FIBERGLASS BAFFLE WALL SYSTEMS

Chlorine Contact Basin at Keegan's Bayou WWTP, Houston, TX

Glass·Steel, Inc.
PO Box 7155
The Woodlands, TX 77387-7155
18468 FM 1314
Conroe, TX 77302
(281) 572-2211 office
(281) 572-2212 fax
www.GlassSteelinc.com

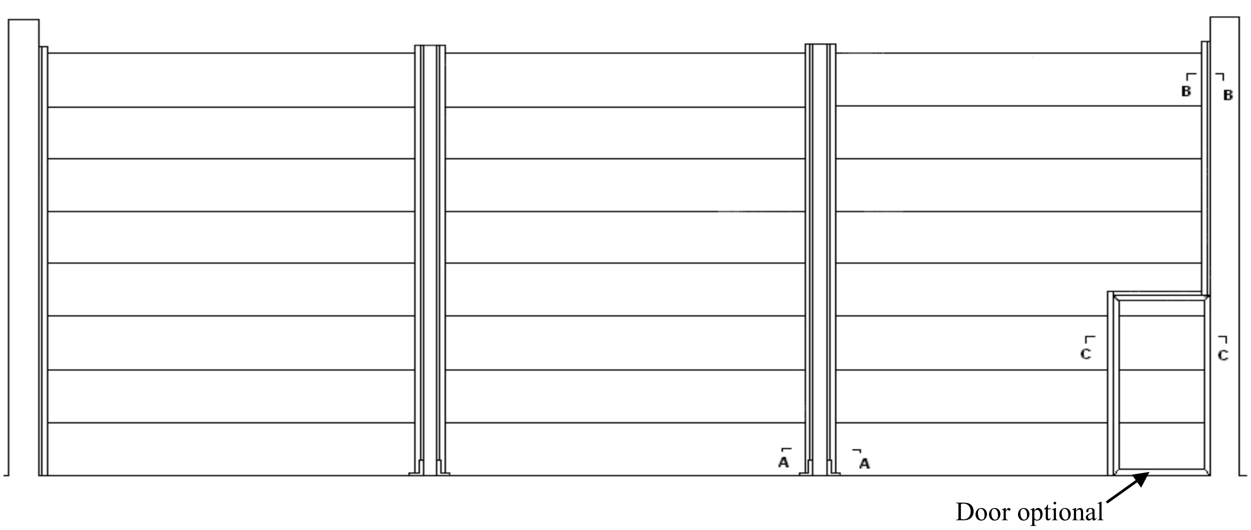
BAFFLE WALL SYSTEM

Glass-Steel, Inc. custom designs and fabricated baffle wall systems for use in clear-wells. Chlorine Contact Chambers, Flocculation Basins, Aeration Chambers, Mixer Basins, etc. Glass-Steel, Inc. baffle wall systems are all fiberglass systems utilizing NSF approved pultruded components. Fiberglass baffle walls are usually lower in cost than clearheart red-wood with stainless steel angle supports, poured in place concrete, aluminum, or stainless. Our fiberglass columns are less expensive than poured in place concrete, aluminum, or stain-less of comparable strength.

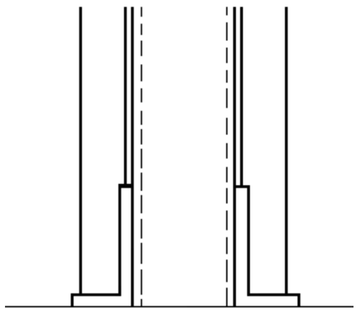
Fiberglass of course will not rot, rust, or corrode and is virtually maintenance free. Fi-berglass is lighter than most other materials and less costly to install. Our baffle wall system and components allow us to build framed door ways into the system for access to equipment when equipment needs to be maintained. Because all of our components are Strongwell's EX-TREN products we have a vast range of structural configurations we can use to accommodate special design considerations. Our support columns are generally a 6" x 9" x 5/16" tubular col-umn or a 6" x 18" x 5/16" tubular column, but we also can utilize I Beams 18" deep, 24" deep, or even our 36" double web column. Our base connection is generally a 7" x 3-1/2" x ¾" angle with a glass configuration and corner radius designed to maximize the effective strength of the component.

