EDWARD C. ROBISON, PE

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SUBJ: ALUMINUM SIDELITE RAILS

The Aluminum Sidelite Rails utilize aluminum extrusions to construct glazed sidelites. The system is intended for interior and exterior weather exposed applications and is suitable for use in all natural environments. The sidelites are designed for the following criteria:

Concentrated load = 50 lbs on 1sf any direction, any location
Live Load = 5 psf (for exterior applications wind will always govern)
Wind load as specified, 10 psf minimum inward or outward

Refer to IBC Section 1607.7.1

Exterior installations shall have the fastener spacing specified based on the supporting structure, wind load, glass height and side rail height using the equations or tables included herein.

The Sidelite system when installed as shown will meet or exceed all requirements of the 1997 Uniform Building Code, 2000, 2003 and 2006 International Building Codes, California Building Standards Code, and 2000 and 2005 Aluminum Design Manual. Stainless steel components are designed in accordance with SEI/ASCE 8-02 Specification for the Design of Cold-Formed Stainless Steel Structural Members. Wood components and anchorage to wood are designed in accordance with the National Design Specification for Wood Construction.

Edward Robison, P.E.
Attachments –
Calculations with design equations/tables: 16 pages
Details: 4 pages

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Typical Installations:

Top side rail is screwed to the header.
Any of the side rail options may be used:

Figure 1

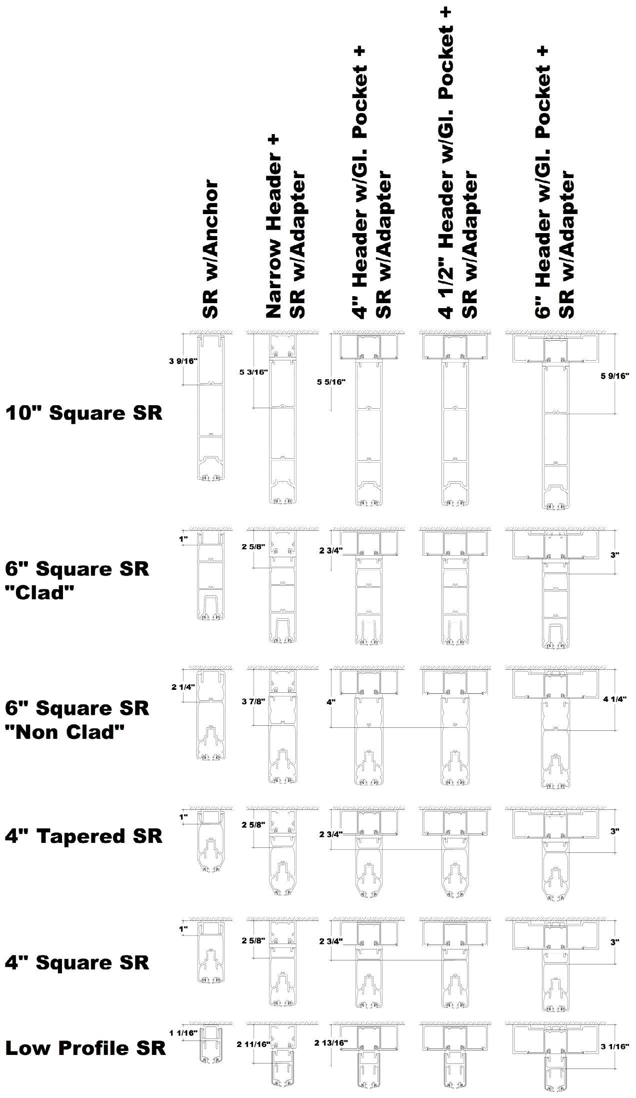
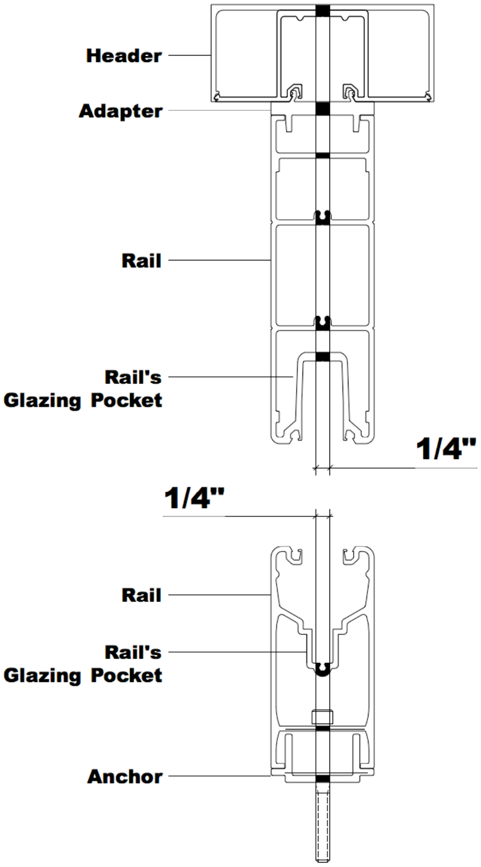


Figure 1A

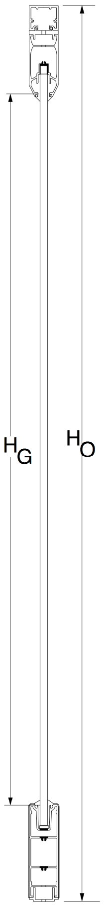


Allowable load will be dependent on the strength of the connection between the side rail and header.

Load path: Glass side lite will load side rail at the glazing pocket horizontally only (no vertical load component). Side rail will transfer horizontal loads to header by a couple between the screw and rail edge. Horizontal forces will be transferred by direct bearing between the rail and header.

LOAD CASES:
SIDE LITES:
Connections at the top and bottom:
Wind load will control loading at the top and bottom of side lites:
H_O = rough opening height
H_G = Glass clear height
h_{rt} = top sidelite rail height (sidelite rail with anchor)
h_{rb} = bottom sidelite rail height
w = wind load, inward or outward, 10 psf minimum
$W = H_G*w/2$ = wind load from glass to rail

Figure 1B



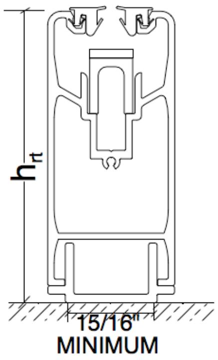
At top of wall:

Sidelight rail resists load by tension/compression couple between screw and rail. Determine screw tension from $\sum M = 0$:
$T = (W* h_{rt} + h_{rt}^2/2*w)/15/16" = 1/2*w*h_{rt} [H_G+h_{rt}]/[(15/16)/12"/ft) =$
$T = 6.396*w*h_{rt} [H_G+h_{rt}]$ **Eq 1**
per linear foot of rail with w in psf and H_G and h_{rt} in feet

Typical installation:

h_{rt} or h_{rb}	T (lbs/ft)
2 5/8" = 0.21875'	$1.4w[H_G+0.21875]$
4.25" = 0.35417'	$2.27w[H_G+0.35417]$
6.25" = 0.52083'	$3.33w[H_G+0.52083]$
10.25" = 0.85417'	$5.47w[H_G+0.85417]$
11.875" = 0.98958'	$6.33w[H_G+0.98958]$

Figure 1 C



Screw spacing $= T_a/T$

Check screw tear through on sidelite rail:
For 1/4" screw
$P_a = Ct_1F_{tu1}(D_{ws}-D_h)/n_s$
$n_s = 2.26$
$P_a = 1*0.125*30ksi(0.6875-0.25)/2.26$
$P_a = 726\#$ MAXIMUM VALUE FOR T_a

T_a = lesser of 726# or pullout strength in substrate.

