MIAMI-DADE

BUILDING CODE COMPLIANCE OFFICE (BCCO)
PRODUCT CONTROL DIVISION

MIAMI-DADE COUNTY, FLORIDA
METRO-DADE FLAGLER BUILDING
140 WEST FLAGLER STREET, SUITE 1603
MIAMI, FLORIDA 33130-1563
(305) 375-2901 FAX (305) 375-2908

NOTICE OF ACCEPTANCE (NOA)

Folding Shutter Corporation.
7089 Hemstreet Place
West Palm Beach, FL 33413

SCOPE:
This NOA is being issued under the applicable rules and regulations governing the use of construction materials. The documentation submitted has been reviewed by Miami-Dade County Product Control Division and accepted by the Board of Rules and Appeals (BORA) to be used in Miami Dade County and other areas where allowed by the Authority Having Jurisdiction (AHJ).

This NOA shall not be valid after the expiration date stated below. The Miami-Dade County Product Control Division (In Miami Dade County) and/or the AHJ (in areas other than Miami Dade County) reserve the right to have this product or material tested for quality assurance purposes. If this product or material fails to perform in the accepted manner, the manufacturer will incur the expense of such testing and the AHJ may immediately revoke, modify, or suspend the use of such product or material within their jurisdiction. BORA reserves the right to revoke this acceptance, if it is determined by Miami-Dade County Product Control Division that this product or material fails to meet the requirements of the applicable building code.

This product is approved as described herein, and has been designed to comply with the High Velocity Hurricane Zone of the Florida Building Code.

DESCRIPTION: Extruded Aluminum Roll Up Shutter

APPROVAL DOCUMENT: Drawing No. 99-10, titled "Roll-Up Shutter Details", sheets 1 through 17 of 17, prepared by Al-Farooq Corporation, dated 03/15/99 with last revision on 06/26/02, signed and sealed by H. Farooq, P.E., bearing the Miami-Dade County Product Control Revision stamp with the Notice of Acceptance number and expiration date by the Miami-Dade County Product Control Division.

MISSILE IMPACT RATING: Large and Small Missile Impact

LABELING: Each unit shall bear a permanent label with the manufacturer's name or logo, city, state and following statement: "Miami-Dade County Product Control Approved", unless otherwise noted herein.

RENEWAL of this NOA shall be considered after a renewal application has been filed and there has been no change in the applicable building code negatively affecting the performance of this product.

TERMINATION of this NOA will occur after the expiration date or if there has been a revision or change in the materials, use, and/or manufacture of the product or process. Misuse of this NOA as an endorsement of any product, for sales, advertising or any other purposes shall automatically terminate this NOA. Failure to comply with any section of this NOA shall be cause for termination and removal of NOA.

ADVERTISEMENT: The NOA number preceded by the words Miami-Dade County, Florida, and followed by the expiration date may be displayed in advertising literature. If any portion of the NOA is displayed, then it shall be done in its entirety.

INSPECTION: A copy of this entire NOA shall be provided to the user by the manufacturer or its distributors and shall be available for inspection at the job site at the request of the Building Official.
This NOA **revises NOA # 02-0226.06** and, consists of this page 1 as well as approval document mentioned above.
The submitted documentation was reviewed by **Candido F. Font, P.E.**

Folding Shutter Corporation.

NOTICE OF ACCEPTANCE: EVIDENCE SUBMITTED
(For File ONLY. Not part of NOA)

A. DRAWINGS

1. Drawing No. 99-10, prepared by Al Farooq Corporation titled "Roll-Up Shutter Details", dated 03/15/99 with last revision on 06/26/02, sheets 1 through 17 of 17, signed and sealed by H. Farooq, PE.
2. Die drawing No. A117, 119, 601, 638, 1139, 11411202, 1227 & FLD 4137 to 4141, prepared by The William L. Bonnell Company Inc.

B. TESTS

1. Test report on:
   a. Large Missile Impact Test per PA 201-94
   b. Cyclic Wind Pressure Test per PA 203-94
   c. Uniform Static Air Pressure Test per PA 202-94

   Of Aluminum Roll-Up Shutter prepared by Hurricane Test Laboratory Inc, report No. 0143-0105-99, dated 02/01/99, signed and sealed by T. S. Marshall, PE.