Glass-Steel, Inc. has installed numerous systems over the last several years and is constantly designing new components to improve the flexibility of the system and improve the cost effectiveness of the system. The following sketches give a few standard details currently being used but they in no way reflect our entire capability of options for these products.■

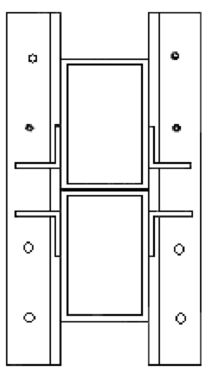
3.70 LBS/ LINEAR FT (12" BAFFLE PANEL)
6.52 LBS/LINEAR FT (24" BAFFLE PANEL)



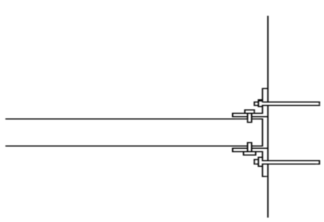
Typical Baffle Wall Elevation



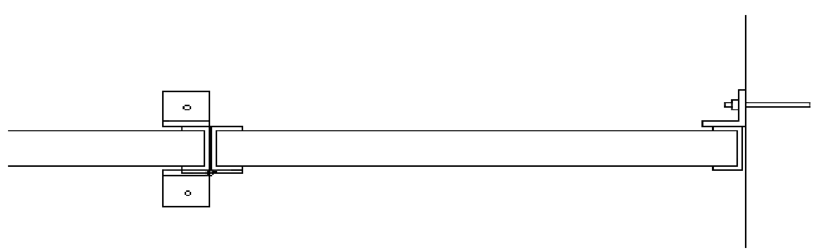
Column 6” x 18” x 5/16” rectangular tube
All guide angles 3” x 3” x 3/8”
Base Angles 7” x 3-1/2” x 3/4” x 2’0”
Door and Jamb Framing 3-1/2” x 2” x 1/4” CHAN
All anchors 1/2”ø
All bolts for guide to column connection 3/8”ø