Check tear through for 3/8" screw (largest size for use with 1/2" and 3/8" glass rails)
$P_a = 1*0.125*30ksi(0.84-0.375)/2.26 = 772\#$

Check tear through for 1/2" screw (largest size for use with 5/8" and 3/4" glass rails)
$P_a = 1*0.125*30ksi(1.0-0.5)/2.26 = 830\#$

For anchor into concrete:
Typical anchor: 1/4” concrete screw, wedge or expansion anchor with 1-1/2” minimum embedment, minimum 3,000 psi concrete
$T_a > P_a$ Use 726#
For concrete anchors allowable tension will be controlled by aluminum tear through.

When installed in masonry ($f'_m \geq 1{,}500$ psi)
$T_a = 340\#$ (may be lower in some jurisdictions)

For screws into steel substrate:
#14 (1/4”) Self drilling screws:

Steel thickness		T_a
18 ga	0.0451”	171#
16 ga	0.0578”	261#
14 ga	0.072”	447#
12 ga	0.0998”	555#
10 ga	0.127”	882# limited to 726# by pull through on rail.

3/8” or 1/2” self drilling screw to steel, 14 ga minimum thickness allowable tension will be controlled by aluminum tear through.

For 1/4” screws into wood (from NDS Table 11K and 11M, 0.12” side plate):
For wind $C_D = 1.60$

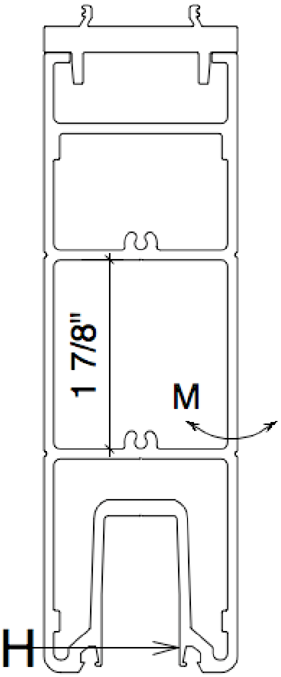
G	T_a wood screw	T_a lag screw
0.43	154*1.6=246#	160*1.6=256#/”
0.46	164*1.6=262#	160*1.6=256#/”
0.49	171*1.6=274#	170*1.6=272#/”
0.50	175*1.6=280#	170*1.6=272#/”
0.55	188*1.6=301#	180*1.6=288#/”

DESIGN EXAMPLE FOR CALCULATION OF FASTENER SPACING:
For 25 psf wind load and 12’ glass height, to 10 ga steel or concrete $T_a = 726\#$:

h_{rt} or h_{rb}	T (lbs/ft)	fastener spacing (ft)	
2 5/8”	1.4*25[12+0.21875] = 428plf	726/428 = 1.7’	(20”)
4.25”	2.27*25[12+0.35417] = 701plf	726/701 = 1.04’	(12”)
5.875”	3.13*25[12+0.48958] = 977plf	726/977 = 0.74’	(9”)
6.25”	3.33*25[12+0.52083] = 1,042plf	726/1,042 = 0.70’	(8”)
7.875”	4.2*25[12+0.65625] = 1,329plf	726/1,329 = 0.55’	(7”)
10.25”	5.47*25[12+0.85417] = 1,758plf	726/1,758 = 0.41’	(5”)
11.875”	6.33*25[12+0.98958] = 2,056plf	726/2,056 = 0.35’	(4”)

Load limitations on side rail extrusions:

Figure 2



Stress in side rail will be:
shear through sidewalls:
f_v = H/(2*0.094”*12”) = H/2.256 in^2
allowable shear stress:
F_v = 8.5 ksi (ADM Table 2-24)
H_{max} = 8.5 ksi*2.256 in^2 = 19.176 k
shear will not limit loading

Bending stress in legs of individual cells:
h_c = 1 7/8” typical
M = [H*h_c/2]/2 legs = H*h_c/4
S = 12”*0.094”^{2}/6 = 0.0177 in^3
F_{bt} = 15 ksi for tension
b/t = 1.875/0.094” = 19.9 < 23
F_{bc} = 15 ksi for compression

M_{max} = 15ksi*0.0177in^3 = 265.5#”/ft
H = 4*265.5#”/1.875 = 566#/ft

Overall rail bending moment - tension and compression in sidewalls:
M = h_r*H
T = C = M/1.75”
f_t = f_c = [M/1.75”]/(12”*0.094”) = M/1.974 in^3 = h_r*H/1.974 in^3
H_{max} = 15ksi*1.974 in^3/h_r = 29.61k/ h_r
for h_r = 10” max
H_{max} = 29.61k”/10” = 2,961# : overall bending will not control design.

Determine maximum horizontal load based on combined effects of cell bending and overall bending:
$f_a/F_a + C_m f_b/[F_b(1-f_a/F_e)]$ or $f_a/F_a + f_b/F_b \leq 1.0$ where
C_m= 0.6-0.4*(M_1/M_2) = 0.2
F_e = 71 ksi
second equation will control
(h_r*H/1.974 in^3)/15,000 + (H*26.48)/15,000 = 1.0 solve for H
H = 15,000/(h_r/1.974 in^3+ 26.48)

h_r	H_a
2 3/8”	15,000/(2.375/1.974 in^3+ 26.48) = 542#/ft
4”	15,000/(4/1.974 in^3+ 26.48) = 526#/ft
6”	15,000/(6/1.974 in^3+ 26.48) = 508#/ft
10”	15,000/(10/1.974 in^3+ 26.48) = 475#/ft

TYPICAL INSTALLATIONS:

Determine allowable wind loads and glass height relationships:

$H = w*H_g/2$

h_r	wind to glass height relationship
2 3/8”	$w*H_g/2$ = 542#/ft
4”	$w*H_g/2$ = 526#/ft
6”	$w*H_g/2$ = 508#/ft
10”	$w*H_g/2$ = 475#/ft

DESIGN EXAMPLE:

Determine allowable maximum side lite glass height for 25 psf wind load:

h_r	allowable glass height	
2 3/8”	H_g = 542#/ft*2/25 = 43.36’	will be limited by glass strength
4”	H_g = 526#/ft*2/25 = 42.08’	will be limited by glass strength
6”	H_g = 508#/ft*2/25 = 40.64’	will be limited by glass strength
10”	H_g = 475#/ft*2/25 = 38.00’	will be limited by glass strength

Determine allowable maximum wind load for side lite glass height = 12’:

h_r	allowable glass height	
2 3/8”	w = 542#/ft*2/12 = 90.3 psf	will be limited by glass strength
4”	w = 526#/ft*2/12 = 87.7 psf	will be limited by glass strength
6”	w = 508#/ft*2/12 = 84.7 psf	will be limited by glass strength
10”	w = 475#/ft*2/12 = 79.2 psf	will be limited by glass strength

For all sidelite rail configurations out of plain bending or deformation of the rails will not control the design

CONCLUSIONS

The critical element of the sidelite rail system is the fastener between the side rail and supporting structure. All side rail profiles may be used for interior or exterior installations. Exterior installations shall have the fastener spacing specified based on the supporting structure, wind load, glass height and side rail height using the equations included previously herein.