C. CALCULATIONS

1. Calculations for Aluminum Roll Shutter prepared by Al-Farooq Corporation, sheets D1 to D5, S1 to S9, T1 to T25, SB1 to SB 75, H1 to H41, M1 to M19 & AP1 to AP12 signed and sealed H. Farooq.
2. Calculations for extrusion of 2" x 6" tube, prepared by Al-Farooq Corporation , dated 09/30/02 and signed by H. Farooq.

D. MATERIAL CERTIFICATIONS

1. Tensile Test of Metallic Materials, Job No. 9HM-1752 prepared by Q.C. Metallurgical Inc. dated 08/06/96 tested as per ASTM E8-93 signed and sealed by F. Grate PE.

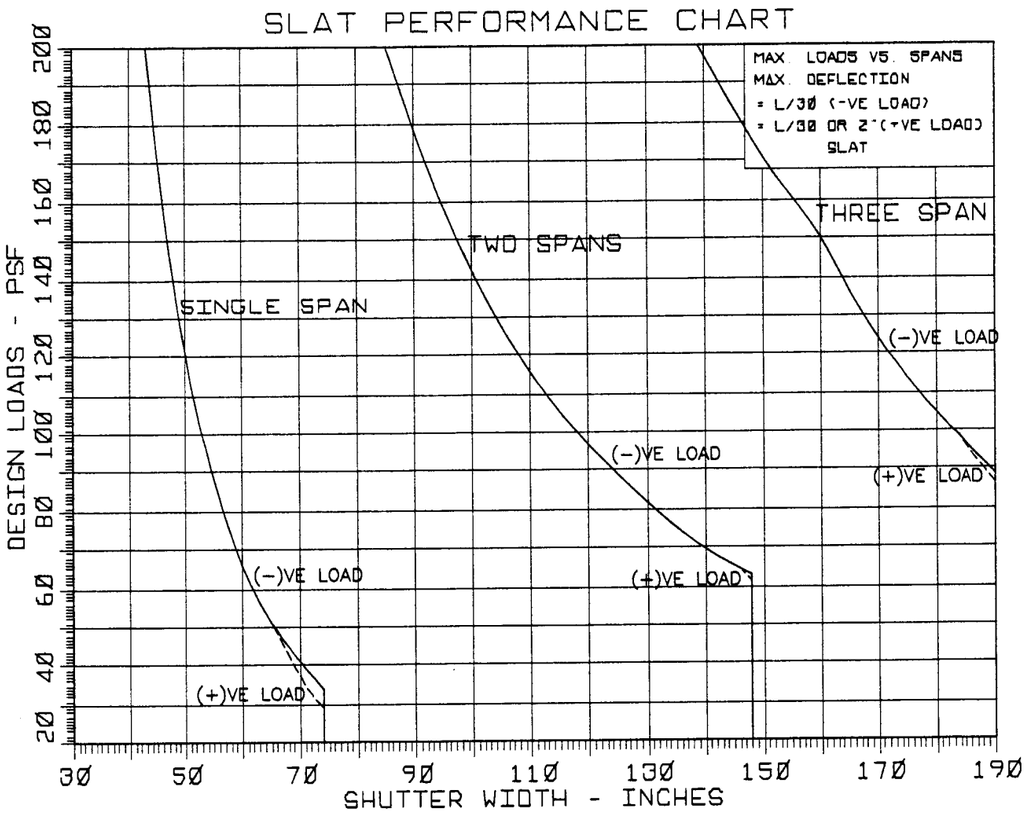
E. STATEMENTS

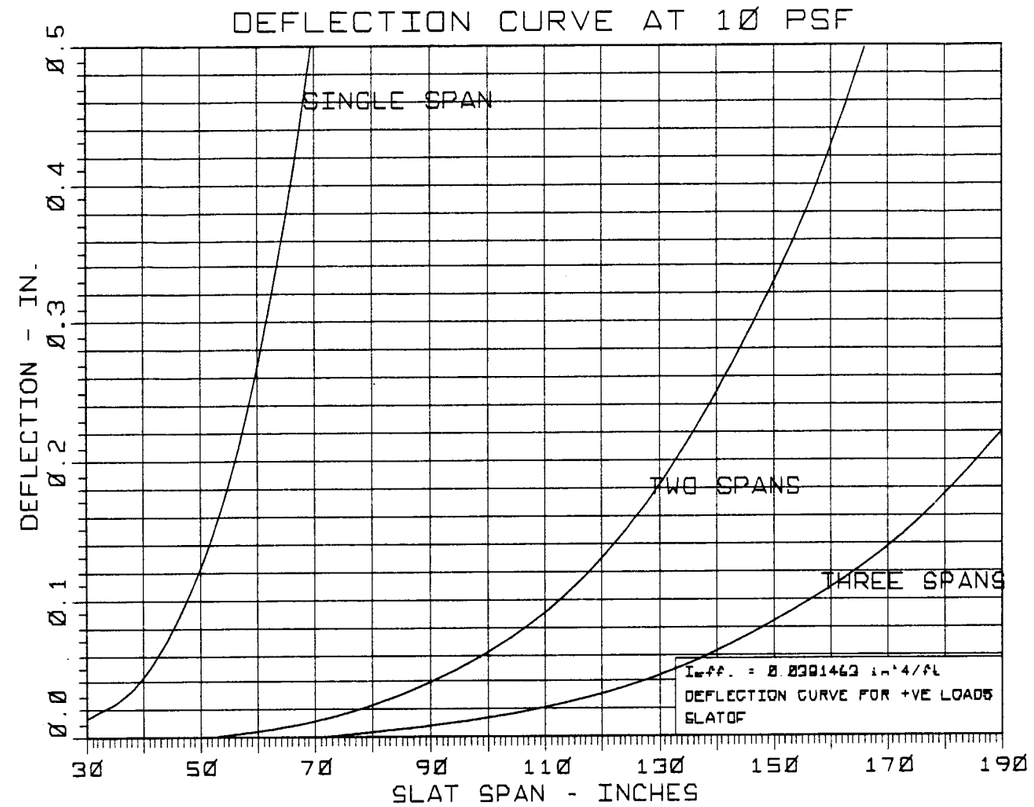
1. Letter of Compliance of the extruded slat with aluminum alloy 6063-T6 issued by William L. Bonnell Co. Inc. dated 07/06/99, signed by Charles Comto.