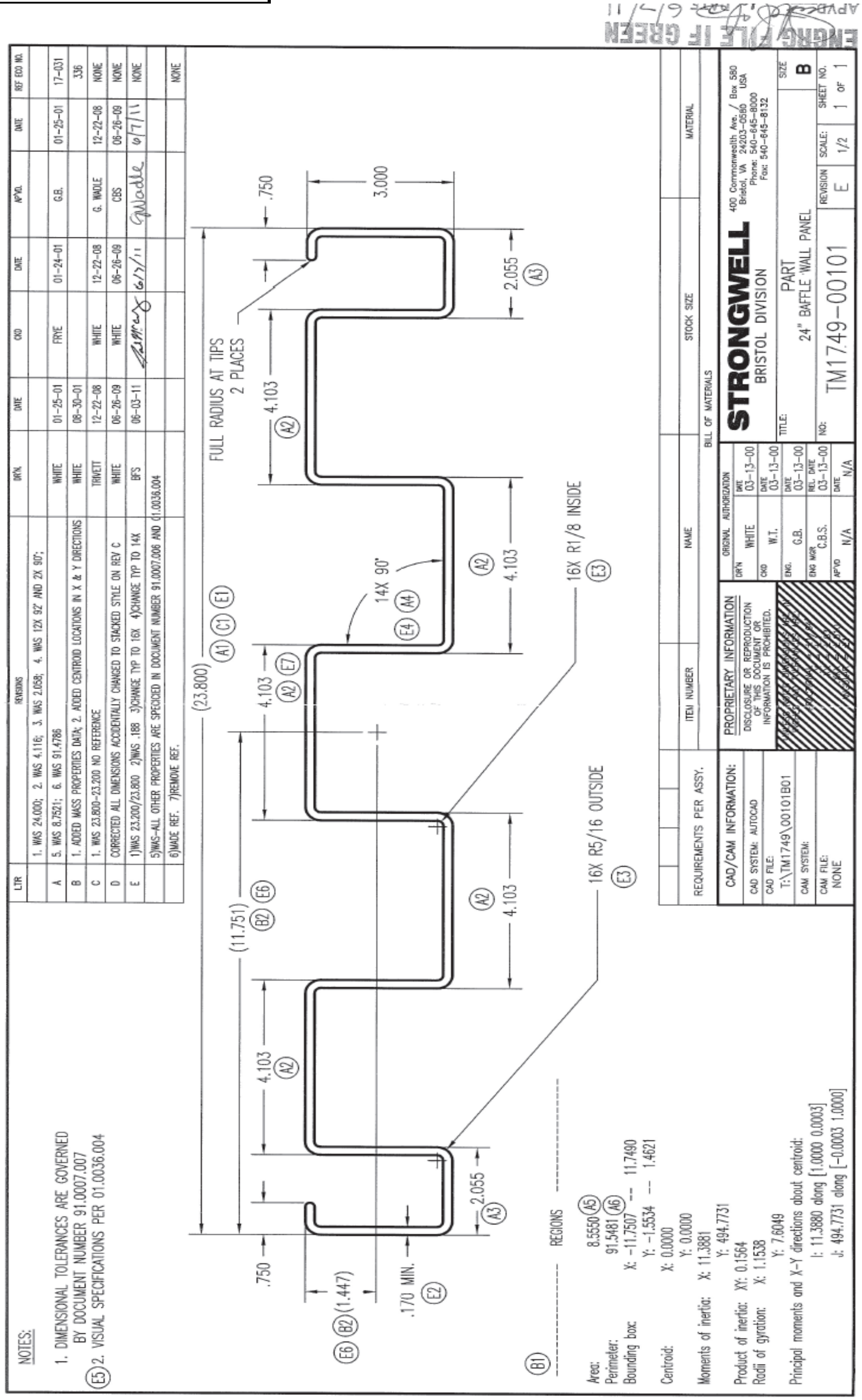
Section A-A
Column & base plate detail



Section B-B
End wall connection



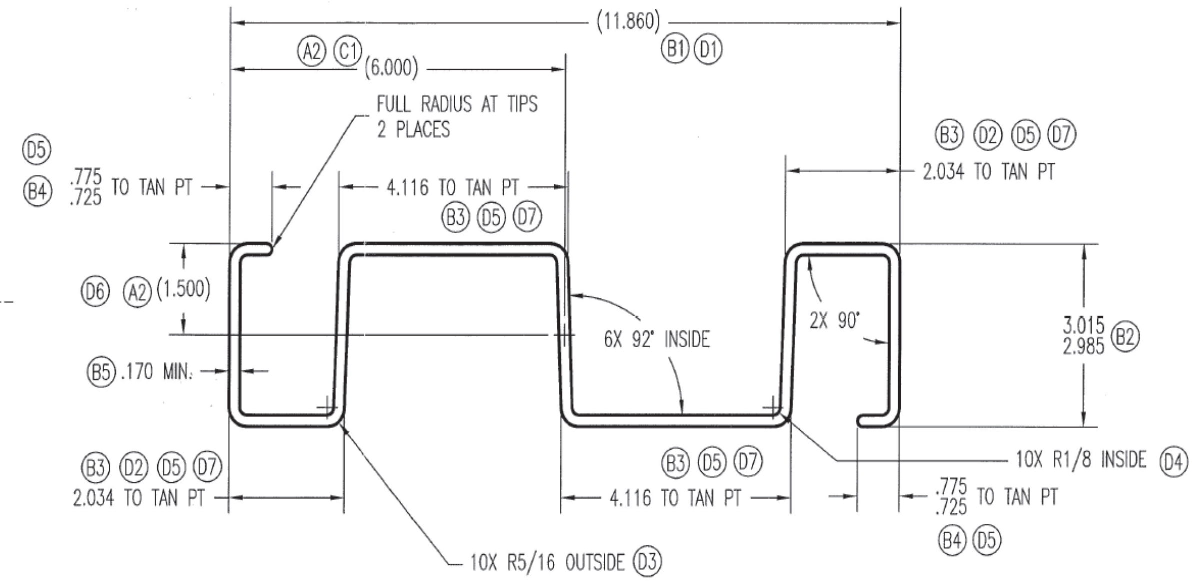
Section C-C
Section through door



NOTES:
1. DIMENSIONAL TOLERANCES ARE GOVERNED BY DOCUMENT NUMBER 91.0007.007
(E5) 2. VISUAL SPECIFICATIONS PER 01.0036.004
LTR | REVISIONS | DR'N. | DATE | CKD | DATE | AP'VD. | DATE | REF ECO NO.
1. WAS 24.000; 2. WAS 4.116; 3. WAS 2.058; 4. WAS 12X 92' AND 2X 90';
A | 5. WAS 8.7521; 6. WAS 91.4786 | WHITE | 01-25-01 | FRYE | 01-24-01 | G.B. | 01-25-01 | 17-031
B | 1. ADDED MASS PROPERTIES DATA; 2. ADDED CENTROID LOCATIONS IN X & Y DIRECTIONS | WHITE | 08-30-01 | 336
C | 1. WAS 23.800-23.200 NO REFERENCE | TRIVETT | 12-22-08 | WHITE | 12-22-08 | G. WADLE | 12-22-08 | NONE
D | CORRECTED ALL DIMENSIONS ACCIDENTALLY CHANGED TO STACKED STYLE ON REV C | WHITE | 06-26-09 | WHITE | 06-26-09 | CBS | 06-26-09 | NONE
E | 1)WAS 23.200/23.800 2)WAS .188 3)CHANGE TYP TO 16X 4)CHANGE TYP TO 14X | BFS | 06-03-11 | 6/7/11 | GWadle | 6/7/11 | NONE
5)WAS-ALL OTHER PROPERTIES ARE SPECICIED IN DOCUMENT NUMBER 91.0007.006 AND 01.0036.004
6)MADE REF. 7)REMOVE REF. | NONE
(23.800) (A1) (C1) (E1)
(11.751) (B2) (E6)
FULL RADIUS AT TIPS 2 PLACES
.750
4.103 (A2)
4.103 (A2) (E7)
(E6) (B2) (1.447)
.170 MIN. (E2)
14X 90° (E4) (A4)
3.000
2.055 (A3)
16X R5/16 OUTSIDE (E3)
16X R1/8 INSIDE (E3)
(B1)
REGIONS
Area: 8.5550 (A5)
Perimeter: 91.5481 (A6)
Bounding box: X: -11.7507 -- 11.7490
Y: -1.5534 -- 1.4621
Centroid: X: 0.0000
Y: 0.0000
Moments of inertia: X: 11.3881
Y: 494.7731
Product of inertia: XY: 0.1564
Radii of gyration: X: 1.1538
Y: 7.6049
Principal moments and X-Y directions about centroid:
I: 11.3880 along [1.0000 0.0003]
J: 494.7731 along [-0.0003 1.0000]
REQUIREMENTS PER ASSY.
ITEM NUMBER | NAME | STOCK SIZE | MATERIAL
BILL OF MATERIALS
CAD/CAM INFORMATION:
CAD SYSTEM: AUTOCAD
CAD FILE: T:\TM1749\00101B01
CAM SYSTEM:
CAM FILE: NONE
PROPRIETARY INFORMATION
DISCLOSURE OR REPRODUCTION OF THIS DOCUMENT OR INFORMATION IS PROHIBITED.
ORIGINAL AUTHORIZATION
DR'N WHITE DATE 03-13-00
CKD W.T. DATE 03-13-00
ENG. G.B. DATE 03-13-00
ENG MGR C.B.S. REL. DATE 03-13-00
AP'VD N/A DATE N/A
STRONGWELL
BRISTOL DIVISION
400 Commonwealth Ave. / Box 580
Bristol, VA 24203-0580 USA
Phone: 540-645-8000
Fax: 540-645-8132
TITLE: PART
24" BAFFLE WALL PANEL
SIZE B
NO: TM1749-00101
REVISION E
SCALE: 1/2
SHEET NO. 1 OF 1
ENGRG FILE IF GREEN
APVD 6/7/11

LTR	REVISIONS	DR'N.	DATE	CKD	DATE	AP'VD.	DATE	REF ECO NO.
A	1. ADDED MASS PRPERTIES DATA; 2. LOCATED CENTROID IN X & Y DIRECTIONS	WHITE	08-30-01	W.T.	08-30-01	G.B.	08-30-01	336
B	1. WAS 12.000; 2. WAS 3.000; 3. MADE REF.; 4. WAS .750; 5. WAS .188	WHITE	05-22-02	G.B.	05-22-02	CBS	05-22-02	814
C	1. MADE REFERENCE	WHITE	10-25-02	W.T.	10-25-02	CBS	10-25-02	NONE
D	1)WAS 11.595/11.790 2)WAS 2.058 3)WAS R5/16 OUTSIDE TYP.	BFS	06-03-11	[illegible]	6/7/11	Gwaddle	6/7/11	
	4)WAS R1/8 INSIDE TYP. 5)DIM TO TAN PT 6)MADE REF. 7)REMOVE REF.							
	8)WAS-ALL OTHER PROPERTIES ARE SPECICIED IN DOCUMENT NUMBER 91.0007.006 AND 01.0036.004							

NOTES:
1. DIMENSIONAL TOLERANCES ARE GOVERNED BY DOCUMENT NUMBER 91.0007.007
(D8) 2. VISUAL SPECIFICATIONS PER 01.0036.004



(A1) REGIONS

Area:	4.9699	
Perimeter:	52.2208	
Bounding box:	X: -6.0000 -- 6.0000	Y: -1.5000 -- 1.5000
Centroid:	X: 0.0000	Y: 0.0000
Moments of inertia:	X: 6.2217	Y: 83.8947
Product of inertia:	XY: -1.1040	
Radii of gyration:	X: 1.1189	Y: 4.1086

Principal moments and X-Y directions about centroid:
I: 6.2061 along [0.9999 -0.0142]
J: 83.9104 along [0.0142 0.9999]

REQUIREMENTS PER ASSY.	ITEM NUMBER	NAME	STOCK SIZE	MATERIAL

BILL OF MATERIALS

CAD/CAM INFORMATION:
CAD SYSTEM: AUTOCAD
CAD FILE: T:\TM1748\00101B01
CAM SYSTEM:
CAM FILE: NONE

PROPRIETARY INFORMATION
DISCLOSURE OR REPRODUCTION OF THIS DOCUMENT OR INFORMATION IS PROHIBITED.