5/8" AND 3/4" GLASS SIDELITE RAIL SYSTEM:
5/8" and 3/4" glass utilize the widened 4" square or tapered rail sized for the thicker glass.

The out of plane bending strength of the rail is similar to that for the narrower 4" rails and therefore will not limit the rail loads.

Determine the anchor tension to load relationship:
Determine screw tension from $\sum M = 0$:

$$T = (W^* h_{rt} + h_{rt}^2/2^*w)/1" =$$
$$1/2^*w^*h_{rt}\ [H_G+h_{rt}]/1" =$$
$$0.5^*w^*h_{rt}\ [H_G+h_{rt}] \qquad \text{Eq 3}$$

Figure 3A

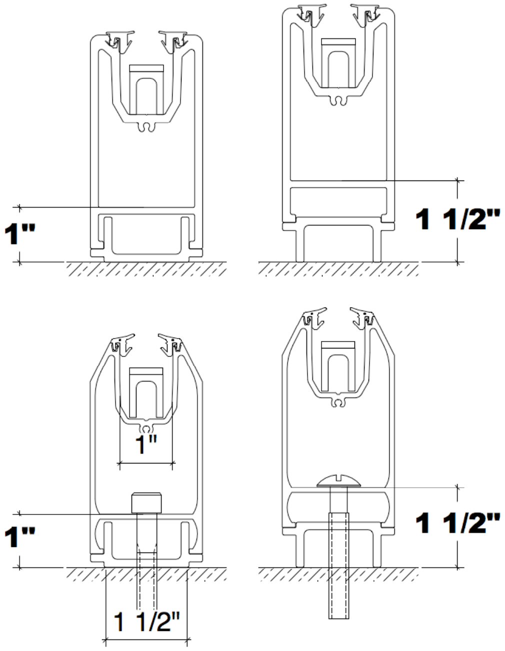
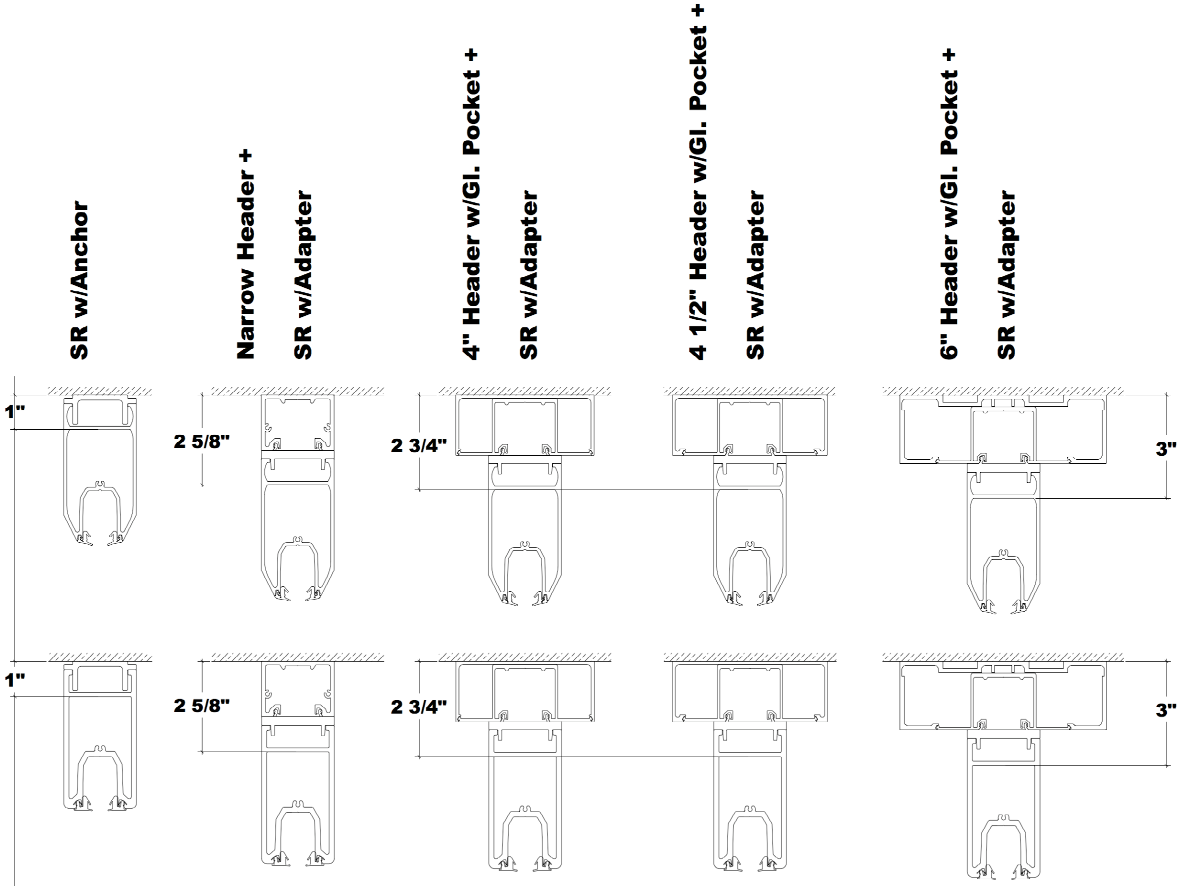


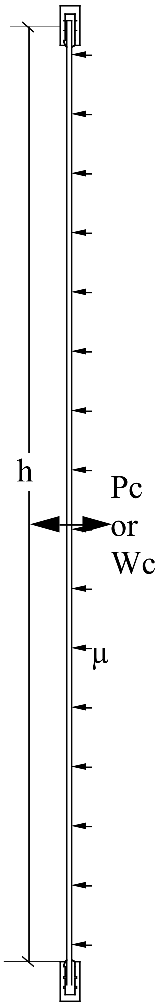
Figure 3B



SIDELITE GLASS:

All glass is fully tempered glass conforming to the specifications of ANSI Z97.1, ASTM C 1048-97b and CPSC 16 CFR 1201. The minimum Modulus of Rupture for the glass Fr is 20,000 psi. The actual Fr for the tempered glass is 24 ksi to 26 ksi minimum, therefore the true Safety Factors are larger than shown herein. In accordance with IBC 2407.1.1 glass used as structural balustrade panels shall be designed for a safety factor of 4.0. This is applicable only to structural panels (glass provides support to railing). Other locations the glass stress may be increased by 33% (SF = 3.0) for glass infill panels. Glass not used in guardrails may be designed for a safety factor of 2.5 in accordance with ASTM E1300-00. No safety factor is specified in the IBC, UBC or applicable standards for glass used as divisor walls or partitions. In athletic facilities glass shall be tested in accordance with CPSC 16 CFR Part 1201 and IBC 2408. The appropriate safety factor shall be selected based on the specific application.

