0.24	6,000	0.20	10,000	0.39
37	5,000	0.16	8,000	0.29	6,000	0.20	10,000	0.39
38	5,000	0.16	8,000	0.29	6,000	0.20	10,000	0.40
39	5,000	0.16	8,000	0.29	6,000	0.20	10,000	0.40
40	6,000	0.21	9,000	0.34	7,000	0.24	10,000	0.40
41	6,000	0.21	9,000	0.35	7,000	0.24	10,000	0.40
42	6,000	0.21	9,000	0.35	7,000	0.24	10,000	0.40
43	6,000	0.21	9,000	0.35	7,000	0.25	10,000	0.40
44	6,000	0.21	10,000	0.40	7,000	0.25	10,000	0.41
45	6,000	0.21	10,000	0.41	8,000	0.30	10,000	0.41
46	7,000	0.26	10,000	0.41	8,000	0.30	10,000	0.41
47	7,000	0.26	10,000	0.41	8,000	0.30	10,000	0.41
48	7,000	0.26	10,000	0.41	8,000	0.30	10,000	0.41
49	7,000	0.26	10,000	0.41	8,000	0.30	10,000	0.41
50	7,000	0.26	10,000	0.41	9,000	0.35	10,000	0.41
51	8,000	0.31	10,000	0.41	9,000	0.35	10,000	0.41
52	8,000	0.31	10,000	0.42	9,000	0.35	10,000	0.42
53	8,000	0.31	10,000	0.42	9,000	0.35	10,000	0.42
54	8,000	0.31	10,000	0.42	9,000	0.36	10,000	0.42
55	8,000	0.31	10,000	0.42	10,000	0.42	10,000	0.42
56	8,000	0.31	10,000	0.42	10,000	0.42	10,000	0.42
57	9,000	0.36	10,000	0.42	10,000	0.42	10,000	0.42
58	9,000	0.36	10,000	0.42	10,000	0.42	10,000	0.42
59	9,000	0.36	10,000	0.42	10,000	0.42	10,000	0.42
60	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
61	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
62	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
>63	10,000	0.43	10,000	0.43	10,000	0.43	10,000	0.43

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 4.7 / 13.0 / 4.7 / 13.0 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
14	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
15	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
16	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
17	3,000	0.02	3,000	0.02	3,000	0.05	3,000	0.05
18	3,000	0.02	3,000	0.02	3,000	0.05	4,000	0.08
19	3,000	0.05	3,000	0.05	3,000	0.06	4,000	0.09
20	3,000	0.05	3,000	0.05	3,000	0.06	4,000	0.09
21	3,000	0.06	3,000	0.06	3,000	0.07	5,000	0.13
22	3,000	0.06	3,000	0.06	3,000	0.07	5,000	0.14
23	3,000	0.07	3,000	0.07	3,000	0.07	5,000	0.14
24	3,000	0.07	4,000	0.10	3,000	0.07	6,000	0.19
25	3,000	0.07	4,000	0.11	3,000	0.08	6,000	0.19
26	3,000	0.08	4,000	0.11	4,000	0.12	6,000	0.20
27	3,000	0.08	4,000	0.11	4,000	0.12	7,000	0.24
28	4,000	0.12	5,000	0.16	4,000	0.12	7,000	0.25
29	4,000	0.12	5,000	0.16	4,000	0.12	8,000	0.30
30	4,000	0.12	5,000	0.16	4,000	0.12	8,000	0.30
31	4,000	0.13	5,000	0.17	4,000	0.13	8,000	0.31
32	4,000	0.13	6,000	0.21	5,000	0.17	9,000	0.36
33	4,000	0.13	6,000	0.21	5,000	0.17	9,000	0.37
34	4,000	0.13	6,000	0.22	5,000	0.17	10,000	0.43
35	4,000	0.13	6,000	0.22	5,000	0.17	10,000	0.43
36	5,000	0.18	7,000	0.27	5,000	0.18	10,000	0.44
37	5,000	0.18	7,000	0.27	5,000	0.18	10,000	0.44
38	5,000	0.18	7,000	0.27	6,000	0.22	10,000	0.44
39	5,000	0.18	8,000	0.32	6,000	0.22	10,000	0.45
40	5,000	0.18	8,000	0.33	6,000	0.23	10,000	0.45
41	5,000	0.18	8,000	0.33	6,000	0.23	10,000	0.45
42	5,000	0.18	8,000	0.33	6,000	0.23	10,000	0.45
43	6,000	0.23	9,000	0.39	7,000	0.27	10,000	0.45
44	6,000	0.24	9,000	0.39	7,000	0.28	10,000	0.45
45	6,000	0.24	9,000	0.39	7,000	0.28	10,000	0.45
46	6,000	0.24	9,000	0.39	7,000	0.28	10,000	0.45
47	6,000	0.24	10,000	0.45	7,000	0.28	10,000	0.46
48	6,000	0.24	10,000	0.45	7,000	0.28	10,000	0.46
49	7,000	0.29	10,000	0.46	8,000	0.34	10,000	0.46
50	7,000	0.29	10,000	0.46	8,000	0.34	10,000	0.46
51	7,000	0.29	10,000	0.46	8,000	0.34	10,000	0.46
52	7,000	0.29	10,000	0.46	8,000	0.34	10,000	0.46
53	7,000	0.29	10,000	0.46	8,000	0.34	10,000	0.46
54	7,000	0.29	10,000	0.46	9,000	0.40	10,000	0.46
55	7,000	0.29	10,000	0.46	9,000	0.40	10,000	0.46
56	8,000	0.35	10,000	0.46	9,000	0.40	10,000	0.46
57	8,000	0.35	10,000	0.47	9,000	0.40	10,000	0.47
58	8,000	0.35	10,000	0.47	9,000	0.40	10,000	0.47
59	8,000	0.35	10,000	0.47	9,000	0.40	10,000	0.47
60	8,000	0.35	10,000	0.47	10,000	0.47	10,000	0.47
61	8,000	0.35	10,000	0.47	10,000	0.47	10,000	0.47
62	9,000	0.41	10,000	0.47	10,000	0.47	10,000	0.47
63	9,000	0.41	10,000	0.47	10,000	0.47	10,000	0.47
64	9,000	0.41	10,000	0.47	10,000	0.47	10,000	0.47
65	9,000	0.41	10,000	0.47	10,000	0.47	10,000	0.47
66	9,000	0.41	10,000	0.47	10,000	0.47	10,000	0.47
67	9,000	0.41	10,000	0.47	10,000	0.47	10,000	0.47
>68	10,000	0.47	10,000	0.47	10,000	0.47	10,000	0.47

Notes:

1. For Cardinal IG unit constructions only, and assumes construction at 700 feet, 70° (assembly pressure of 14.3 psi)
2. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
3. Tempered glass limits restricted by edge seal load only. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
4. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 5.7 / 6.5 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	4,000	0.02	4,000	0.02
15	3,000	0.00	3,000	0.00	4,000	0.02	4,000	0.02
16	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
17	3,000	0.01	3,000	0.01	5,000	0.03	5,000	0.03
18	3,000	0.01	3,000	0.01	6,000	0.04	6,000	0.04
19	4,000	0.02	4,000	0.02	6,000	0.05	6,000	0.05
20	4,000	0.03	4,000	0.03	7,000	0.06	7,000	0.06
21	4,000	0.03	4,000	0.03	7,000	0.06	8,000	0.07
22	5,000	0.04	5,000	0.04	7,000	0.06	9,000	0.09
23	5,000	0.04	5,000	0.04	8,000	0.08	9,000	0.09
24	6,000	0.05	6,000	0.05	8,000	0.08	10,000	0.11
25	6,000	0.06	6,000	0.06	8,000	0.08	10,000	0.11
26	7,000	0.07	7,000	0.07	9,000	0.10	10,000	0.11
27	8,000	0.09	8,000	0.09	9,000	0.10	10,000	0.11
28	8,000	0.09	8,000	0.09	9,000	0.10	10,000	0.12
29	9,000	0.10	9,000	0.10	10,000	0.12	10,000	0.12
30	9,000	0.10	9,000	0.10	10,000	0.12	10,000	0.12
31	9,000	0.11	10,000	0.12	10,000	0.12	10,000	0.12
>32	10,000	0.12	10,000	0.12	10,000	0.12	10,000	0.12

Double-Pane: 5.7 / 8.0 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
15	3,000	0.00	3,000	0.00	4,000	0.02	4,000	0.02
16	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
17	3,000	0.01	3,000	0.01	5,000	0.04	5,000	0.04
18	3,000	0.02	3,000	0.02	5,000	0.04	5,000	0.04
19	3,000	0.02	3,000	0.02	6,000	0.05	6,000	0.05
20	4,000	0.03	4,000	0.03	6,000	0.06	6,000	0.06
21	4,000	0.03	4,000	0.03	6,000	0.06	7,000	0.07
22	4,000	0.03	4,000	0.03	6,000	0.06	7,000	0.08
23	5,000	0.05	5,000	0.05	7,000	0.08	8,000	0.09
24	5,000	0.05	5,000	0.05	7,000	0.08	9,000	0.11
25	6,000	0.07	6,000	0.07	7,000	0.08	9,000	0.11
26	6,000	0.07	6,000	0.07	8,000	0.10	10,000	0.13
27	7,000	0.08	7,000	0.08	8,000	0.10	10,000	0.14
28	7,000	0.09	7,000	0.09	8,000	0.10	10,000	0.14
29	8,000	0.11	8,000	0.11	8,000	0.11	10,000	0.14
30	8,000	0.11	8,000	0.11	9,000	0.12	10,000	0.14
31	8,000	0.11	9,000	0.13	9,000	0.12	10,000	0.14
32	8,000	0.11	9,000	0.13	9,000	0.12	10,000	0.14
33	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
34	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
35	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
36	9,000	0.13	10,000	0.15	10,000	0.15	10,000	0.15
>37	10,000	0.16	10,000	0.16	10,000	0.16	10,000	0.16

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. **Above limits do not take into account aesthetics.**

Altitude Limits (Installed)