UNLESS NOTED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE:
FRACTIONAL = ±1/64"
.X = ±.1
.XX = ±.03
.XXX = ±.010
ANGULAR = ±1°

ORIGINAL AUTHORIZATION		
DR'N	WHITE	DATE 03-13-00
CKD	WHITE	DATE 05-24-00
ENG.	G.B.	DATE 05-25-00
ENG MGR		REL. DATE
AP'VD		DATE

STRONGWELL
BRISTOL DIVISION
400 Commonwealth Ave. / Box 580
Bristol, VA 24203-0580 USA
Phone: 540-645-8000
Fax: 540-645-8132

TITLE: PART
12" BAFFLE WALL PANEL
SIZE: B
NO: TM1748-00101
REVISION: D
SCALE: 1/2
SHEET NO. 1 OF 1

ENGRG FILE IF GREEN
APVD [illegible] DATE 6/7/11

LAB TEST RESULTS

ASTM D695 Compression Test

CW	Ultimate Load	Ultimate Stress
Specimen-1	2,078	21,054
Specimen-2	2,133	22,198
Specimen-3	2,065	22,421
Specimen-4	2,031	21,957
Average	2,077	21,907
Std. Dev.	42	599
% Variance	2.04%	2.74%

ASTM D695 Compression Test

LW	Ultimate Load	Ultimate Stress	Modulus
Specimen-1	5,898	60,679	3.069181
Specimen-2	5,796	63,414	3.382721
Specimen-3	5,217	58,225	2.857323
Specimen-4	5,561	58,722	2.892075
Average	5,618	60,260	3.045325
Std. Dev.	302	2,264	0.231641
% Variance	5.38%	3.91%	7.59%

ASTM D2344 Short Beam Shear Test

CW	Ultimate Load	Ultimate Stress
Specimen-1	242	3,891
Specimen-2	183	2,942
Specimen-3	250	3,682
Specimen-4	254	3,774
Average	232	3,572
Std. Dev.	33	429
% Variance	14.30%	12.00%

ASTM D790 Flexural Test

CW	Ultimate Load	Ultimate Stress	Modulus
Specimen-1	106	26,765	1.542683
Specimen-2	109	26,924	1.551389
Specimen-3	105	25,936	1.539374
Specimen-4	109	27,191	1.633966
Average	108	26,704	1.566853
Std. Dev.	2	541	0.045028
% Variance	1.76%	2.03%	2.87%

ASTM D2344 Short Beam Shear Test

LW	Ultimate Load	Ultimate Stress
Specimen-1	292	4,695
Specimen-2	326	4,962
Specimen-3	325	4,880
Specimen-4	297	4,885
Average	310	4,856
Std. Dev.	18	113
% Variance	5.81%	2.34%

ASTM D790 Flexural Test

LW	Ultimate Load	Ultimate Stress	Modulus
Specimen-1	123	31,158	1.49941
Specimen-2	128	36,060	1.715262
Specimen-3	128	30,794	1.494734
Specimen-4	117	28,338	1.498601
Average	124	31,588	1.552002
Std. Dev.	5	3,234	0.106658
% Variance	4.22%	10.24%	7.01%

Glass %

Spec	Actual
50% min	50.00%

ASTM D750 Water Absorbtion

Spec	Actual
0.6 max. (Extren)	0.22%

ASTM D638 Tensil Test

LW	Ultimate Load	Ultimate Stress	Modulus
Specimen-1	3,634	39,934	2.734163
Specimen-2	3,850	40,704	2.674926
Specimen-3	4,370	47,707	3.089276
Specimen-4	3,995	41,485	2.589634
Average	3,962	42,306	2.767000
Std. Dev.	310	3,686	0.225367
% Variance	7.82%	8.67%	8.14%

24" BAFFLE CONCENTRATED LOAD TABLE

Result of actual test full section bending. Test done in Strongwell, Bristol, VA lab.

SPAN (ft.)	50 lbs.	100 lbs.	200 lbs.	300 lbs.	400 lbs.	500 lbs.	600 lbs.	Modulus (10^6 psi)
8	.034"	.087"	.134"	.202"	.269"	.337"	.404"	2.51
10	.058"	.113"	.231"	.346"	.462"	.577"	.693"	2.86
12	.095"	.190"	.380"	.571"	.761"	.951"	1.141"	3.00
14	.148"	.298"	.595"	.894"	1.192"	1.491"	1.789"	3.04
16	.217"	.433"	.867"	1.301"	1.734"	2.168"	2.602"	3.12
18	.308"	.617"	1.235"	1.852"	2.485"	3.088"	3.704"	3.12
20	.413"	.828"	1.651"	2.477"	3.303"	4.128"	4.954"	3.20

Notes:

1) Concentrated load is applied across the width of the panel
2) These typical deflections could vary by 15%
3) Testing based on a simple beam deflection of a 24 ft. long baffle

Deflection in inches based on the following differential head pressures.