Figure 4A



Allowable glass bending stress: $F_b = 24{,}000/SF$
Allowable compression stress: $F_c = 24{,}000psi/SF$
Allowable bearing stress: $F_B = 24{,}000\ psi/SF$
Allowable shear stress: $F_v = 0.5*24{,}000/SF$

Bending strength of glass for the given thickness:

$$S = \frac{12"*(t)^2}{6} = 2*(t)^2\ in^3/ft$$

$M_{all} = 6{,}000psi*S =$ (guard application) SF = 4
$M_{all} = 8{,}000psi*S =$ (divisor wall) SF = 3
$M_{all} = 9{,}600psi*S =$ (windows) SF = 2.5

For lites simply supported on two opposite sides the moment and deflection are calculated from basic beam theory, (other sides not supported).

$M_w = \mu*h^2/8$ for uniform load W and span L or
$M_p = P*h/4$ for concentrated load P and span L, maximum for P @ h/2
where: μ = distributed load (psf), W = uniform load (plf), P = conc. load
h = lite height (between supports) and b = lite width

The allowable loads for a lite height:

$\mu = M_{all}*8/h^2$
$Wc = M_{all}*4/(h*b)$ or $Pc = M_{all}*4/(h*b)$

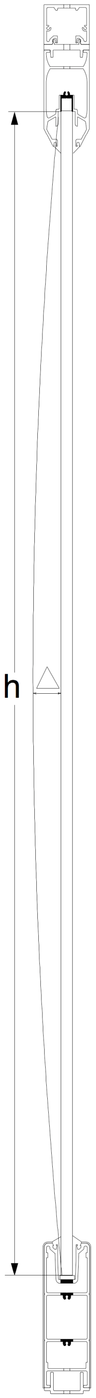
Glass stress = $f_b = M/S$
$f_b = wh^2/(8*S) = wh^2/(8*2t^2) = wh^2/(16t^2)$

Deflections must be checked for:
Differential deflections < 0.9t (glass thickness) based on 50plf load at mid height

Total deflection < h/60 at center of glass
Top vertical deflection so that edge bite is not less than the minimum (never controls)

For differential deflection assume one light is loaded and adjacent is unloaded. For total deflection use total net wind load, air pressure or live load over entire light surface.

Figure 4B



For differential deflection:
$\Delta_d = Ph_d^3/(48EI)$
$P = 50\#$
h_d = light height or distance between clamps
$E = 10.4x10^6$ psi for glass
$I = 12\text{”}*t^3/12 = t^3$

Substitute and simplify
$\Delta_d = 0.9t = 50h^3/(48*E*t^3)$

Solve for t:
$t*t^3 = 50h_d^3/(48*E*0.9)$
$t = 0.01826(h_d^3)^{1/4}$

Solve for h
$h_d^3 = 0.9t^4*48*E/50$
$h_d = 207.9(t^4)^{1/3}$

Maximum light height or bracket spacing for specified glass thickness:

t (in)	h_d (in)
3/8	56
1/2	82
5/8	111
3/4	141

For total deflection
$\Delta_t = 5wh^4/(384EI)$
where:
h = light height
w = greater of wind load, differential air pressure or live load (10 psf minimum)
$E = 10.4x10^6$ psi for glass
$I = 12\text{”}*t^3/12 = t^3$

Substitute and simplify
$\Delta = h/60 = 5w'h^4/(384Et^3)$

Solve for h:
$h^3 = (384Et^3) /(60*5*w') = (384Et^3) /(60*5*w/12)$
$h = [159,744,000(t^3)]^{1/3}$
$h = 542.6t/(w'^{1/3})$
where w' = w/12("/ft)

Solve for t:
$t = h(w'^{1/3})/542.6$ Eq. 3

Solve for w:
$w' = [(384Et^3)h/(60*5h^4)]*12$
$w = (159,744,000t^3)/(h^3)$

For typical 1/2" fully tempered glass lights
Allowable height for given thickness and load

w (psf)	t(in)	h (in)	stress psi
10	0.5	127.6	3389
15	0.5	111.4	3880
20	0.5	101.2	4270
25	0.5	94.0	4600
30	0.5	88.4	4888
35	0.5	84.0	5146
40	0.5	80.4	5380
45	0.5	77.3	5596
50	0.5	74.6	5796
55	0.5	72.3	5983
60	0.5	70.2	6159

Allowable load for given height and thickness:

h (in)	t(in)	w (psf)	stress
72	0.5	53.5	5778
84	0.5	33.7	4952
96	0.5	22.6	4333
108	0.5	15.9	3852
120	0.5	11.6	3467

For higher loading for a given light height the glass must be reinforced using buttress fins designed for the loading and height to support the light edges.

SYSTEM DESIGN METHODOLOGY:

The maximum allowable rail load increases as the light height decreases because of the deflection limits on the glass allow for much higher loads as the light height decreases. If glass is reinforced with buttress fins the fins will carry most of the glass loads so that this method will not be applicable.

Step 1:
Select glass thickness based on loading and light height. Calculate using Equation 3 (page 10); or see Table 1. Glass deflection will control for sidelights. If higher loads or greater heights are required then buttress fins or other reinforcement is required. Design of the buttress fins is beyond the scope of this report.

Step 2:
Select Rail Type and anchor load from Tables 2a through 2d:
For 3/8" and 1/2" glass all rail styles may be used.
For 5/8" and 3/4" can only use appropriate 4" square or tapered rail.
Anchor load may be calculated for the specific light height and wind load using Eq. 1 on page 3.

Step 3:
Calculate the anchor spacing using the allowable anchor tension for the anchor type and substrate from Table 3 or calculated value for other anchor or substrate types.
Anchor spacing:

$$S = T_a/T*12"/ft \quad \text{inches on center}$$

Step 4:
Determine if storefront clamps are required using table 4. For glass light height:

$$h_g \geq h_d$$

Storefront clamps must be installed so that clear distance:

$$h_c \leq 0.75h_d$$

Refer to figure 4A, 4B and 4C for definition of dimensions.