Double-Pane: 5.7 / 9.8 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
15	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
17	3,000	0.01	3,000	0.01	4,000	0.04	4,000	0.04
18	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
19	3,000	0.02	3,000	0.02	5,000	0.05	5,000	0.05
20	3,000	0.02	3,000	0.02	5,000	0.06	5,000	0.06
21	3,000	0.02	3,000	0.02	5,000	0.06	6,000	0.07
22	4,000	0.04	4,000	0.04	6,000	0.07	6,000	0.07
23	4,000	0.04	4,000	0.04	6,000	0.08	7,000	0.09
24	5,000	0.06	5,000	0.06	6,000	0.08	8,000	0.11
25	5,000	0.06	5,000	0.06	6,000	0.08	8,000	0.12
26	5,000	0.06	5,000	0.06	7,000	0.10	9,000	0.14
27	6,000	0.08	6,000	0.08	7,000	0.10	9,000	0.14
28	6,000	0.08	6,000	0.08	7,000	0.10	10,000	0.17
29	7,000	0.10	7,000	0.10	7,000	0.10	10,000	0.17
30	7,000	0.11	7,000	0.11	8,000	0.12	10,000	0.17
31	7,000	0.11	8,000	0.13	8,000	0.12	10,000	0.17
32	7,000	0.11	8,000	0.13	8,000	0.13	10,000	0.17
33	8,000	0.13	8,000	0.13	8,000	0.13	10,000	0.17
34	8,000	0.13	9,000	0.16	9,000	0.15	10,000	0.17
35	8,000	0.14	9,000	0.16	9,000	0.15	10,000	0.18
36	8,000	0.14	10,000	0.18	9,000	0.15	10,000	0.18
37	8,000	0.14	10,000	0.19	10,000	0.19	10,000	0.19
38	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
39	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
40	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
41	9,000	0.16	10,000	0.19	10,000	0.19	10,000	0.19
>42	10,000	0.19	10,000	0.19	10,000	0.19	10,000	0.19

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 5.7 / 11.5 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
17	3,000	0.01	3,000	0.01	4,000	0.04	4,000	0.04
18	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
19	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
20	3,000	0.02	3,000	0.02	5,000	0.06	5,000	0.06
21	3,000	0.03	3,000	0.03	5,000	0.06	5,000	0.06
22	3,000	0.03	3,000	0.03	5,000	0.07	6,000	0.08
23	4,000	0.05	4,000	0.05	5,000	0.07	6,000	0.09
24	4,000	0.05	4,000	0.05	5,000	0.07	7,000	0.11
25	4,000	0.05	4,000	0.05	6,000	0.09	7,000	0.11
26	5,000	0.07	5,000	0.07	6,000	0.09	8,000	0.13
27	5,000	0.07	5,000	0.07	6,000	0.09	9,000	0.16
28	6,000	0.10	6,000	0.10	6,000	0.10	9,000	0.16
29	6,000	0.10	6,000	0.10	7,000	0.12	10,000	0.19
30	6,000	0.10	6,000	0.10	7,000	0.12	10,000	0.20
31	6,000	0.10	7,000	0.12	7,000	0.12	10,000	0.20
32	7,000	0.13	7,000	0.13	7,000	0.13	10,000	0.20
33	7,000	0.13	8,000	0.15	8,000	0.15	10,000	0.20
34	7,000	0.13	8,000	0.15	8,000	0.15	10,000	0.20
35	7,000	0.13	8,000	0.15	8,000	0.15	10,000	0.20
36	7,000	0.13	9,000	0.18	8,000	0.15	10,000	0.20
37	8,000	0.16	9,000	0.18	9,000	0.18	10,000	0.21
38	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
39	8,000	0.16	10,000	0.22	9,000	0.18	10,000	0.22
40	8,000	0.16	10,000	0.22	9,000	0.18	10,000	0.22
41	8,000	0.16	10,000	0.22	10,000	0.22	10,000	0.22
42	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
43	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
44	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
45	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
>46	10,000	0.22	10,000	0.22	10,000	0.22	10,000	0.22

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 5.7 / 6.5 / 5.7 / 6.5 / 5.7

Double-Pane: 5.7 / 13.0 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
17	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
18	3,000	0.01	3,000	0.01	4,000	0.04	4,000	0.04
19	3,000	0.02	3,000	0.02	4,000	0.05	4,000	0.05
20	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
21	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
22	3,000	0.03	3,000	0.03	5,000	0.07	5,000	0.07
23	3,000	0.03	3,000	0.03	5,000	0.07	6,000	0.09
24	4,000	0.05	4,000	0.05	5,000	0.08	6,000	0.10
25	4,000	0.06	4,000	0.06	5,000	0.08	7,000	0.12
26	4,000	0.06	4,000	0.06	5,000	0.08	7,000	0.13
27	5,000	0.08	5,000	0.08	6,000	0.10	8,000	0.15
28	5,000	0.08	5,000	0.08	6,000	0.11	8,000	0.16
29	5,000	0.09	5,000	0.09	6,000	0.11	9,000	0.18
30	6,000	0.11	6,000	0.11	6,000	0.11	9,000	0.19
31	6,000	0.11	6,000	0.11	7,000	0.13	10,000	0.22
32	6,000	0.11	7,000	0.14	7,000	0.14	10,000	0.22
33	6,000	0.12	7,000	0.14	7,000	0.14	10,000	0.22
34	6,000	0.12	7,000	0.14	7,000	0.14	10,000	0.23
35	7,000	0.14	8,000	0.17	7,000	0.14	10,000	0.23
36	7,000	0.15	8,000	0.17	8,000	0.17	10,000	0.23
37	7,000	0.15	9,000	0.21	8,000	0.17	10,000	0.23
38	7,000	0.15	9,000	0.21	8,000	0.17	10,000	0.23
39	7,000	0.15	9,000	0.21	8,000	0.17	10,000	0.23
40	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
41	8,000	0.18	10,000	0.24	9,000	0.20	10,000	0.24
42	8,000	0.18	10,000	0.25	9,000	0.20	10,000	0.25
43	8,000	0.18	10,000	0.25	9,000	0.20	10,000	0.25
44	8,000	0.18	10,000	0.25	10,000	0.25	10,000	0.25
45	8,000	0.21	10,000	0.25	10,000	0.25	10,000	0.25
46	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
47	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
48	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
49	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
>50	10,000	0.25	10,000	0.25	10,000	0.25	10,000	0.25

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 5.7 / 14.5 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
17	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
18	3,000	0.01	3,000	0.01	4,000	0.05	4,000	0.05
19	3,000	0.02	3,000	0.02	4,000	0.05	4,000	0.05
20	3,000	0.03	3,000	0.03	4,000	0.05	4,000	0.05
21	3,000	0.03	3,000	0.03	4,000	0.06	5,000	0.07
22	3,000	0.03	3,000	0.03	4,000	0.06	5,000	0.08
23	3,000	0.04	3,000	0.04	4,000	0.06	5,000	0.08
24	4,000	0.06	4,000	0.06	5,000	0.08	6,000	0.11
25	4,000	0.06	4,000	0.06	5,000	0.09	6,000	0.11
26	4,000	0.06	4,000	0.06	5,000	0.09	7,000	0.14
27	4,000	0.07	4,000	0.07	5,000	0.09	7,000	0.14
28	5,000	0.09	5,000	0.09	5,000	0.09	8,000	0.17
29	5,000	0.09	5,000	0.09	6,000	0.12	8,000	0.17
30	5,000	0.10	5,000	0.10	6,000	0.12	9,000	0.21
31	5,000	0.10	6,000	0.12	6,000	0.12	9,000	0.21
32	6,000	0.12	6,000	0.12	6,000	0.12	10,000	0.24
33	6,000	0.13	6,000	0.13	6,000	0.13	10,000	0.25
34	6,000	0.13	7,000	0.16	7,000	0.15	10,000	0.25
35	6,000	0.13	7,000	0.16	7,000	0.15	10,000	0.25
36	6,000	0.13	8,000	0.19	7,000	0.16	10,000	0.25
37	6,000	0.13	8,000	0.19	7,000	0.16	10,000	0.26
38	7,000	0.16	8,000	0.19	8,000	0.19	10,000	0.26
39	7,000	0.16	9,000	0.23	8,000	0.19	10,000	0.26
40	7,000	0.17	9,000	0.23	8,000	0.19	10,000	0.26
41	7,000	0.17	9,000	0.23	8,000	0.19	10,000	0.26
42	7,000	0.17	10,000	0.27	9,000	0.22	10,000	0.27
43	8,000	0.20	10,000	0.27	9,000	0.22	10,000	0.27
44	8,000	0.20	10,000	0.27	9,000	0.23	10,000	0.27
45	8,000	0.20	10,000	0.27	9,000	0.23	10,000	0.27
46	8,000	0.20	10,000	0.27	9,000	0.23	10,000	0.27
47	8,000	0.20	10,000	0.27	10,000	0.27	10,000	0.27
48	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
49	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
50	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
51	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
52	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
53	9,000	0.24	10,000	0.28	10,000	0.28	10,000	0.28
>54	10,000	0.28	10,000	0.28	10,000	0.28	10,000	0.28

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 5.7 / 8.0 / 5.7 / 8.0 / 5.7