Simple spans ends not fixed.

Head / Span	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"	Effective Modulus of Elasticity
8'	0.017	0.035	0.052	0.070	0.087	0.105	0.122	0.140	0.157	0.175	0.192	0.211	2.405×10^6
9'	0.026	0.052	0.078	0.105	0.131	0.157	0.183	0.209	0.235	0.262	0.288	0.314	2.577×10^6
10'	0.037	0.074	0.112	0.149	0.186	0.223	0.261	0.298	0.335	0.372	0.410	0.447	$2..749 \times 10^6$
11'	0.053	0.107	0.160	0.214	0.267	0.321	0.374	0.428	0.481	0.535	0.588	0.642	$2..812 \times 10^6$
12'	0.074	0.148	0.222	0.296	0.371	0.445	0.519	0.593	0.667	0.741	0.815	0.889	2.875×10^6
13'	0.101	0.203	0.304	0.406	0.507	0.609	0.710	0.811	0.913	1.014	1.116	1.217	2.893×10^6
14'	0.136	0.271	0.407	0.542	0.678	0.813	0.949	1.085	1.220	1.356	1.491	1.627	2.911×10^6
15'	0.176	0.353	0.529	0.706	0.882	1.059	1.235	1.411	1.588	1.764	1.941	2.117	2.947×10^6
16'	0.226	0.452	0.677	0.903	1.129	1.355	1.580	1.806	2.032	2.258	2.484	2.709	2.983×10^6
17'	0.288	0.576	0.863	1.151	1.439	1.727	2.014	2.302	2.590	2.878	3.165	3.453	2.983×10^6
18'	0.362	0.723	1.085	1.447	1.809	2.170	2.532	2.894	3.255	3.617	3.979	4.340	2.983×10^6
19'	0.443	0.886	1.329	1.772	2.214	2.657	3.100	3.543	3.986	4.429	4.872	5.315	3.022×10^6
20'	0.537	1.074	1.610	2.147	2.684	3.221	3.758	4.295	4.832	5.368	5.905	6.442	3.062×10^6

Deflection in inches based on the following wind pressures.

Simple spans ends not fixed.

Wind / Span	10psf	15psf	20psf	25psf	30psf	35psf	40psf	Effective Modulus of Elasticity
8'	0.067	0.101	0.135	0.168	0.202	0.235	0.269	2.405×10^6
9'	0.101	0.151	0.201	0.251	0.302	0.352	0.402	2.577×10^6
10'	0.144	0.216	0.288	0.359	0.431	0.503	0.575	$2..749 \times 10^6$
11'	0.206	0.309	0.411	0.514	0.617	0.720	0.823	$2..812 \times 10^6$
12'	0.285	0.428	0.570	0.713	0.855	0.998	1.140	2.875×10^6
13'	0.390	0.585	0.780	0.975	1.170	1.365	1.506	2.893×10^6
14'	0.521	0.782	1.043	1.304	1.564	1.825	2.086	2.911×10^6
15'	0.679	1.018	1.357	1.697	2.036	2.375	2.715	2.947×10^6
16'	0.868	1.303	1.737	2.171	2.605	3.040	3.474	2.983×10^6
17'	1.107	1.660	2.214	2.767	3.320	3.874	4.427	2.983×10^6
18'	1.391	2.087	2.782	3.478	4.173	4.869	5.564	2.983×10^6
19'	1.703	2.555	3.407	4.259	5.110	5.962	6.814	3.022×10^6
20'	2.065	3.097	4.130	5.162	6.194	7.227	8.259	3.062×10^6

Deflection in inches based on the following differential head pressures.

Simple spans ends fixed.