TABLE 1

Allowable load for given height and thickness (deflection controls):

t(in)	h (in)	w (psf)	stress	end reaction
0.375	60	39.0	5200	98
0.375	72	22.6	4333	68
0.375	84	14.2	3714	50
0.375	94	10.1	3319	40

t(in)	h (in)	w (psf)	stress	end reaction
0.5	72	53.5	5778	160
0.5	84	33.7	4952	118
0.5	96	22.6	4333	90
0.5	108	15.9	3852	71
0.5	120	11.6	3467	58
0.5	126	10.0	3302	52

t(in)	h (in)	w (psf)	stress	end reaction
0.625	72	104.5	7222	313
0.625	84	65.8	6190	230
0.625	96	44.1	5417	176
0.625	108	31.0	4815	139
0.625	120	22.6	4333	113
0.625	132	17.0	3939	93
0.625	144	13.1	3611	78
0.625	156	10.3	3333	67

t(in)	h (in)	w (psf)	stress	end reaction
0.75	72	180.6	8667	542
0.75	84	113.7	7429	398
0.75	96	76.2	6500	305
0.75	108	53.5	5778	241
0.75	120	39.0	5200	195
0.75	132	29.3	4727	161
0.75	144	22.6	4333	135
0.75	156	17.8	4000	115
0.75	168	14.2	3714	99
0.75	180	11.6	3467	87
0.75	188	10.1	3319	79

TABLE 2a:

FOR 3/8" GLASS Rail Style	Rail Height (in)	Glass Height (in)	Wind/live Load (psf)	T Anchor Tension (plf)
Low profile (low anchor)	2.625	72	22.6	196.6
Low profile (low anchor)	2.625	84	14.2	143.4
Low profile (low anchor)	2.625	94	10.1	113.8
Low profile (tall anchor)	3.125	72	22.6	235.7
Low profile (tall anchor)	3.125	84	14.2	171.7
Low profile (tall anchor)	3.125	94	10.1	136.2
Low profile (w/ header)	4.125	72	22.6	315.2
Low profile (w/ header)	4.125	84	14.2	229.3
Low profile (w/ header)	4.125	94	10.1	181.6
4" all styles (low anchor)	4.25	72	22.6	325.3
4" all styles (low anchor)	4.25	84	14.2	236.6
4" all styles (low anchor)	4.25	94	10.1	187.3
4" all styles (tall anchor)	4.75	72	22.6	366.0
4" all styles (tall anchor)	4.75	84	14.2	265.9
4" all styles (tall anchor)	4.75	94	10.1	210.4
4" all styles (w/ header)	6.25	72	22.6	490.9
4" all styles (w/ header)	6.25	84	14.2	355.8
4" all styles (w/ header)	6.25	94	10.1	281.1
6" Square (low anchor)	6.25	72	22.6	490.9
6" Square (low anchor)	6.25	84	14.2	355.8
6" Square (low anchor)	6.25	94	10.1	281.1
6" Square (tall anchor)	6.75	72	22.6	533.6
6" Square (tall anchor)	6.75	84	14.2	386.4
6" Square (tall anchor)	6.75	94	10.1	305.1
6" Square (w/ header)	8.25	72	22.6	664.6
6" Square (w/ header)	8.25	84	14.2	480.0
6" Square (w/ header)	8.25	94	10.1	378.4
10" Square (low anchor)	10.25	72	22.6	846.3
10" Square (low anchor)	10.25	84	14.2	609.3
10" Square (low anchor)	10.25	94	10.1	479.4
10" Square (tall anchor)	10.75	72	22.6	893.0
10" Square (tall anchor)	10.75	84	14.2	642.4
10" Square (tall anchor)	10.75	94	10.1	505.2
10" Square (w/ header)	11.75	72	22.6	987.8
10" Square (w/ header)	11.75	84	14.2	709.6
10" Square (w/ header)	11.75	94	10.1	557.4

TABLE 2b:

FOR 1/2" GLASS Rail Style	Rail Height (in)	Glass Height (in)	Wind/live Load (psf)	T Anchor Tension (plf)
Low profile (low anchor)	2.625	72	53.5	465.5
Low profile (low anchor)	2.625	96	22.6	259.9
Low profile (low anchor)	2.625	120	11.6	165.8
Low profile (tall anchor)	3.125	96	22.6	310.9
Low profile (tall anchor)	3.125	120	11.6	198.2
Low profile (tall anchor)	3.125	72	53.5	557.9
Low profile (w/ header)	4.125	96	22.6	414.6
Low profile (w/ header)	4.125	120	11.6	263.8
Low profile (w/ header)	4.125	72	53.5	746.2
4" all styles (low anchor)	4.25	72	53.5	770.1
4" all styles (low anchor)	4.25	96	22.6	427.7
4" all styles (low anchor)	4.25	120	11.6	272.1
4" all styles (tall anchor)	4.75	72	53.5	866.3
4" all styles (tall anchor)	4.75	96	22.6	480.4
4" all styles (tall anchor)	4.75	120	11.6	305.3
4" all styles (w/ header)	6.25	72	53.5	1162.2
4" all styles (w/ header)	6.25	96	22.6	641.5
4" all styles (w/ header)	6.25	120	11.6	406.6
6" Square (low anchor)	6.25	72	53.5	1162.2
6" Square (low anchor)	6.25	96	22.6	641.5
6" Square (low anchor)	6.25	120	11.6	406.6
6" Square (tall anchor)	6.75	72	53.5	1263.1
6" Square (tall anchor)	6.75	96	22.6	696.2
6" Square (tall anchor)	6.75	120	11.6	440.8
6" Square (w/ header)	8.25	72	53.5	1573.3
6" Square (w/ header)	8.25	96	22.6	863.3
6" Square (w/ header)	8.25	120	11.6	545.1
10" Square (low anchor)	10.25	72	53.5	2003.4
10" Square (low anchor)	10.25	96	22.6	1093.2
10" Square (low anchor)	10.25	120	11.6	687.9
10" Square (tall anchor)	10.75	72	53.5	2113.9
10" Square (tall anchor)	10.75	96	22.6	1151.9
10" Square (tall anchor)	10.75	120	11.6	724.2
10" Square (w/ header)	11.75	72	53.5	2338.4
10" Square (w/ header)	11.75	96	22.6	1270.9
10" Square (w/ header)	11.75	120	11.6	797.6

TABLE 2c 5/8" GLASS	Rail Height (in)	Glass Height (in)	Wind/live Load (psf)	T Anchor Tension (plf)
4" all styles (low anchor)	4.25	96	44.1	782.9
4" all styles (low anchor)	4.25	108	31	616.2
4" all styles (low anchor)	4.25	120	22.6	497.3
4" all styles (low anchor)	4.25	132	17	410.2
4" all styles (low anchor)	4.25	144	13.1	343.9
4" all styles (low anchor)	4.25	156	10.3	292.3
4" all styles (tall anchor)	4.75	96	44.1	879.4
4" all styles (tall anchor)	4.75	108	31	691.8
4" all styles (tall anchor)	4.75	120	22.6	558.0
4" all styles (tall anchor)	4.75	132	17	460.1
4" all styles (tall anchor)	4.75	144	13.1	385.7
4" all styles (tall anchor)	4.75	156	10.3	327.7
4" all styles (w/ header)	6.25	96	44.1	1174.3
4" all styles (w/ header)	6.25	108	31	922.3
4" all styles (w/ header)	6.25	120	22.6	743.0
4" all styles (w/ header)	6.25	132	17	612.0
4" all styles (w/ header)	6.25	144	13.1	512.6
4" all styles (w/ header)	6.25	156	10.3	435.2