Double-Pane: 5.7 / 16.0 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
17	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
18	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
19	3,000	0.01	3,000	0.01	4,000	0.05	4,000	0.05
20	3,000	0.03	3,000	0.03	4,000	0.06	4,000	0.06
21	3,000	0.04	3,000	0.04	4,000	0.06	4,000	0.06
22	3,000	0.04	3,000	0.04	4,000	0.06	5,000	0.08
23	3,000	0.04	3,000	0.04	4,000	0.07	5,000	0.09
24	3,000	0.04	3,000	0.04	4,000	0.07	6,000	0.12
25	4,000	0.07	4,000	0.07	4,000	0.07	6,000	0.12
26	4,000	0.07	4,000	0.07	5,000	0.10	6,000	0.12
27	4,000	0.07	4,000	0.07	5,000	0.10	7,000	0.15
28	4,000	0.07	4,000	0.07	5,000	0.10	7,000	0.16
29	5,000	0.10	5,000	0.10	5,000	0.10	8,000	0.19
30	5,000	0.10	5,000	0.10	5,000	0.10	8,000	0.19
31	5,000	0.11	5,000	0.11	6,000	0.13	9,000	0.23
32	5,000	0.11	6,000	0.14	6,000	0.13	9,000	0.23
33	5,000	0.11	6,000	0.14	6,000	0.13	10,000	0.27
34	6,000	0.14	6,000	0.14	6,000	0.14	10,000	0.27
35	6,000	0.14	7,000	0.17	6,000	0.14	10,000	0.28
36	6,000	0.14	7,000	0.17	7,000	0.17	10,000	0.28
37	6,000	0.14	7,000	0.18	7,000	0.15	10,000	0.28
38	6,000	0.14	8,000	0.21	7,000	0.17	10,000	0.28
39	6,000	0.15	8,000	0.21	7,000	0.17	10,000	0.28
40	7,000	0.18	8,000	0.21	8,000	0.21	10,000	0.28
41	7,000	0.18	9,000	0.25	8,000	0.21	10,000	0.29
42	7,000	0.18	9,000	0.25	8,000	0.21	10,000	0.29
43	7,000	0.18	9,000	0.26	8,000	0.21	10,000	0.29
44	7,000	0.18	10,000	0.29	8,000	0.21	10,000	0.29
45	7,000	0.18	10,000	0.30	9,000	0.25	10,000	0.30
46	8,000	0.22	10,000	0.30	9,000	0.25	10,000	0.30
47	8,000	0.22	10,000	0.30	9,000	0.25	10,000	0.30
48	8,000	0.22	10,000	0.30	9,000	0.25	10,000	0.30
49	8,000	0.22	10,000	0.30	10,000	0.30	10,000	0.30
50	8,000	0.22	10,000	0.30	10,000	0.30	10,000	0.30
51	9,000	0.26	10,000	0.31	10,000	0.31	10,000	0.31
52	9,000	0.26	10,000	0.31	10,000	0.31	10,000	0.31
53	9,000	0.27	10,000	0.31	10,000	0.31	10,000	0.31
54	9,000	0.27	10,000	0.31	10,000	0.31	10,000	0.31
55	9,000	0.27	10,000	0.31	10,000	0.31	10,000	0.31
>56	10,000	0.31	10,000	0.31	10,000	0.31	10,000	0.31

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 5.7 / 9.8 / 5.7 / 9.8 / 5.7

Double-Pane: 5.7 / 19.5 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
17	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
18	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
19	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
20	3,000	0.02	3,000	0.02	3,000	0.04	4,000	0.06
21	3,000	0.02	3,000	0.02	3,000	0.05	4,000	0.07
22	3,000	0.04	3,000	0.04	4,000	0.07	4,000	0.07
23	3,000	0.04	3,000	0.04	4,000	0.08	4,000	0.08
24	3,000	0.05	3,000	0.05	4,000	0.08	5,000	0.11
25	3,000	0.05	3,000	0.05	4,000	0.08	5,000	0.11
26	3,000	0.05	3,000	0.05	4,000	0.08	6,000	0.14
27	4,000	0.08	4,000	0.08	4,000	0.09	6,000	0.15
28	4,000	0.09	4,000	0.09	4,000	0.09	6,000	0.15
29	4,000	0.09	4,000	0.09	4,000	0.09	7,000	0.19
30	4,000	0.09	4,000	0.09	5,000	0.12	7,000	0.19
31	4,000	0.09	5,000	0.12	5,000	0.12	8,000	0.23
32	5,000	0.13	5,000	0.13	5,000	0.13	8,000	0.23
33	5,000	0.13	5,000	0.13	5,000	0.13	8,000	0.24
34	5,000	0.13	6,000	0.16	5,000	0.13	9,000	0.28
35	5,000	0.13	6,000	0.17	6,000	0.16	9,000	0.28
36	5,000	0.13	6,000	0.17	6,000	0.17	10,000	0.33
37	5,000	0.14	6,000	0.17	6,000	0.17	10,000	0.33
38	5,000	0.14	7,000	0.21	6,000	0.17	10,000	0.34
39	6,000	0.17	7,000	0.21	6,000	0.17	10,000	0.34
40	6,000	0.18	7,000	0.21	7,000	0.21	10,000	0.34
41	6,000	0.18	8,000	0.26	7,000	0.21	10,000	0.34
42	6,000	0.18	8,000	0.26	7,000	0.21	10,000	0.34
43	6,000	0.18	8,000	0.26	7,000	0.21	10,000	0.34
44	6,000	0.18	9,000	0.30	7,000	0.21	10,000	0.34
45	6,000	0.18	9,000	0.30	8,000	0.25	10,000	0.35
46	7,000	0.22	9,000	0.31	8,000	0.25	10,000	0.35
47	7,000	0.22	9,000	0.31	8,000	0.25	10,000	0.35
48	7,000	0.22	10,000	0.36	8,000	0.25	10,000	0.36
49	7,000	0.22	10,000	0.36	8,000	0.25	10,000	0.36
50	7,000	0.22	10,000	0.36	8,000	0.25	10,000	0.36
51	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
52	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
53	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
54	8,000	0.27	10,000	0.36	9,000	0.30	10,000	0.36
55	8,000	0.27	10,000	0.37	10,000	0.37	10,000	0.37
56	8,000	0.27	10,000	0.37	10,000	0.37	10,000	0.37
57	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
58	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
59	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
60	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
61	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
62	9,000	0.32	10,000	0.37	10,000	0.37	10,000	0.37
>63	10,000	0.37	10,000	0.37	10,000	0.37	10,000	0.37

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 5.7 / 11.5 / 5.7 / 11.5 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
17	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
18	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
19	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
20	3,000	0.02	3,000	0.02	3,000	0.05	4,000	0.05
21	3,000	0.02	3,000	0.02	3,000	0.05	4,000	0.08
22	3,000	0.02	3,000	0.02	3,000	0.06	4,000	0.08
23	3,000	0.05	3,000	0.05	3,000	0.06	4,000	0.09
24	3,000	0.05	3,000	0.05	3,000	0.06	4,000	0.09
25	3,000	0.06	3,000	0.06	3,000	0.06	5,000	0.13
26	3,000	0.06	3,000	0.06	4,000	0.10	5,000	0.13
27	3,000	0.06	3,000	0.06	4,000	0.10	5,000	0.13
28	4,000	0.10	4,000	0.10	4,000	0.10	6,000	0.17
29	4,000	0.10	4,000	0.10	4,000	0.10	6,000	0.17
30	4,000	0.10	4,000	0.10	4,000	0.11	6,000	0.18
31	4,000	0.11	4,000	0.11	4,000	0.11	7,000	0.22
32	4,000	0.11	4,000	0.11	4,000	0.11	7,000	0.22
33	4,000	0.11	5,000	0.15	5,000	0.15	8,000	0.27
34	4,000	0.11	5,000	0.15	5,000	0.15	8,000	0.28
35	4,000	0.11	5,000	0.15	5,000	0.15	8,000	0.28
36	5,000	0.15	5,000	0.15	5,000	0.15	9,000	0.33
37	5,000	0.16	6,000	0.20	5,000	0.16	9,000	0.33
38	5,000	0.16	6,000	0.20	5,000	0.16	10,000	0.39
39	5,000	0.16	6,000	0.20	6,000	0.19	10,000	0.39
40	5,000	0.16	7,000	0.24	6,000	0.20	10,000	0.39
41	5,000	0.16	7,000	0.25	6,000	0.20	10,000	0.40
42	5,000	0.16	7,000	0.25	6,000	0.20	10,000	0.40
43	5,000	0.16	7,000	0.25	6,000	0.20	10,000	0.40
44	6,000	0.21	8,000	0.30	6,000	0.21	10,000	0.40
45	6,000	0.21	8,000	0.30	7,000	0.24	10,000	0.40
46	6,000	0.21	8,000	0.30	7,000	0.25	10,000	0.40
47	6,000	0.21	8,000	0.30	7,000	0.25	10,000	0.41
48	6,000	0.21	9,000	0.36	7,000	0.25	10,000	0.41
49	6,000	0.21	9,000	0.36	7,000	0.25	10,000	0.41
50	6,000	0.21	9,000	0.36	8,000	0.29	10,000	0.41
51	7,000	0.26	9,000	0.36	8,000	0.30	10,000	0.41
52	7,000	0.26	10,000	0.42	8,000	0.30	10,000	0.42
53	7,000	0.26	10,000	0.42	8,000	0.30	10,000	0.42
54	7,000	0.26	10,000	0.42	8,000	0.30	10,000	0.42
55	7,000	0.26	10,000	0.42	8,000	0.30	10,000	0.42
56	7,000	0.26	10,000	0.42	9,000	0.36	10,000	0.42
57	8,000	0.32	10,000	0.42	9,000	0.36	10,000	0.42
58	8,000	0.32	10,000	0.42	9,000	0.36	10,000	0.42
59	8,000	0.32	10,000	0.42	9,000	0.36	10,000	0.42
60	8,000	0.32	10,000	0.42	9,000	0.36	10,000	0.42
61	8,000	0.32	10,000	0.43	10,000	0.43	10,000	0.43
62	8,000	0.32	10,000	0.43	10,000	0.43	10,000	0.43
63	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
64	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
65	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
66	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
67	9,000	0.37	10,000	0.43	10,000	0.43	10,000	0.43
68	9,000	0.38	10,000	0.43	10,000	0.43	10,000	0.43
69	9,000	0.38	10,000	0.43	10,000	0.43	10,000	0.43
70	9,000	0.38	10,000	0.44	10,000	0.44	10,000	0.44
>71	10,000	0.44	10,000	0.44	10,000	0.44	10,000	0.44