Head / Span	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"	Effective Modulus of Elasticity
8'	0.003	0.007	0.010	0.014	0.017	0.021	0.024	0.028	0.031	0.035	0.038	0.042	2.405×10^6
9'	0.005	0.010	0.016	0.021	0.026	0.031	0.037	0.042	0.047	0.052	0.058	0.063	2.577×10^6
10'	0.007	0.015	0.022	0.030	0.037	0.045	0.052	0.060	0.067	0.074	0.082	0.089	$2..749 \times 10^6$
11'	0.011	0.021	0.032	0.043	0.053	0.064	0.075	0.086	0.096	0.107	0.118	0.128	$2..812 \times 10^6$
12'	0.015	0.030	0.044	0.060	0.074	0.089	0.104	0.119	0.133	0.148	0.163	0.178	2.875×10^6
13'	0.020	0.041	0.061	0.081	0.101	0.122	0.142	0.162	0.183	0.203	0.223	0.243	2.893×10^6
14'	0.027	0.054	0.081	0.108	0.136	0.163	0.190	0.217	0.244	0.271	0.298	0.325	2.911×10^6
15'	0.035	0.071	0.106	0.141	0.176	0.212	0.247	0.282	0.318	0.353	0.388	0.423	2.947×10^6
16'	0.045	0.090	0.135	0.181	0.226	0.271	0.316	0.361	0.406	0.452	0.497	0.542	2.983×10^6
17'	0.058	0.115	0.173	0.230	0.288	0.345	0.403	0.460	0.518	0.576	0.633	0.691	2.983×10^6
18'	0.072	0.145	0.217	0.289	0.362	0.434	0.506	0.579	0.651	0.723	0.796	0.868	2.983×10^6
19'	0.089	0.177	0.266	0.354	0.443	0.531	0.620	0.709	0.797	0.886	0.976	1.063	3.022×10^6
20'	0.107	0.215	0.322	0.429	0.537	0.644	0.752	0.859	0.986	1.074	1.181	1.288	3.062×10^6

Deflection in inches based on the following wind pressures.

Simple spans ends fixed.

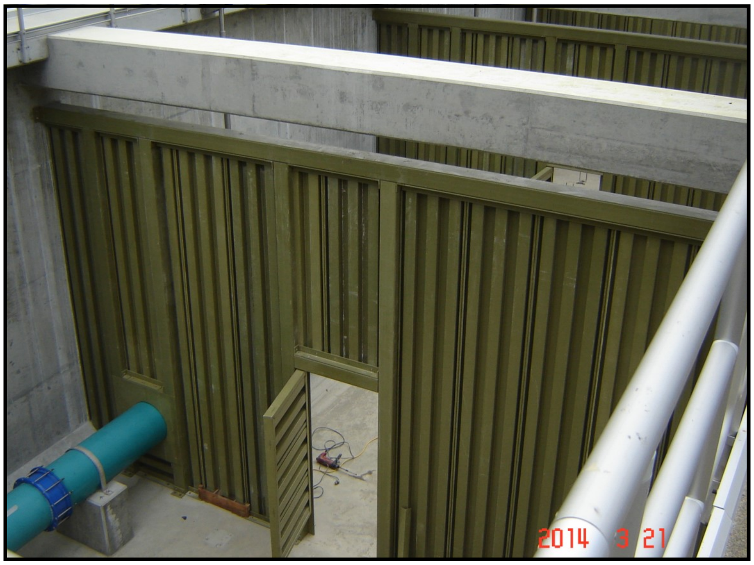
Wind / Span	10psf	15psf	20psf	25psf	30psf	35psf	40psf	Effective Modulus of Elasticity
8'	0.013	0.020	0.027	0.034	0.040	0.047	0.054	2.405×10^6
9'	0.020	0.030	0.040	0.050	0.060	0.070	0.080	2.577×10^6
10'	0.029	0.043	0.058	0.072	0.086	0.101	0.115	$2..749 \times 10^6$
11'	0.041	0.062	0.082	0.103	0.123	0.144	0.165	$2..812 \times 10^6$
12'	0.057	0.086	0.114	0.143	0.171	0.200	0.228	2.875×10^6
13'	0.078	0.117	0.156	0.195	0.234	0.273	0.301	2.893×10^6
14'	0.104	0.156	0.209	0.261	0.313	0.365	0.417	2.911×10^6
15'	0.136	0.204	0.271	0.339	0.407	0.475	0.543	2.947×10^6
16'	0.174	0.261	0.347	0.434	0.521	0.608	0.695	2.983×10^6
17'	0.221	0.332	0.443	0.553	0.664	0.775	0.885	2.983×10^6
18'	0.278	0.417	0.556	0.696	0.835	0.974	1.123	2.983×10^6
19'	0.341	0.511	0.681	0.852	1.022	1.192	1.363	3.022×10^6
20'	0.413	0.619	0.826	1.032	1.239	1.445	1.652	3.062×10^6

Fiberglass baffle walls in Clear Well at St. Cloud, FL

Access door in Baffle Wall showing hinge connection on opening side at St. Cloud, FL