TABLE 2d 3/4" GLASS	Rail Height (in)	Glass Height (in)	Wind/live Load (psf)	T Anchor Tension (plf)
4" all styles (low anchor)	4.25	132	29.3	706.9
4" all styles (low anchor)	4.25	144	22.6	593.3
4" all styles (low anchor)	4.25	156	17.8	505.1
4" all styles (low anchor)	4.25	168	14.2	433.1
4" all styles (low anchor)	4.25	180	11.6	378.5
4" all styles (low anchor)	4.25	188	10.1	343.8
4" all styles (tall anchor)	4.75	132	29.3	793.0
4" all styles (tall anchor)	4.75	144	22.6	665.3
4" all styles (tall anchor)	4.75	156	17.8	566.3
4" all styles (tall anchor)	4.75	168	14.2	485.5
4" all styles (tall anchor)	4.75	180	11.6	424.2
4" all styles (tall anchor)	4.75	188	10.1	385.3
4" all styles (w/ header)	6.25	132	29.3	1054.9
4" all styles (w/ header)	6.25	144	22.6	884.3
4" all styles (w/ header)	6.25	156	17.8	752.1
4" all styles (w/ header)	6.25	168	14.2	644.4
4" all styles (w/ header)	6.25	180	11.6	562.6
4" all styles (w/ header)	6.25	188	10.1	510.9

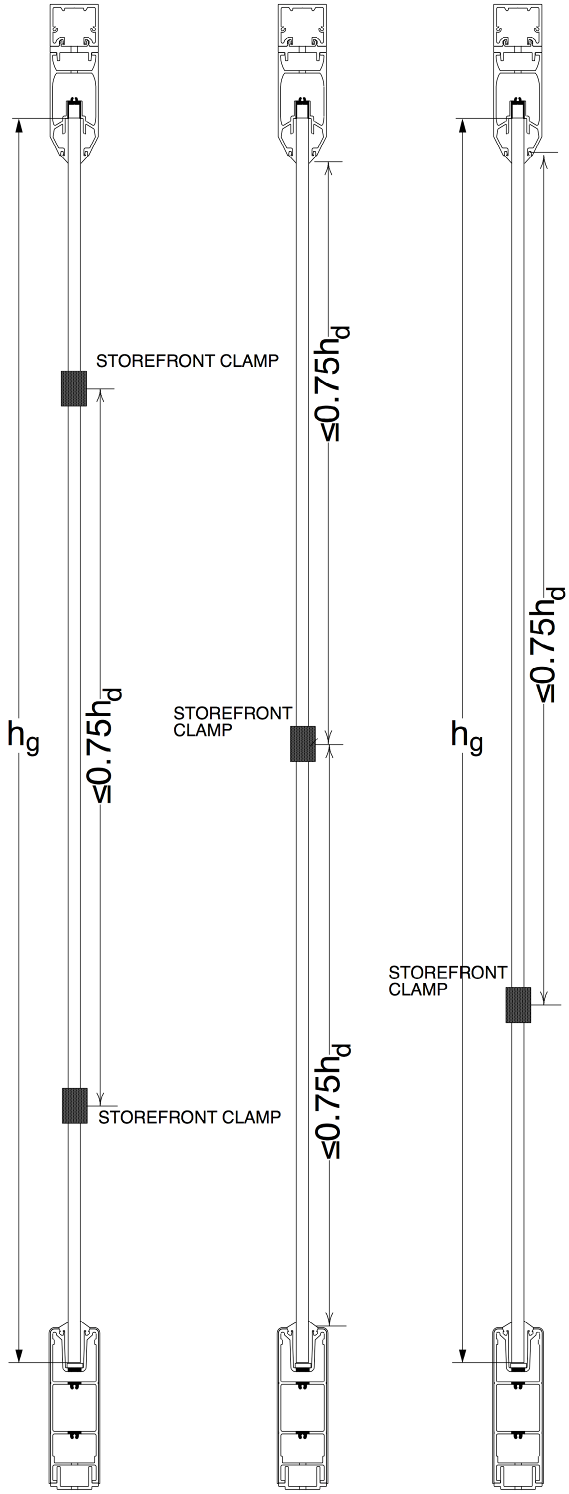
Table 3: Anchor selection

Anchor type	substrate	T_a (lbs) allowable tension	
1/4” self drilling screw	18 ga 0.0451”	171#	
	16 ga 0.0578”	261#	
	14 ga 0.072”	447#	
	12 ga 0.0998”	555#	
	10 ga 0.127”	726#	
3/8” self drilling screw			
	14 ga 0.072”	772#	
	or thicker	772#	
1/2” self drilling screw			
	14 ga 0.072”	830#	
	or thicker	830#	
1/4” concrete screw	1-3/4” embed to concrete	580#	
3/8” concrete screw	2-1/4” embed to concrete	772#	
1/2” concrete screw	2-1/4” embed to concrete	830#	
1/4” expansion anchor	1-1/2” embed to concrete	726#	
3/8” expansion anchor	1-3/4” embed to concrete	772#	
1/2” expansion anchor	1-7/8” embed to concrete	830#	
1/4” concrete screw	2” embed to CMU	340#	
3/8” concrete screw	2-3/4” embed to CMU	772#	
1/2” concrete screw	2-3/4” embed to CMU	830#	
1/4” expansion anchor	2” embed to CMU	432#	
3/8” expansion anchor	2-1/2” embed to CMU	626#	
1/2” expansion anchor	3-1/2” embed to CMU	724#	
1/4” Wood screw	2” into South Pine ($G = 0.55$)	666#	
1/4” Wood screw	2.5” into DFL ($G \geq 0.49$)	660#	Douglas Fir- Larch
1/4” Wood screw	3” into SPF ($G = 0.42$)	580#	Spruce-Pine-Fir
1/4” Wood lag screw	2” into South Pine ($G = 0.55$)	726#	
1/4” Wood lag screw	2-1/4” into DFL ($G \geq 0.49$)	726#	
1/4” Wood lag screw	3” into SPF ($G = 0.42$)	726#	
3/8” Wood lag screw	2” into South Pine ($G = 0.55$)	772#	
3/8” Wood lag screw	2” into DFL ($G \geq 0.49$)	772#	
3/8” Wood lag screw	2” into SPF ($G \geq 0.42$)	772#	
1/2” Wood lag screw	2” into South Pine ($G = 0.55$)	830#	
1/2” Wood lag screw	2” into DFL ($G \geq 0.49$)	830#	
1/2” Wood lag screw	2” into SPF ($G \geq 0.42$)	830#	

Table 4
Maximum sidelight height or bracket spacing for specified glass thickness:

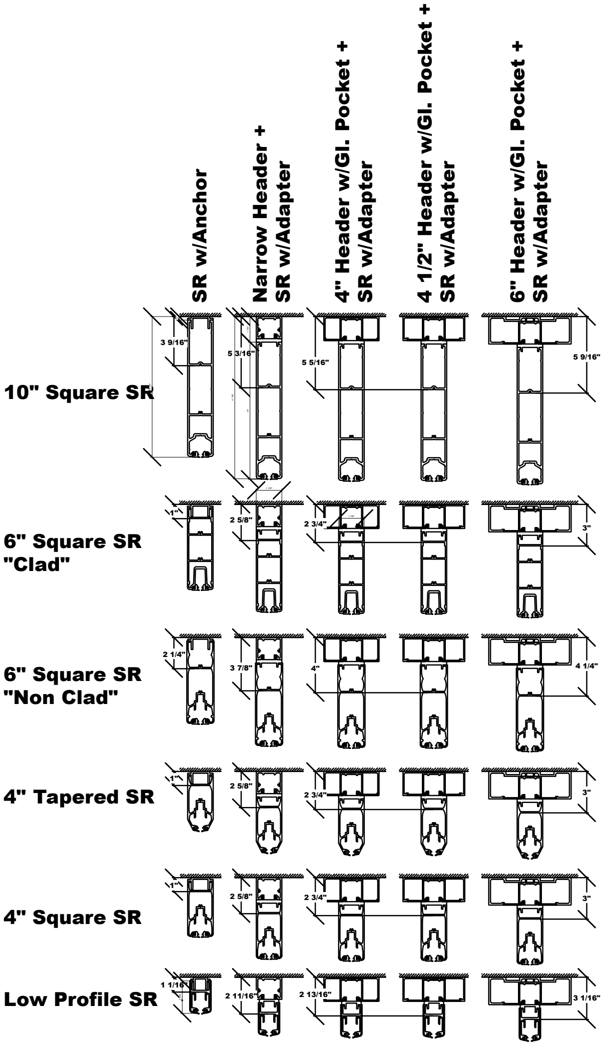
t (in)	h_d (in)
3/8	56
1/2	82
5/8	111
3/4	141

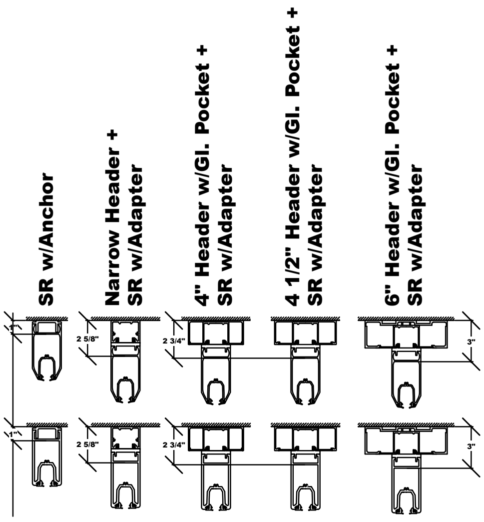
FIGURE 4C



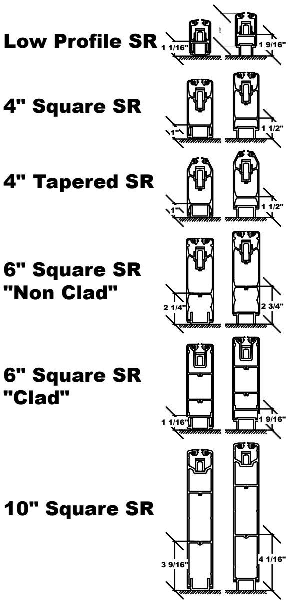
SIDELITE RAILS INSTALLATION CONFIGURATIONS