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Triple-Pane: 5.7 / 13.0 / 5.7 / 13.0 / 5.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
11	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
14	3,000	0.00	3,000	0.00	3,000	0.02	3,000	0.02
15	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
16	3,000	0.01	3,000	0.01	3,000	0.03	3,000	0.03
17	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
18	3,000	0.01	3,000	0.01	3,000	0.04	3,000	0.04
19	3,000	0.01	3,000	0.01	3,000	0.05	3,000	0.05
20	3,000	0.02	3,000	0.02	3,000	0.05	3,000	0.05
21	3,000	0.02	3,000	0.02	3,000	0.06	3,000	0.06
22	3,000	0.02	3,000	0.02	3,000	0.06	4,000	0.09
23	3,000	0.03	3,000	0.03	3,000	0.06	4,000	0.09
24	3,000	0.06	3,000	0.06	3,000	0.07	4,000	0.10
25	3,000	0.06	3,000	0.06	3,000	0.07	4,000	0.10
26	3,000	0.06	3,000	0.06	3,000	0.07	5,000	0.14
27	3,000	0.07	3,000	0.07	3,000	0.07	5,000	0.15
28	3,000	0.07	3,000	0.07	4,000	0.11	5,000	0.15
29	3,000	0.07	3,000	0.07	4,000	0.11	6,000	0.19
30	4,000	0.11	4,000	0.11	4,000	0.12	6,000	0.20
31	4,000	0.12	4,000	0.12	4,000	0.12	6,000	0.20
32	4,000	0.12	4,000	0.12	4,000	0.12	7,000	0.25
33	4,000	0.12	4,000	0.12	4,000	0.12	7,000	0.25
34	4,000	0.12	5,000	0.16	4,000	0.12	7,000	0.26
35	4,000	0.13	5,000	0.17	4,000	0.13	8,000	0.31
36	4,000	0.13	5,000	0.17	5,000	0.17	8,000	0.31
37	4,000	0.13	5,000	0.17	5,000	0.17	8,000	0.31
38	4,000	0.13	6,000	0.22	5,000	0.17	9,000	0.37
39	4,000	0.13	6,000	0.22	5,000	0.17	9,000	0.37
40	5,000	0.18	6,000	0.22	5,000	0.18	10,000	0.44
41	5,000	0.18	6,000	0.23	5,000	0.18	10,000	0.44
42	5,000	0.18	7,000	0.27	6,000	0.22	10,000	0.44
43	5,000	0.18	7,000	0.28	6,000	0.22	10,000	0.44
44	5,000	0.18	7,000	0.28	6,000	0.22	10,000	0.45
45	5,000	0.18	7,000	0.28	6,000	0.23	10,000	0.45
46	5,000	0.18	8,000	0.34	6,000	0.23	10,000	0.45
47	6,000	0.23	8,000	0.34	6,000	0.23	10,000	0.45
48	6,000	0.24	8,000	0.34	7,000	0.28	10,000	0.45
49	6,000	0.24	8,000	0.34	7,000	0.28	10,000	0.46
50	6,000	0.24	9,000	0.40	7,000	0.28	10,000	0.46
51	6,000	0.24	9,000	0.40	7,000	0.28	10,000	0.46
52	6,000	0.24	9,000	0.40	7,000	0.28	10,000	0.46
53	6,000	0.24	9,000	0.40	7,000	0.28	10,000	0.46
54	6,000	0.24	9,000	0.41	8,000	0.34	10,000	0.46
55	7,000	0.29	10,000	0.46	8,000	0.34	10,000	0.46
56	7,000	0.29	10,000	0.47	8,000	0.34	10,000	0.47
57	7,000	0.30	10,000	0.47	8,000	0.34	10,000	0.47
58	7,000	0.30	10,000	0.47	8,000	0.34	10,000	0.47
59	7,000	0.30	10,000	0.47	8,000	0.34	10,000	0.47
60	7,000	0.30	10,000	0.47	9,000	0.40	10,000	0.47
61	7,000	0.30	10,000	0.47	9,000	0.40	10,000	0.47
62	8,000	0.35	10,000	0.47	9,000	0.40	10,000	0.47
63	8,000	0.35	10,000	0.48	9,000	0.40	10,000	0.48
64	8,000	0.35	10,000	0.48	9,000	0.41	10,000	0.48
65	8,000	0.35	10,000	0.48	10,000	0.48	10,000	0.48
66	8,000	0.36	10,000	0.48	10,000	0.48	10,000	0.48
67	8,000	0.36	10,000	0.48	10,000	0.48	10,000	0.48
68	8,000	0.36	10,000	0.48	10,000	0.48	10,000	0.48
69	9,000	0.42	10,000	0.48	10,000	0.48	10,000	0.48
70	9,000	0.42	10,000	0.48	10,000	0.48	10,000	0.48
71	9,000	0.42	10,000	0.48	10,000	0.48	10,000	0.48
72	9,000	0.42	10,000	0.48	10,000	0.48	10,000	0.48
73	9,000	0.42	10,000	0.48	10,000	0.48	10,000	0.48
74	9,000	0.42	10,000	0.48	10,000	0.48	10,000	0.48
>75	10,000	0.48	10,000	0.48	10,000	0.48	10,000	0.48

Notes:

1. For Cardinal IG unit constructions only, and assumes construction at 700 feet, 70° (assembly pressure of 14.3 psi)
2. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
3. Tempered glass limits restricted by edge seal load only. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
4. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 7.5 / 5.7 (6.0L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	4,000	0.04	4,000	0.04	4,000	0.05	6,000	0.08
13	4,000	0.05	4,000	0.05	4,000	0.05	7,000	0.10
14	4,000	0.05	5,000	0.07	4,000	0.06	8,000	0.13
15	4,000	0.06	5,000	0.07	4,000	0.06	8,000	0.14
16	4,000	0.06	6,000	0.10	4,000	0.06	9,000	0.17
17	4,000	0.06	6,000	0.10	4,000	0.06	10,000	0.20
18	4,000	0.07	7,000	0.13	5,000	0.09	10,000	0.20
19	5,000	0.09	8,000	0.15	5,000	0.09	10,000	0.21
20	5,000	0.09	8,000	0.16	6,000	0.11	10,000	0.21
21	5,000	0.09	9,000	0.18	6,000	0.11	10,000	0.22
22	6,000	0.12	10,000	0.21	6,000	0.12	10,000	0.22
23	6,000	0.12	10,000	0.21	7,000	0.14	10,000	0.22
24	6,000	0.12	10,000	0.22	7,000	0.14	10,000	0.22
25	7,000	0.15	10,000	0.22	8,000	0.17	10,000	0.23
26	7,000	0.15	10,000	0.22	8,000	0.17	10,000	0.23
27	7,000	0.15	10,000	0.22	8,000	0.17	10,000	0.23
28	7,000	0.15	10,000	0.23	9,000	0.20	10,000	0.23
29	8,000	0.18	10,000	0.23	9,000	0.20	10,000	0.23
30	8,000	0.18	10,000	0.23	10,000	0.23	10,000	0.23
31	9,000	0.20	10,000	0.23	10,000	0.23	10,000	0.23
32	9,000	0.20	10,000	0.23	10,000	0.23	10,000	0.23
33	9,000	0.20	10,000	0.23	10,000	0.23	10,000	0.23
>34	10,000	0.23	10,000	0.23	10,000	0.23	10,000	0.23

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 7.5 / 7.1 (6.9L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.02	3,000	0.02	3,000	0.02	5,000	0.05
11	4,000	0.03	4,000	0.03	4,000	0.03	5,000	0.06
12	4,000	0.04	4,000	0.04	4,000	0.05	6,000	0.08
13	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.09
14	4,000	0.05	5,000	0.07	4,000	0.06	7,000	0.12
15	4,000	0.06	5,000	0.08	4,000	0.06	8,000	0.15
16	4,000	0.06	6,000	0.10	4,000	0.06	9,000	0.18
17	4,000	0.07	6,000	0.11	4,000	0.07	10,000	0.21
18	4,000	0.07	7,000	0.14	5,000	0.09	10,000	0.22
19	5,000	0.09	7,000	0.14	5,000	0.09	10,000	0.22
20	5,000	0.10	8,000	0.17	5,000	0.10	10,000	0.23
21	5,000	0.10	8,000	0.17	6,000	0.12	10,000	0.23
22	5,000	0.10	9,000	0.20	6,000	0.12	10,000	0.23
23	6,000	0.13	10,000	0.23	6,000	0.13	10,000	0.24
24	6,000	0.13	10,000	0.23	7,000	0.15	10,000	0.24
25	6,000	0.13	10,000	0.24	7,000	0.15	10,000	0.24
26	6,000	0.13	10,000	0.24	8,000	0.18	10,000	0.24
27	7,000	0.16	10,000	0.24	8,000	0.18	10,000	0.24
28	7,000	0.16	10,000	0.24	8,000	0.18	10,000	0.24
29	7,000	0.16	10,000	0.25	9,000	0.21	10,000	0.25
30	8,000	0.19	10,000	0.25	9,000	0.21	10,000	0.25
31	8,000	0.19	10,000	0.25	9,000	0.22	10,000	0.25
32	8,000	0.19	10,000	0.25	10,000	0.25	10,000	0.25
33	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
34	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
35	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
>36	10,000	0.25	10,000	0.25	10,000	0.25	10,000	0.25