2. Leer of Test Compliance, issued by Hurricane Test Laboratory, Inc. dated 09/03/99 signed and sealed by T. S. Marshall, PE.

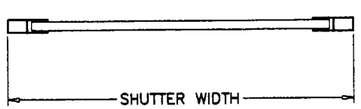
F. OTHER

NOA 02-0226.06

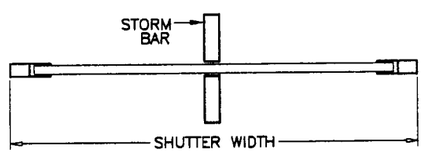
Candido F. Font, P.E.
Senior Product Control Examiner
NOA No 02-0828.02
Expiration Date: January 14, 2008
Approval Date: November 28, 2002



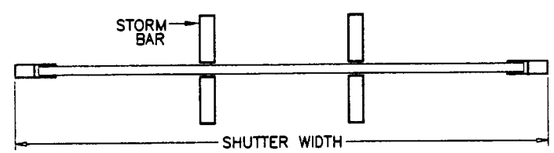




SINGLE SPANS



TWO SPANS



THREE SPANS

THIS PRODUCT HAS BEEN TESTED TO MEET DADE COUNTY PROTOCOLS PA202-94, PA201-94 AND PA203-94.

DESIGN LOADS SHALL BE CALCULATED AS PER REQUIREMENTS OF ASCE 7-88 OR ASCE 7-98 AS REQUIRED BY BUILDING CODE.

PRODUCT MARKING

A LABEL SHALL BE AFFIXED ON UNIT AT RIGHT BOTTOM OF BOX WITH THE FOLLOWING STATEMENT:

FOLDING SHUTTER CORPORATION, WEST PALM BEACH, FL.
"DADE COUNTY PRODUCT CONTROL APPROVED"