Clearwell Baffle Wall and round concrete tank at St. Cloud, FL

Rear View of access door at St. Cloud, FL



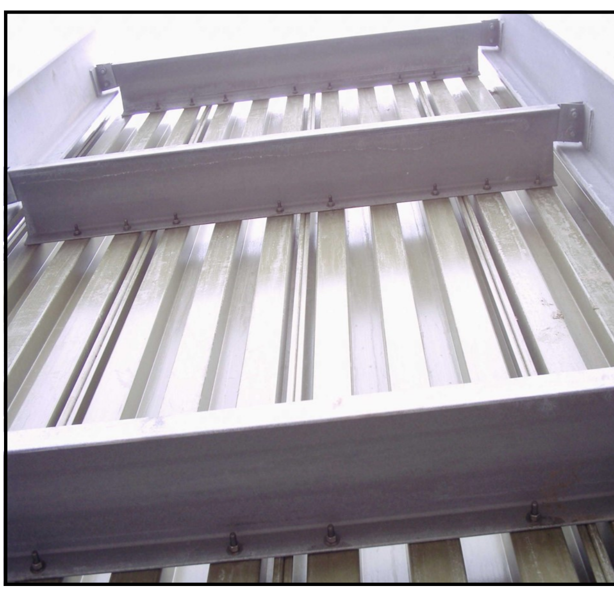
"Vertical" installation of Fiberglass baffle walls
Installed at Russian River, CA

"Vertical" installation of Fiberglass baffle walls
Installed at Russian River, CA

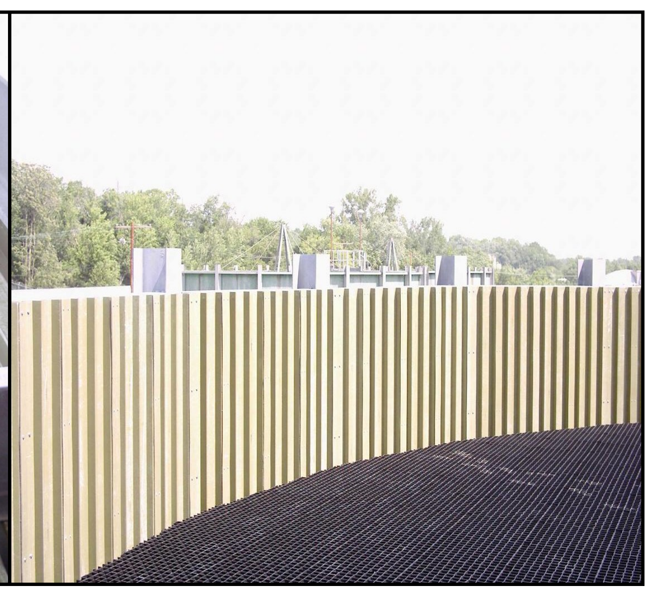
Basin Installation at
Russian River, CA

Typical Baffle Wall Installation
Keegan's Bayou
Houston, TX

Trickling Filter at Leavenworth. KS using baffle panel in vertical position with batten strips over seams.



Exterior close up showing attachment



Interior close-up showing batten strip over seams

COMMENTS

The baffle panel system is designed around Extren pultruded fiberglass products. The Extren product line has been around for over (40) years. Current composite designs have been fine tuned from this vast experience in laminate design. Fiberglass pultrusions are anisotropic in physical characteristics by nature of the process and by loading requirements. In normal structural applications we design the laminates to exhibit greater strength in the lengthwise direction than in the crosswise direction. In small compact parts such as round and square bar we use no transverse reinforcements. This allows our longitudinal values to soar to 6.0×10^6 Modulus of Elasticity and 100,000 psi tensile strength. Our glass content on these parts is 70%. When parts become wider and thicker we drop our glass content to 50% to allow for fiberglass reinforcements to be placed in the transverse direction also. When fiberglass must overlap fiberglass in the longitudinal direction it takes up more space and reduces the amount of fiberglass reinforcement that can be placed into the part. Providing little, or no, transverse reinforcements in a wide section part can cause the laminate to crack during rough handling or when stresses are unexpectedly placed on the laminate in the transverse direction.

We are capable of altering our standard panel laminate design to a higher glass content and therefore attaining higher longitudinal properties. However the buyer should be aware of the potential consequences of neglecting transverse properties.

The load tables in this brochure indicate the deflection values of our standard laminate which is a 50% glass content part as indicated in the lab test also included. Higher glass content parts would result in lower deflection values.

The two chart sets displayed are for non fixed ends and fixed ends. On non fixed ends the panels are set between the guide angles loose for ease of potential removal or adjustment. The deflection charts for fixed ends are based on the guide angles being fixed to the wall or column in a continuous manner. Then the panels are stacked and bolted or screwed to the guide angles to attain fixity of the ends against little or no rotation of the members relative to each other. The angle between intersecting members is virtually unchanged under the design load because the deflections are so low ($L/D < 360$) under most loads.

Most design loads are for when the structure is empty of water (when wind loads are used) or when the structure is being loaded or unloaded with water (when differential head is used) otherwise during operation loads are approximately equal.■

Glass·Steel, Inc.
PO Box 7155
The Woodlands, TX 77387-7155
18468 FM 1314
Conroe, TX 77302
(281) 572-2211 office
(281) 572-2212 fax
www.GlassSteelinc.com