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 9.8 / 5.7 (6.0L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.03	4,000	0.04	3,000	0.04	5,000	0.07
13	3,000	0.04	4,000	0.05	3,000	0.04	6,000	0.10
14	3,000	0.04	4,000	0.06	3,000	0.05	6,000	0.11
15	3,000	0.05	5,000	0.09	3,000	0.05	7,000	0.14
16	3,000	0.05	5,000	0.09	4,000	0.08	8,000	0.18
17	4,000	0.08	5,000	0.10	4,000	0.08	9,000	0.21
18	4,000	0.08	6,000	0.13	4,000	0.08	9,000	0.22
19	4,000	0.08	6,000	0.13	4,000	0.08	10,000	0.26
20	4,000	0.09	7,000	0.16	5,000	0.11	10,000	0.26
21	4,000	0.09	8,000	0.19	5,000	0.11	10,000	0.27
22	5,000	0.12	8,000	0.20	5,000	0.12	10,000	0.27
23	5,000	0.12	9,000	0.23	6,000	0.14	10,000	0.28
24	5,000	0.12	9,000	0.23	6,000	0.15	10,000	0.28
25	5,000	0.12	10,000	0.27	6,000	0.15	10,000	0.28
26	6,000	0.15	10,000	0.27	7,000	0.18	10,000	0.28
27	6,000	0.15	10,000	0.27	7,000	0.18	10,000	0.29
28	6,000	0.15	10,000	0.28	7,000	0.18	10,000	0.29
29	6,000	0.15	10,000	0.28	8,000	0.21	10,000	0.29
30	7,000	0.19	10,000	0.28	8,000	0.21	10,000	0.29
31	7,000	0.19	10,000	0.28	8,000	0.21	10,000	0.29
32	7,000	0.19	10,000	0.28	9,000	0.25	10,000	0.29
33	8,000	0.22	10,000	0.28	9,000	0.25	10,000	0.29
34	8,000	0.22	10,000	0.29	9,000	0.25	10,000	0.29
35	8,000	0.22	10,000	0.29	10,000	0.29	10,000	0.29
36	9,000	0.25	10,000	0.29	10,000	0.30	10,000	0.30
37	9,000	0.26	10,000	0.29	10,000	0.30	10,000	0.30
38	9,000	0.26	10,000	0.29	10,000	0.30	10,000	0.30
39	9,000	0.26	10,000	0.29	10,000	0.30	10,000	0.30
>40	10,000	0.29	10,000	0.29	10,000	0.30	10,000	0.30

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 7.0 / 5.7 (6.0L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
13	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
14	3,000	0.02	3,000	0.02	4,000	0.04	6,000	0.07
15	4,000	0.04	4,000	0.04	4,000	0.04	6,000	0.07
16	4,000	0.04	4,000	0.04	5,000	0.06	7,000	0.09
17	5,000	0.06	5,000	0.06	5,000	0.06	8,000	0.11
18	5,000	0.06	5,000	0.06	5,000	0.07	9,000	0.14
19	5,000	0.07	6,000	0.08	5,000	0.07	9,000	0.14
20	5,000	0.07	6,000	0.09	6,000	0.09	10,000	0.17
21	5,000	0.07	7,000	0.11	6,000	0.09	10,000	0.17
22	6,000	0.09	8,000	0.13	6,000	0.09	10,000	0.17
23	6,000	0.09	8,000	0.13	7,000	0.11	10,000	0.18
24	6,000	0.10	9,000	0.16	7,000	0.11	10,000	0.18
25	6,000	0.10	9,000	0.16	7,000	0.11	10,000	0.18
26	7,000	0.12	10,000	0.18	8,000	0.14	10,000	0.18
27	7,000	0.12	10,000	0.19	8,000	0.14	10,000	0.19
28	7,000	0.12	10,000	0.19	9,000	0.16	10,000	0.19
29	8,000	0.14	10,000	0.19	9,000	0.16	10,000	0.19
30	8,000	0.14	10,000	0.19	9,000	0.16	10,000	0.19
31	8,000	0.15	10,000	0.19	10,000	0.19	10,000	0.19
32	9,000	0.17	10,000	0.19	10,000	0.19	10,000	0.19
33	9,000	0.17	10,000	0.20	10,000	0.20	10,000	0.20
34	9,000	0.17	10,000	0.20	10,000	0.20	10,000	0.20
>35	10,000	0.20	10,000	0.20	10,000	0.20	10,000	0.20

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 7.0 / 7.1 (6.9L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
10	3,000	0.01	3,000	0.01	4,000	0.02	4,000	0.02
11	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
12	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
13	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
14	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.06
15	4,000	0.04	4,000	0.04	4,000	0.05	6,000	0.08
16	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.08
17	4,000	0.05	4,000	0.05	4,000	0.05	7,000	0.11
18	4,000	0.05	5,000	0.07	5,000	0.07	8,000	0.13
19	5,000	0.07	5,000	0.07	5,000	0.08	8,000	0.16
20	5,000	0.08	6,000	0.10	5,000	0.08	9,000	0.16
21	5,000	0.08	6,000	0.10	5,000	0.08	10,000	0.17
22	5,000	0.08	7,000	0.12	6,000	0.10	10,000	0.20
23	5,000	0.09	7,000	0.13	6,000	0.10	10,000	0.20
24	6,000	0.11	8,000	0.15	6,000	0.11	10,000	0.20
25	6,000	0.11	8,000	0.16	7,000	0.13	10,000	0.21
26	6,000	0.11	9,000	0.18	7,000	0.13	10,000	0.21
27	6,000	0.11	10,000	0.21	7,000	0.13	10,000	0.21
28	7,000	0.14	10,000	0.21	8,000	0.16	10,000	0.21
29	7,000	0.14	10,000	0.21	8,000	0.16	10,000	0.21
30	7,000	0.14	10,000	0.22	8,000	0.16	10,000	0.22
31	7,000	0.14	10,000	0.22	9,000	0.18	10,000	0.22
32	8,000	0.17	10,000	0.22	9,000	0.19	10,000	0.22
33	8,000	0.17	10,000	0.22	10,000	0.22	10,000	0.22
34	8,000	0.17	10,000	0.22	10,000	0.22	10,000	0.22
35	9,000	0.20	10,000	0.22	10,000	0.22	10,000	0.22
36	9,000	0.20	10,000	0.22	10,000	0.22	10,000	0.22
37	9,000	0.20	10,000	0.22	10,000	0.22	10,000	0.22
>38	10,000	0.22	10,000	0.22	10,000	0.22	10,000	0.22

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 8.0 / 5.7 (6.0L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.01	3,000	0.01	4,000	0.03	4,000	0.03
13	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.05
14	3,000	0.02	3,000	0.02	4,000	0.04	5,000	0.06
15	4,000	0.04	4,000	0.04	4,000	0.05	6,000	0.08
16	4,000	0.05	4,000	0.05	4,000	0.05	6,000	0.08
17	4,000	0.05	4,000	0.05	4,000	0.05	7,000	0.11
18	4,000	0.05	5,000	0.07	5,000	0.07	8,000	0.13
19	5,000	0.07	5,000	0.07	5,000	0.08	9,000	0.16
20	5,000	0.08	6,000	0.10	5,000	0.08	9,000	0.16
21	5,000	0.08	6,000	0.10	5,000	0.08	10,000	0.19
22	5,000	0.08	7,000	0.12	6,000	0.10	10,000	0.19
23	5,000	0.08	7,000	0.13	6,000	0.10	10,000	0.20
24	6,000	0.11	8,000	0.15	6,000	0.11	10,000	0.20
25	6,000	0.11	9,000	0.17	7,000	0.13	10,000	0.20
26	6,000	0.11	9,000	0.18	7,000	0.13	10,000	0.21
27	6,000	0.11	10,000	0.20	7,000	0.13	10,000	0.21
28	7,000	0.14	10,000	0.21	8,000	0.15	10,000	0.21
29	7,000	0.14	10,000	0.21	8,000	0.15	10,000	0.21
30	7,000	0.14	10,000	0.21	9,000	0.18	10,000	0.21
31	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
32	8,000	0.16	10,000	0.21	9,000	0.18	10,000	0.21
33	8,000	0.16	10,000	0.22	10,000	0.22	10,000	0.22
34	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
35	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
36	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
37	9,000	0.19	10,000	0.22	10,000	0.22	10,000	0.22
>38	10,000	0.22	10,000	0.22	10,000	0.22	10,000	0.22

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 8.0 / 7.1 (6.9L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
13	3,000	0.02	3,000	0.02	4,000	0.04	4,000	0.04
14	3,000	0.02	3,000	0.02	4,000	0.05	5,000	0.06
15	3,000	0.03	3,000	0.03	4,000	0.05	5,000	0.07
16	4,000	0.05	4,000	0.05	4,000	0.06	6,000	0.07
17	4,000	0.05	4,000	0.05	4,000	0.06	7,000	0.12
18	4,000	0.06	4,000	0.06	4,000	0.06	7,000	0.12
19	4,000	0.06	5,000	0.08	4,000	0.06	8,000	0.15
20	4,000	0.06	5,000	0.09	5,000	0.09	9,000	0.18
21	4,000	0.07	6,000	0.11	5,000	0.09	9,000	0.19
22	5,000	0.09	6,000	0.11	5,000	0.09	10,000	0.22
23	5,000	0.09	7,000	0.14	5,000	0.09	10,000	0.22
24	5,000	0.10	7,000	0.14	6,000	0.12	10,000	0.23
25	5,000	0.10	8,000	0.17	6,000	0.12	10,000	0.23
26	6,000	0.12	8,000	0.17	6,000	0.12	10,000	0.23
27	6,000	0.13	9,000	0.20	7,000	0.15	10,000	0.23
28	6,000	0.13	9,000	0.21	7,000	0.15	10,000	0.24
29	6,000	0.13	10,000	0.24	7,000	0.15	10,000	0.24
30	7,000	0.16	10,000	0.24	8,000	0.18	10,000	0.24
31	7,000	0.16	10,000	0.24	8,000	0.18	10,000	0.24
32	7,000	0.16	10,000	0.24	8,000	0.18	10,000	0.24
33	7,000	0.16	10,000	0.24	9,000	0.21	10,000	0.24
34	8,000	0.19	10,000	0.25	9,000	0.21	10,000	0.25
35	8,000	0.19	10,000	0.25	9,000	0.21	10,000	0.25
36	8,000	0.19	10,000	0.25	10,000	0.24	10,000	0.25
37	9,000	0.22	10,000	0.25	10,000	0.24	10,000	0.25
38	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
39	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
40	9,000	0.22	10,000	0.25	10,000	0.25	10,000	0.25
>41	10,000	0.25	10,000	0.25	10,000	0.25	10,000	0.25