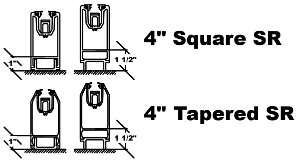
TOP OPTIONS





BOTTOM OPTIONS



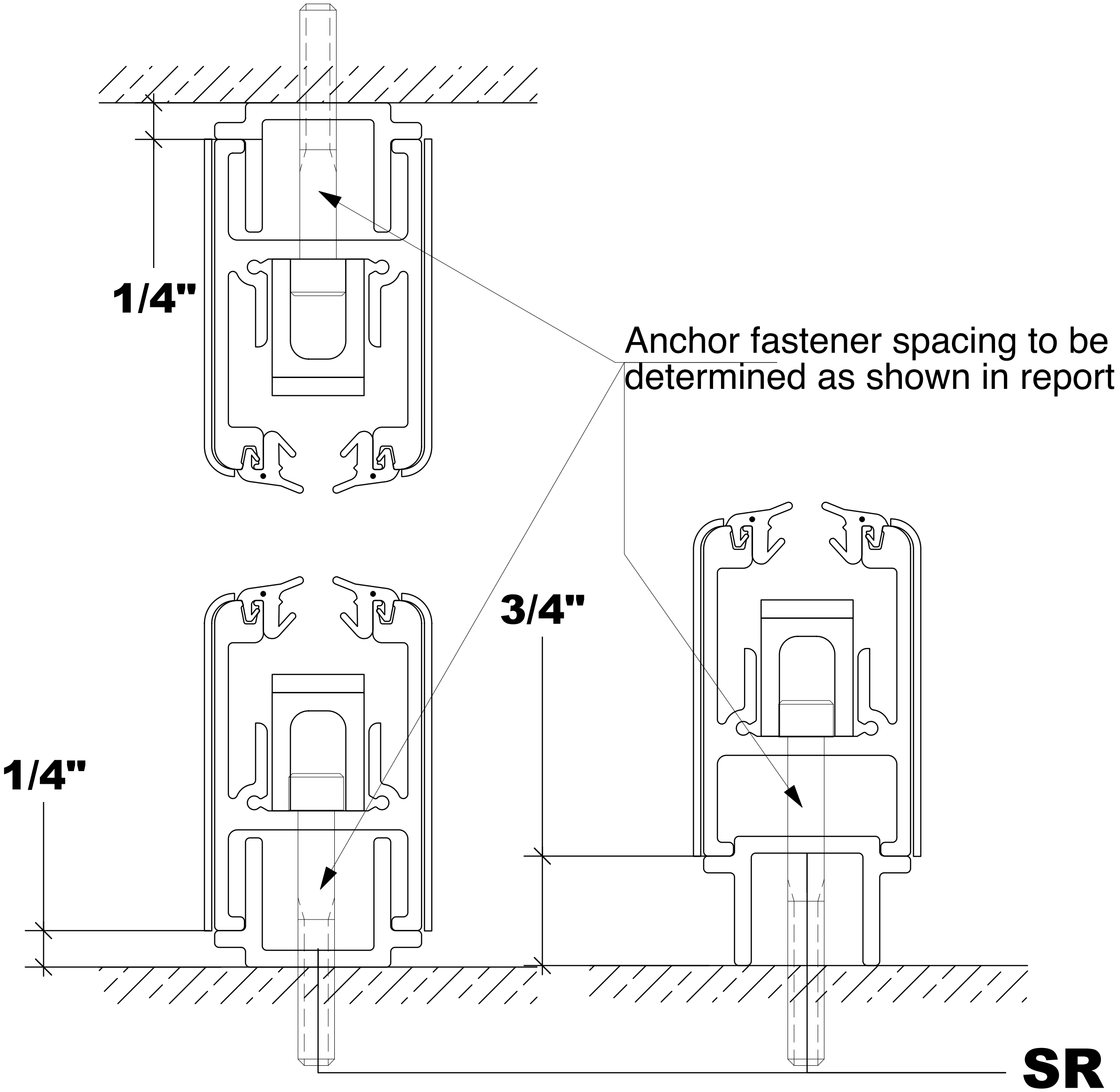


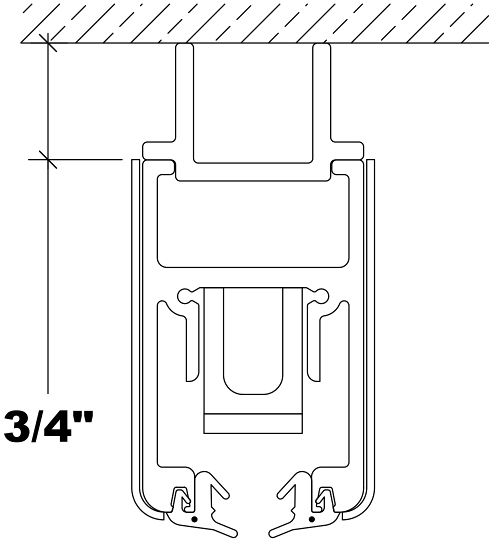
3/8" & 1/2" Glazing

5/8" & 3/4" Glazing

SR Top / Bottom ANCHOR

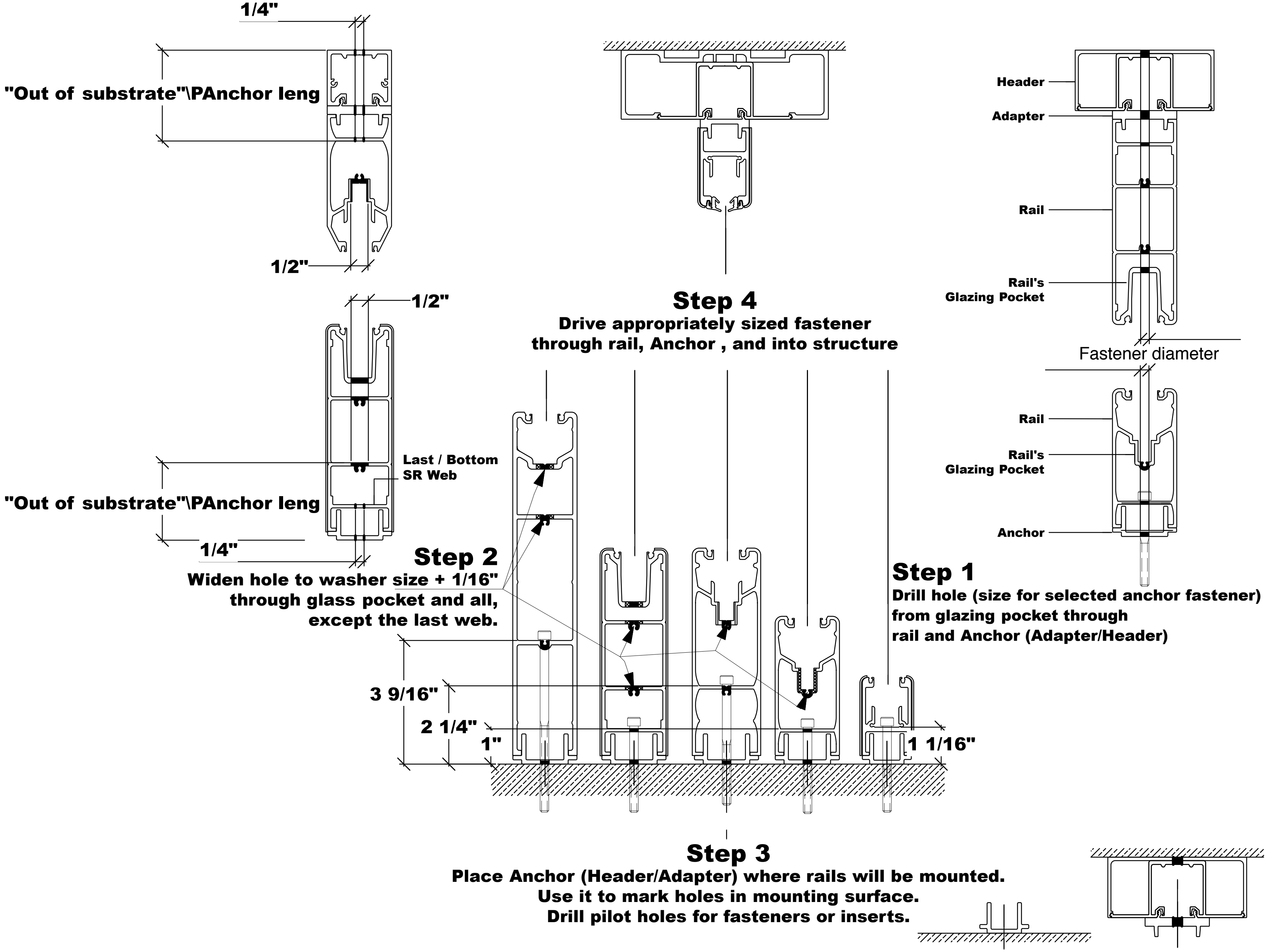
Use 1/4" (low) or 3/4" (tall) configuration in bottom application .
Typically used in 1/4" (low) configuration in top application
Low Profile SR shown. Same applies to all other CRL SR.





When used in this configuration engineer must verify that upward deflection of the header will not occur during any loading cases.

Sidelite Rails - Installation Instructions



Step 4

Drive appropriately sized fastener through rail, Anchor , and into structure

Step 2

Widen hole to washer size + 1/16" through glass pocket and all, except the last web.

Step 1

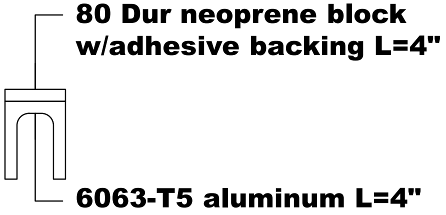
Drill hole (size for selected anchor fastener) from glazing pocket through rail and Anchor (Adapter/Header)

Step 3

Place Anchor (Header/Adapter) where rails will be mounted.
Use it to mark holes in mounting surface.
Drill pilot holes for fasteners or inserts.

SR Glazing Set Up

Setting Block

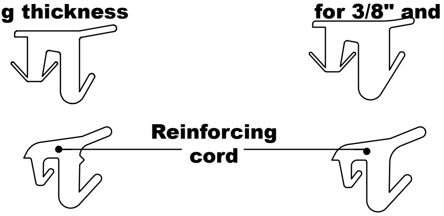


E.P.D.M. Glazing Vinyls

with 5:1 ratio silicone/water formulation coat

GG12_
Used in 4", 6", and 10" Square SRs
for 1/2" and 3/4" glazing thickness

GG12_
Used in 4", 6", and 10" Square SRs
for 3/8" and 5/8" glazing thickness



SV906
Used in 4", 6", and 10" Square SRs
for 1/2" and 3/4" glazing thickness

SV905
Used in 4", 6", and 10" Square SRs
for 3/8" and 5/8" glazing thickness

Glazing engagement

Shown applies to all SRs and configurations