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 13.0 / 5.7 (6.0L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
13	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.05
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
15	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
16	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.09
17	3,000	0.05	3,000	0.05	3,000	0.05	5,000	0.10
18	3,000	0.05	4,000	0.07	3,000	0.05	6,000	0.13
19	3,000	0.05	4,000	0.08	3,000	0.06	6,000	0.14
20	3,000	0.06	4,000	0.08	4,000	0.09	7,000	0.17
21	4,000	0.09	5,000	0.11	4,000	0.09	7,000	0.18
22	4,000	0.09	5,000	0.12	4,000	0.09	8,000	0.21
23	4,000	0.09	5,000	0.12	4,000	0.09	9,000	0.25
24	4,000	0.10	6,000	0.15	4,000	0.10	9,000	0.30
25	4,000	0.10	6,000	0.16	5,000	0.13	10,000	0.30
26	4,000	0.10	7,000	0.19	5,000	0.13	10,000	0.30
27	5,000	0.13	7,000	0.19	5,000	0.13	10,000	0.31
28	5,000	0.13	8,000	0.23	5,000	0.13	10,000	0.31
29	5,000	0.13	8,000	0.23	6,000	0.16	10,000	0.31
30	5,000	0.14	8,000	0.23	6,000	0.17	10,000	0.32
31	5,000	0.14	9,000	0.27	6,000	0.17	10,000	0.32
32	6,000	0.17	9,000	0.27	7,000	0.20	10,000	0.32
33	6,000	0.17	10,000	0.31	7,000	0.20	10,000	0.32
34	6,000	0.17	10,000	0.31	7,000	0.20	10,000	0.32
35	6,000	0.17	10,000	0.32	7,000	0.20	10,000	0.33
36	7,000	0.21	10,000	0.32	8,000	0.24	10,000	0.33
37	7,000	0.21	10,000	0.32	8,000	0.24	10,000	0.33
38	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.33
39	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.33
40	7,000	0.21	10,000	0.32	9,000	0.29	10,000	0.33
41	8,000	0.25	10,000	0.32	9,000	0.29	10,000	0.33
42	8,000	0.25	10,000	0.32	9,000	0.29	10,000	0.33
43	8,000	0.25	10,000	0.33	9,000	0.29	10,000	0.33
44	8,000	0.25	10,000	0.33	10,000	0.33	10,000	0.33
45	9,000	0.29	10,000	0.33	10,000	0.33	10,000	0.33
46	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
47	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
48	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
>49	10,000	0.33	10,000	0.33	10,000	0.34	10,000	0.34

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. **Above limits do not take into account aesthetics.**

Altitude Limits (Installed)

Double-Pane: 3.9 / 13.0 / 7.1 (6.9L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
13	3,000	0.02	3,000	0.02	3,000	0.04	3,000	0.04
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
15	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.07
16	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.08
17	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.11
18	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.12
19	3,000	0.06	4,000	0.08	3,000	0.06	6,000	0.15
20	3,000	0.06	4,000	0.09	3,000	0.07	6,000	0.16
21	3,000	0.07	4,000	0.10	3,000	0.07	7,000	0.20
22	3,000	0.07	5,000	0.13	4,000	0.10	7,000	0.20
23	3,000	0.07	5,000	0.13	4,000	0.10	8,000	0.24
24	4,000	0.11	5,000	0.14	4,000	0.11	8,000	0.25
25	4,000	0.11	6,000	0.17	4,000	0.11	9,000	0.29
26	4,000	0.11	6,000	0.18	4,000	0.11	10,000	0.34
27	4,000	0.11	6,000	0.18	5,000	0.15	10,000	0.35
28	4,000	0.12	7,000	0.22	5,000	0.15	10,000	0.35
29	4,000	0.12	7,000	0.22	5,000	0.15	10,000	0.36
30	5,000	0.15	8,000	0.26	5,000	0.15	10,000	0.36
31	5,000	0.15	8,000	0.26	6,000	0.19	10,000	0.36
32	5,000	0.16	8,000	0.27	6,000	0.19	10,000	0.36
33	5,000	0.16	9,000	0.31	6,000	0.19	10,000	0.37
34	5,000	0.16	9,000	0.31	6,000	0.19	10,000	0.37
35	6,000	0.20	9,000	0.31	7,000	0.23	10,000	0.37
36	6,000	0.20	10,000	0.36	7,000	0.23	10,000	0.37
37	6,000	0.20	10,000	0.36	7,000	0.23	10,000	0.37
38	6,000	0.20	10,000	0.36	7,000	0.23	10,000	0.37
39	6,000	0.20	10,000	0.36	8,000	0.28	10,000	0.37
40	7,000	0.24	10,000	0.36	8,000	0.28	10,000	0.37
41	7,000	0.24	10,000	0.37	8,000	0.28	10,000	0.38
42	7,000	0.24	10,000	0.37	8,000	0.28	10,000	0.38
43	7,000	0.25	10,000	0.37	9,000	0.33	10,000	0.38
44	8,000	0.28	10,000	0.37	9,000	0.33	10,000	0.38
45	8,000	0.28	10,000	0.37	9,000	0.33	10,000	0.38
46	8,000	0.28	10,000	0.37	9,000	0.33	10,000	0.38
47	8,000	0.28	10,000	0.37	10,000	0.38	10,000	0.38
48	8,000	0.28	10,000	0.37	10,000	0.38	10,000	0.38
49	9,000	0.33	10,000	0.37	10,000	0.38	10,000	0.38
50	9,000	0.33	10,000	0.37	10,000	0.38	10,000	0.38
51	9,000	0.33	10,000	0.37	10,000	0.38	10,000	0.38
52	9,000	0.33	10,000	0.37	10,000	0.38	10,000	0.38
>53	10,000	0.37	10,000	0.37	10,000	0.38	10,000	0.38

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 4.7 / 9.8 / 9.0 (10.1L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
13	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
14	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
15	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
16	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.05
17	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
18	3,000	0.04	3,000	0.04	3,000	0.04	4,000	0.06
19	3,000	0.04	3,000	0.04	4,000	0.07	5,000	0.09
20	3,000	0.04	3,000	0.04	4,000	0.07	5,000	0.10
21	4,000	0.07	4,000	0.07	4,000	0.07	6,000	0.12
22	4,000	0.07	4,000	0.07	4,000	0.08	6,000	0.13
23	4,000	0.08	4,000	0.08	4,000	0.08	7,000	0.16
24	4,000	0.08	4,000	0.08	4,000	0.08	7,000	0.16
25	4,000	0.08	5,000	0.11	5,000	0.11	8,000	0.20
26	4,000	0.09	5,000	0.11	5,000	0.11	8,000	0.20
27	4,000	0.09	6,000	0.14	5,000	0.11	9,000	0.24
28	5,000	0.12	6,000	0.15	5,000	0.12	10,000	0.28
29	5,000	0.12	6,000	0.15	5,000	0.12	10,000	0.28
30	5,000	0.12	7,000	0.18	6,000	0.15	10,000	0.29
31	5,000	0.12	7,000	0.18	6,000	0.15	10,000	0.29
32	5,000	0.13	7,000	0.19	6,000	0.15	10,000	0.29
33	5,000	0.13	8,000	0.22	6,000	0.15	10,000	0.29
34	6,000	0.16	8,000	0.22	7,000	0.18	10,000	0.30
35	6,000	0.16	9,000	0.26	7,000	0.18	10,000	0.30
36	6,000	0.16	9,000	0.26	7,000	0.18	10,000	0.30
37	6,000	0.16	9,000	0.26	7,000	0.19	10,000	0.30
38	7,000	0.20	10,000	0.30	8,000	0.22	10,000	0.30
39	7,000	0.20	10,000	0.30	8,000	0.22	10,000	0.30
40	7,000	0.20	10,000	0.30	8,000	0.22	10,000	0.30
41	7,000	0.20	10,000	0.31	8,000	0.22	10,000	0.31
42	7,000	0.20	10,000	0.31	9,000	0.26	10,000	0.31
43	8,000	0.23	10,000	0.31	9,000	0.26	10,000	0.31
44	8,000	0.24	10,000	0.31	9,000	0.26	10,000	0.31
45	8,000	0.24	10,000	0.31	9,000	0.26	10,000	0.31
46	8,000	0.24	10,000	0.31	10,000	0.31	10,000	0.31
47	8,000	0.24	10,000	0.31	10,000	0.31	10,000	0.31
48	9,000	0.28	10,000	0.31	10,000	0.31	10,000	0.31
49	9,000	0.28	10,000	0.31	10,000	0.31	10,000	0.31
50	9,000	0.28	10,000	0.31	10,000	0.31	10,000	0.31
51	9,000	0.28	10,000	0.32	10,000	0.32	10,000	0.32
>52	10,000	0.32	10,000	0.32	10,000	0.32	10,000	0.32

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. **Above limits do not take into account aesthetics.**

Altitude Limits (Installed)

Double-Pane: 5.7 / 9.8 / 9.0 (10.1L)

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.00	3,000	0.00	3,000	0.01	3,000	0.01
13	3,000	0.01	3,000	0.01	3,000	0.01	3,000	0.01
14	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
15	3,000	0.01	3,000	0.01	3,000	0.02	3,000	0.02
16	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
17	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
18	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
19	3,000	0.03	3,000	0.03	4,000	0.05	4,000	0.05
20	3,000	0.03	3,000	0.03	4,000	0.06	4,000	0.06
21	3,000	0.04	3,000	0.04	4,000	0.06	4,000	0.06
22	3,000	0.04	3,000	0.04	4,000	0.06	5,000	0.09
23	3,000	0.04	3,000	0.04	4,000	0.07	5,000	0.09
24	3,000	0.04	3,000	0.04	4,000	0.07	5,000	0.09
25	3,000	0.05	3,000	0.05	4,000	0.07	6,000	0.12
26	4,000	0.07	4,000	0.07	5,000	0.10	6,000	0.12
27	4,000	0.07	4,000	0.07	5,000	0.10	7,000	0.15
28	4,000	0.08	4,000	0.08	5,000	0.10	7,000	0.15
29	5,000	0.10	5,000	0.10	5,000	0.10	8,000	0.19
30	5,000	0.11	5,000	0.11	5,000	0.11	8,000	0.19
31	5,000	0.11	5,000	0.11	6,000	0.13	9,000	0.22
32	5,000	0.11	6,000	0.14	6,000	0.13	9,000	0.22
33	5,000	0.11	6,000	0.14	6,000	0.13	10,000	0.26
34	5,000	0.11	6,000	0.14	6,000	0.14	10,000	0.26
35	6,000	0.14	7,000	0.17	7,000	0.17	10,000	0.26
36	6,000	0.14	7,000	0.17	7,000	0.17	10,000	0.27
37	6,000	0.15	8,000	0.21	7,000	0.17	10,000	0.27
38	6,000	0.15	8,000	0.21	7,000	0.17	10,000	0.27
39	6,000	0.15	8,000	0.21	7,000	0.17	10,000	0.27
40	7,000	0.18	9,000	0.24	8,000	0.20	10,000	0.27
41	7,000	0.18	9,000	0.24	8,000	0.20	10,000	0.27
42	7,000	0.18	9,000	0.25	8,000	0.20	10,000	0.28
43	7,000	0.18	10,000	0.28	8,000	0.20	10,000	0.28
44	7,000	0.18	10,000	0.28	9,000	0.24	10,000	0.28
45	8,000	0.22	10,000	0.29	9,000	0.24	10,000	0.29
46	8,000	0.22	10,000	0.29	9,000	0.24	10,000	0.29
47	8,000	0.22	10,000	0.29	9,000	0.24	10,000	0.29
48	8,000	0.22	10,000	0.29	10,000	0.29	10,000	0.29
49	8,000	0.22	10,000	0.29	10,000	0.29	10,000	0.29
50	9,000	0.25	10,000	0.29	10,000	0.29	10,000	0.29
51	9,000	0.26	10,000	0.29	10,000	0.29	10,000	0.29
52	9,000	0.26	10,000	0.29	10,000	0.29	10,000	0.29
53	9,000	0.26	10,000	0.29	10,000	0.29	10,000	0.29
54	10,000	0.29	10,000	0.29	10,000	0.29	10,000	0.29
>55	10,000	0.29	10,000	0.29	10,000	0.29	10,000	0.29

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 9.8 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.03	4,000	0.04	3,000	0.04	5,000	0.07
13	3,000	0.03	4,000	0.05	3,000	0.04	6,000	0.10
14	3,000	0.04	4,000	0.06	3,000	0.04	7,000	0.12
15	4,000	0.06	5,000	0.08	4,000	0.07	8,000	0.15
16	4,000	0.07	5,000	0.09	4,000	0.07	8,000	0.16
17	4,000	0.07	6,000	0.11	4,000	0.07	9,000	0.19
18	4,000	0.07	6,000	0.12	4,000	0.07	10,000	0.23
19	4,000	0.08	7,000	0.14	5,000	0.10	10,000	0.23
20	4,000	0.08	8,000	0.17	5,000	0.10	10,000	0.24
21	5,000	0.10	8,000	0.18	5,000	0.10	10,000	0.24
22	5,000	0.11	9,000	0.21	6,000	0.13	10,000	0.25
23	5,000	0.11	9,000	0.21	6,000	0.13	10,000	0.25
24	6,000	0.13	10,000	0.24	7,000	0.16	10,000	0.25
25	6,000	0.14	10,000	0.24	7,000	0.16	10,000	0.25
26	6,000	0.14	10,000	0.25	7,000	0.16	10,000	0.26
27	6,000	0.14	10,000	0.25	8,000	0.19	10,000	0.26
28	7,000	0.17	10,000	0.25	8,000	0.19	10,000	0.26
29	7,000	0.17	10,000	0.25	8,000	0.19	10,000	0.26
30	7,000	0.17	10,000	0.25	9,000	0.23	10,000	0.26
31	8,000	0.20	10,000	0.26	9,000	0.23	10,000	0.26
32	8,000	0.20	10,000	0.26	9,000	0.23	10,000	0.26
33	8,000	0.20	10,000	0.26	10,000	0.27	10,000	0.27
34	9,000	0.23	10,000	0.26	10,000	0.27	10,000	0.27
35	9,000	0.23	10,000	0.26	10,000	0.27	10,000	0.27
36	9,000	0.23	10,000	0.26	10,000	0.27	10,000	0.27
37	10,000	0.26	10,000	0.26	10,000	0.27	10,000	0.27

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 11.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.03	3,000	0.03	3,000	0.04	5,000	0.08
13	3,000	0.04	4,000	0.05	3,000	0.04	6,000	0.11
14	3,000	0.04	4,000	0.06	3,000	0.05	6,000	0.11
15	3,000	0.05	4,000	0.07	3,000	0.05	7,000	0.15
16	3,000	0.05	5,000	0.10	4,000	0.08	8,000	0.18
17	3,000	0.05	5,000	0.10	4,000	0.08	8,000	0.19
18	4,000	0.08	6,000	0.13	4,000	0.08	9,000	0.23
19	4,000	0.09	6,000	0.14	4,000	0.09	10,000	0.26
20	4,000	0.09	7,000	0.17	5,000	0.11	10,000	0.27
21	4,000	0.09	7,000	0.17	5,000	0.12	10,000	0.28
22	4,000	0.09	8,000	0.20	5,000	0.12	10,000	0.28
23	5,000	0.12	8,000	0.21	5,000	0.12	10,000	0.28
24	5,000	0.12	9,000	0.24	6,000	0.15	10,000	0.29
25	5,000	0.12	9,000	0.24	6,000	0.15	10,000	0.29
26	5,000	0.13	10,000	0.27	6,000	0.15	10,000	0.29
27	6,000	0.16	10,000	0.28	7,000	0.19	10,000	0.30
28	6,000	0.16	10,000	0.28	7,000	0.19	10,000	0.30
29	6,000	0.16	10,000	0.28	7,000	0.19	10,000	0.30
30	7,000	0.19	10,000	0.28	8,000	0.22	10,000	0.30
31	7,000	0.19	10,000	0.29	8,000	0.22	10,000	0.30
32	7,000	0.19	10,000	0.29	8,000	0.23	10,000	0.30
33	7,000	0.19	10,000	0.29	9,000	0.26	10,000	0.30
34	8,000	0.22	10,000	0.29	9,000	0.26	10,000	0.30
35	8,000	0.22	10,000	0.29	9,000	0.26	10,000	0.30
36	8,000	0.23	10,000	0.29	10,000	0.30	10,000	0.30
37	9,000	0.26	10,000	0.29	10,000	0.30	10,000	0.30
38	9,000	0.26	10,000	0.29	10,000	0.30	10,000	0.30
39	9,000	0.26	10,000	0.29	10,000	0.30	10,000	0.30
40	10,000	0.30	10,000	0.30	10,000	0.31	10,000	0.31

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 13.0 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.03	3,000	0.03	3,000	0.04	5,000	0.08
13	3,000	0.04	4,000	0.06	3,000	0.05	5,000	0.09
14	3,000	0.05	4,000	0.07	3,000	0.05	6,000	0.12
15	3,000	0.05	4,000	0.07	3,000	0.06	6,000	0.13
16	3,000	0.06	5,000	0.10	3,000	0.06	7,000	0.17
17	3,000	0.06	5,000	0.11	3,000	0.06	8,000	0.21
18	3,000	0.06	5,000	0.12	4,000	0.09	8,000	0.21
19	3,000	0.07	6,000	0.15	4,000	0.09	9,000	0.25
20	4,000	0.10	6,000	0.15	4,000	0.10	10,000	0.30
21	4,000	0.10	7,000	0.18	4,000	0.10	10,000	0.30
22	4,000	0.10	7,000	0.19	5,000	0.13	10,000	0.31
23	4,000	0.10	8,000	0.22	5,000	0.13	10,000	0.31
24	5,000	0.14	8,000	0.23	5,000	0.14	10,000	0.32
25	5,000	0.14	9,000	0.26	6,000	0.17	10,000	0.32
26	5,000	0.14	9,000	0.27	6,000	0.17	10,000	0.33
27	5,000	0.14	10,000	0.30	6,000	0.17	10,000	0.33
28	6,000	0.17	10,000	0.31	6,000	0.17	10,000	0.33
29	6,000	0.17	10,000	0.31	7,000	0.21	10,000	0.33
30	6,000	0.18	10,000	0.31	7,000	0.21	10,000	0.33
31	6,000	0.18	10,000	0.31	7,000	0.21	10,000	0.33
32	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.33
33	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.33
34	7,000	0.21	10,000	0.32	8,000	0.25	10,000	0.33
35	7,000	0.21	10,000	0.32	9,000	0.29	10,000	0.33
36	8,000	0.25	10,000	0.32	9,000	0.29	10,000	0.34
37	8,000	0.25	10,000	0.32	9,000	0.30	10,000	0.34
38	8,000	0.25	10,000	0.32	10,000	0.34	10,000	0.34
39	8,000	0.25	10,000	0.32	10,000	0.34	10,000	0.34
40	9,000	0.29	10,000	0.33	10,000	0.34	10,000	0.34
41	9,000	0.29	10,000	0.33	10,000	0.35	10,000	0.35
42	9,000	0.29	10,000	0.33	10,000	0.35	10,000	0.35
43	9,000	0.29	10,000	0.33	10,000	0.35	10,000	0.35
44	10,000	0.33	10,000	0.33	10,000	0.35	10,000	0.35

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 14.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.03	3,000	0.03	3,000	0.05	4,000	0.07
13	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.10
14	3,000	0.05	4,000	0.07	3,000	0.05	5,000	0.11
15	3,000	0.05	4,000	0.08	3,000	0.06	6,000	0.14
16	3,000	0.06	4,000	0.08	3,000	0.06	7,000	0.18
17	3,000	0.06	5,000	0.12	3,000	0.07	7,000	0.19
18	3,000	0.07	5,000	0.12	3,000	0.07	8,000	0.23
19	3,000	0.07	5,000	0.13	4,000	0.10	9,000	0.28
20	3,000	0.07	6,000	0.16	4,000	0.11	9,000	0.28
21	4,000	0.11	6,000	0.17	4,000	0.11	10,000	0.33
22	4,000	0.11	7,000	0.20	4,000	0.11	10,000	0.34
23	4,000	0.11	7,000	0.21	5,000	0.11	10,000	0.34
24	4,000	0.11	8,000	0.24	5,000	0.15	10,000	0.35
25	4,000	0.12	8,000	0.25	5,000	0.15	10,000	0.35
26	5,000	0.15	9,000	0.29	5,000	0.15	10,000	0.35
27	5,000	0.15	9,000	0.29	6,000	0.19	10,000	0.36
28	5,000	0.15	10,000	0.33	6,000	0.19	10,000	0.36
29	5,000	0.15	10,000	0.33	6,000	0.19	10,000	0.36
30	6,000	0.19	10,000	0.34	7,000	0.23	10,000	0.36
31	6,000	0.19	10,000	0.34	7,000	0.23	10,000	0.36
32	6,000	0.19	10,000	0.34	7,000	0.23	10,000	0.37
33	6,000	0.19	10,000	0.34	7,000	0.23	10,000	0.37
34	7,000	0.23	10,000	0.34	8,000	0.28	10,000	0.37
35	7,000	0.23	10,000	0.35	8,000	0.28	10,000	0.37
36	7,000	0.23	10,000	0.35	8,000	0.28	10,000	0.37
37	7,000	0.23	10,000	0.35	9,000	0.32	10,000	0.37
38	8,000	0.27	10,000	0.35	9,000	0.32	10,000	0.37
39	8,000	0.27	10,000	0.35	9,000	0.33	10,000	0.37
40	8,000	0.27	10,000	0.35	9,000	0.33	10,000	0.37
41	8,000	0.27	10,000	0.35	10,000	0.37	10,000	0.37
42	9,000	0.31	10,000	0.35	10,000	0.37	10,000	0.37
43	9,000	0.31	10,000	0.35	10,000	0.37	10,000	0.37
44	9,000	0.31	10,000	0.35	10,000	0.38	10,000	0.38
45	9,000	0.32	10,000	0.36	10,000	0.38	10,000	0.38
46	10,000	0.36	10,000	0.36	10,000	0.38	10,000	0.38

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.0 / 17.5 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.04	3,000	0.04	3,000	0.05	4,000	0.07
13	3,000	0.04	3,000	0.04	3,000	0.06	4,000	0.08
14	3,000	0.05	3,000	0.05	3,000	0.06	5,000	0.12
15	3,000	0.06	4,000	0.08	3,000	0.07	5,000	0.13
16	3,000	0.07	4,000	0.09	3,000	0.07	6,000	0.17
17	3,000	0.07	4,000	0.10	3,000	0.08	6,000	0.18
18	3,000	0.08	5,000	0.14	3,000	0.08	7,000	0.23
19	3,000	0.08	5,000	0.15	3,000	0.08	8,000	0.27
20	3,000	0.08	5,000	0.15	3,000	0.08	8,000	0.28
21	3,000	0.09	6,000	0.19	4,000	0.13	9,000	0.33
22	3,000	0.09	6,000	0.20	4,000	0.13	9,000	0.34
23	3,000	0.09	6,000	0.20	4,000	0.13	10,000	0.39
24	4,000	0.13	7,000	0.24	4,000	0.13	10,000	0.40
25	4,000	0.13	7,000	0.24	4,000	0.13	10,000	0.41
26	4,000	0.13	8,000	0.29	5,000	0.18	10,000	0.41
27	4,000	0.14	8,000	0.29	5,000	0.18	10,000	0.42
28	4,000	0.14	9,000	0.33	5,000	0.18	10,000	0.42
29	5,000	0.18	9,000	0.34	5,000	0.18	10,000	0.42
30	5,000	0.18	9,000	0.34	6,000	0.23	10,000	0.43
31	5,000	0.18	10,000	0.38	6,000	0.23	10,000	0.43
32	5,000	0.18	10,000	0.39	6,000	0.23	10,000	0.43
33	5,000	0.18	10,000	0.39	6,000	0.23	10,000	0.43
34	6,000	0.23	10,000	0.39	7,000	0.28	10,000	0.43
35	6,000	0.23	10,000	0.39	7,000	0.28	10,000	0.44
36	6,000	0.23	10,000	0.40	7,000	0.28	10,000	0.44
37	6,000	0.23	10,000	0.40	8,000	0.33	10,000	0.44
38	7,000	0.27	10,000	0.40	8,000	0.33	10,000	0.44
39	7,000	0.27	10,000	0.40	8,000	0.33	10,000	0.44
40	7,000	0.27	10,000	0.40	8,000	0.33	10,000	0.44
41	7,000	0.27	10,000	0.41	8,000	0.33	10,000	0.44
42	8,000	0.32	10,000	0.41	9,000	0.38	10,000	0.44
43	8,000	0.32	10,000	0.41	9,000	0.38	10,000	0.44
44	8,000	0.32	10,000	0.41	9,000	0.38	10,000	0.44
45	8,000	0.32	10,000	0.41	10,000	0.44	10,000	0.44
46	8,000	0.32	10,000	0.41	10,000	0.44	10,000	0.44
47	**	**	10,000	0.41	10,000	0.44	10,000	0.44

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

Altitude Limits (Installed)

Double-Pane: 3.9 / 16.0 / 4.7

Short Side Dimension (in)	Aspect Ratio = 1.0				Aspect Ratio = 2.0			
	Annealed Glass		Tempered Glass		Annealed Glass		Tempered Glass	
	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)	Altitude (ft)	Deflection (in)
12	3,000	0.02	3,000	0.02	3,000	0.03	3,000	0.03
13	3,000	0.02	3,000	0.02	3,000	0.03	4,000	0.05
14	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.06
15	3,000	0.03	3,000	0.03	3,000	0.04	4,000	0.07
16	3,000	0.04	3,000	0.04	3,000	0.05	5,000	0.09
17	3,000	0.05	3,000	0.05	3,000	0.05	5,000	0.10
18	3,000	0.05	4,000	0.07	3,000	0.06	6,000	0.13
19	3,000	0.05	4,000	0.08	3,000	0.06	6,000	0.14
20	3,000	0.06	4,000	0.08	4,000	0.09	7,000	0.17
21	4,000	0.09	5,000	0.11	4,000	0.09	7,000	0.18
22	4,000	0.09	5,000	0.12	4,000	0.09	8,000	0.22
23	4,000	0.09	5,000	0.12	4,000	0.09	8,000	0.22
24	4,000	0.10	6,000	0.15	4,000	0.09	9,000	0.26
25	4,000	0.10	6,000	0.16	5,000	0.13	10,000	0.31
26	4,000	0.10	7,000	0.19	5,000	0.13	10,000	0.31
27	4,000	0.10	7,000	0.20	5,000	0.13	10,000	0.32
28	5,000	0.13	7,000	0.20	5,000	0.13	10,000	0.32
29	5,000	0.14	8,000	0.24	6,000	0.17	10,000	0.32
30	5,000	0.14	8,000	0.24	6,000	0.17	10,000	0.33
31	5,000	0.14	9,000	0.28	6,000	0.17	10,000	0.33
32	5,000	0.14	9,000	0.28	6,000	0.17	10,000	0.33
33	6,000	0.18	9,000	0.28	7,000	0.21	10,000	0.33
34	6,000	0.18	10,000	0.32	7,000	0.21	10,000	0.34
35	6,000	0.18	10,000	0.33	7,000	0.21	10,000	0.34
36	6,000	0.18	10,000	0.33	7,000	0.21	10,000	0.34
37	7,000	0.21	10,000	0.33	8,000	0.25	10,000	0.34
38	7,000	0.21	10,000	0.33	8,000	0.25	10,000	0.34
39	7,000	0.22	10,000	0.33	8,000	0.25	10,000	0.34
40	7,000	0.22	10,000	0.33	8,000	0.25	10,000	0.34
41	8,000	0.26	10,000	0.34	9,000	0.30	10,000	0.34
42	8,000	0.26	10,000	0.34	9,000	0.30	10,000	0.34
43	8,000	0.26	10,000	0.34	9,000	0.30	10,000	0.34
44	8,000	0.26	10,000	0.34	9,000	0.30	10,000	0.34
45	8,000	0.26	10,000	0.34	10,000	0.35	10,000	0.35
46	9,000	0.30	10,000	0.34	10,000	0.35	10,000	0.35
47	9,000	0.30	10,000	0.34	10,000	0.35	10,000	0.35
48	9,000	0.30	10,000	0.34	10,000	0.35	10,000	0.35
49	9,000	0.30	10,000	0.34	10,000	0.35	10,000	0.35
50	10,000	0.34	10,000	0.34	10,000	0.35	10,000	0.35

Notes:

1. The altitude limits are for Cardinal IG unit constructions only.
2. Altitudes limits assumes units were constructed at 700 feet, 70° (assembly pressure of 14.3 psi)
3. Maximum of 1% breakage probability for annealed IG unit. Maximum edge seal load of 5 pli. Duration of load is 1 month.
4. Tempered glass limits restricted by edge seal load only.
5. The above altitude limitations do not apply to IG units with external and roomside applied grilles.
6. Above limits do not take into account aesthetics.

How To Use The Altitude Limit Table

1. First determine the short side dimension of the window product.
2. Knowing the glass thickness, locate the appropriate tab at the bottom of Excel spreadsheet.
3. Knowing the airspace and glass thickness, select the appropriate insulating glass table.
4. Using the short side dimension, select the appropriate row.
5. There are two columns of data: AR=1 and AR=2.
 - If the Long dimension divided by the short dimension equals 1, then use the AR=1 Table.
 - If the Long dimension divided by the short dimension equals 2, then use the AR=2 Table.
 - If the Long dimension divided by the short dimension equals 1.5, then interpolate a value between AR=1 and AR=2.
6. If the glass is annealed, use first two columns. If the glass is tempered, use the 3rd and 4th columns.
7. Additional assistance is available from Cardinal's Technology Center 952-929-3134.