GENERAL NOTES

1. THIS PRODUCT IS DESIGNED TO COMPLY WITH THE HIGH VELOCITY HURRICANE ZONE OF THE 2001 FLORIDA BUILDING CODE.
   ALSO FOR WIND LOADS AS PER ASCE 7 USING CORRESPONDING LOADS.
2. DESIGN CRITERIA FOR ALUMINUM, MINIMUM MECHANICAL PROPERTIES, AND SAFETY FACTORS ARE IN ACCORDANCE WITH THE "ALUMINUM CONSTRUCTION MANUAL" LATEST EDITION.
3. ALUMINUM ALLOYS: ALL EXTRUSIONS SHALL BE ALLOY AS NOTED.
4. STEEL SURFACES TO BE PLACED IN CONTACT WITH ALUMINUM SHALL BE GIVEN ONE COAT OF ZINC CHROMATE PRIMER IN ACCORDANCE WITH FEDERAL SPEC. NO. TTP-645, OR BE GALVANIZED.
5. ANCHORS SHALL BE AS LISTED, SPACED AS SHOWN ON DETAILS. ANCHOR EMBEDMENT TO BASE MATERIAL SHALL BE BEYOND WALL DRESSING OR STUCCO.
6. ALL BOLTS, NUTS AND WASHERS SHALL BE STAINLESS STEEL OR ALUMINUM ALLOY 2024-T4 OR 7075-T6, OR PLATED STEEL.
7. SHUTTERS MAY BE MOTOR, TAPE PULLEY, OR GEAR DRIVEN.
8. DESIGN CRITERIA: FOR MULTIPLE SPANS THE COMBINED MAX DEFLECTION OF HEADER, STORM BARS AND SLATS $\leq$ L/30 OR 2". FOR MULLIONS MAX DEFLECTION $\leq$ L/180.
9. ANCHORING OR LOADING CONDITIONS OTHER THAN THOSE SHOWN IN THESE DETAILS ARE NOT PART OF THIS APPROVAL.

INDEX OF DRAWING

SHEET NO.	DESCRIPTION
1	NOTES, SLAT GRAPHS
2	EXTRUSION DETAILS, INSTRUCTIONS FOR USING GRAPHS
3	SINGLE SPAN DETAILS
4	MULTIPLE SPAN DETAILS
5	TRACK INSTALLATIONS AND BOX DETAIL
6	MULLION INSTALLATION DETAILS
7	HEADER/TOP SUPPORT INSTALLATION DETAILS
8	STORM BAR INSTALLATION DETAILS
9	ANCHOR GRAPHS
10	MULLION (POST) LOADING GRAPHS
11 THRU 13	HEADER (TOP SUPPORT) LOADING GRAPHS
14 THRU 16	STORM BAR LOADING GRAPHS
17	CALCULATION SHEET FOR OVERALL DEFLECTION

PRODUCT REVISED
as complying with the Florida Building Code
Accepted for: 02-0828.02
Expiration Date: 01/14/08
By:
Miami Dade Product Control Division

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

AL-FAROOQ CORPORATION
ENGINEERS, PLANNERS & PRODUCT DESIGN
1235 SW 87 AVE
MIAMI, FLORIDA 33174
TEL. (305) 264-8100 FAX. (305) 262-6978

ROLLUP\99-10FSC

ROLL UP SHUTTER DETAILS

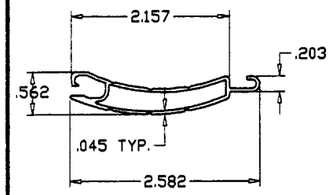
FOLDING SHUTTER CORP.
7089 HEMSTREET PLACE
WEST PALM BEACH, FL 33413
TEL.(561) 683-4811 FAX.(561) 640-8204

revisions:

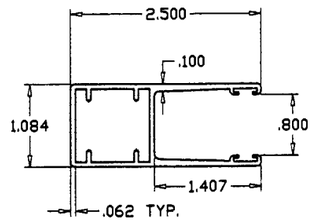
no	date	by	description
A	10.04.99		GRAPHS LIMITS REV.
B	11.17.99		GRAPH LIMITS REDUCED TO 200
C	06.26.02		GENERAL REVISION

date: 03-15-99
scale: 1/2" = 1"
dr. by: HAMID
chk. by:

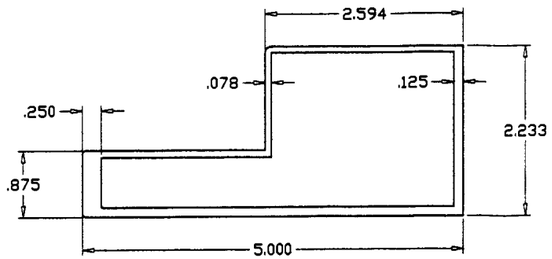
drawing no.
99-10



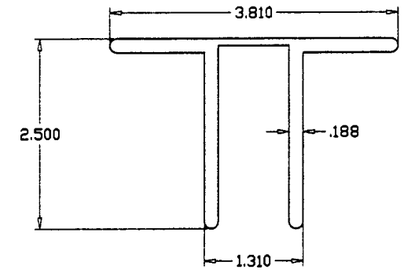
EXTRUDED ALUMINUM SLAT
6063-T6



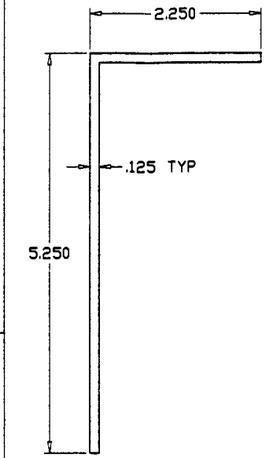
TRACK
6063-T6



CUSTOM HEADER
6061-T6 OR 6005-T5

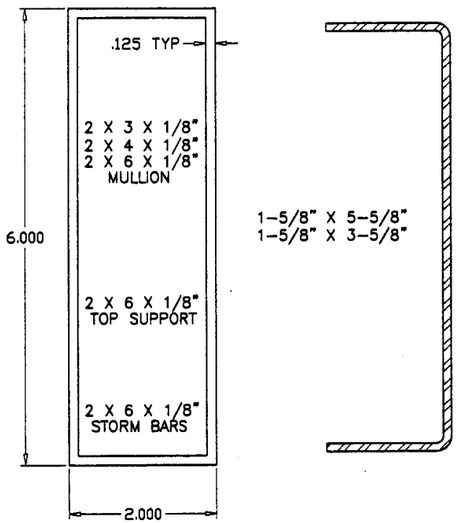


'T' CLIP
6005-T5 OR 6061-T6



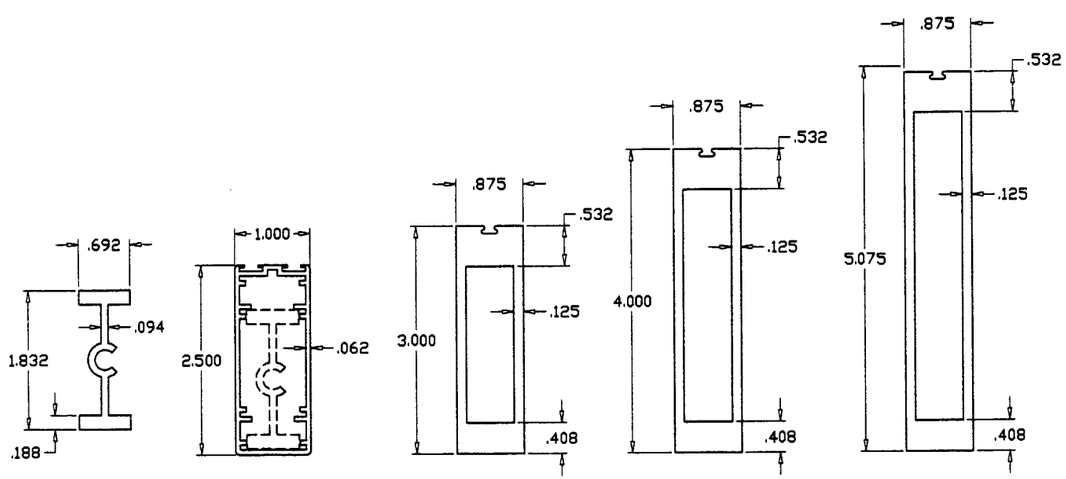
1 X 2 X 1/8"
1-1/2 X 2 X 1/8"
2 X 2 X 1/8"
2 X 3 X 1/8"
2 X 4 X 1/8"
2 X 5 X 1/8"
2-1/4 X 5-1/4 X 1/8"

ALUMINUM ANGLES
6063-T6



ALUM TUBES
6063-T6

STIFFENER FOR
STORM BAR/TOP SUPPORT/MULLION
12 GA. GALV. STEEL CHANNEL



INSERT | 2-1/2" X 1" | 3" X .875" | 4" X .875" | 5" X .875"

STORM BARS
6063-T6

Guide to use charts and graphs

1. Calculate Design Wind Load requirements using ASCE 7 based on building height, exposure category, roof slope and tributary area.
2. From slat performance chart, select span condition as 1, 2 or 3 to determine the number of storm bars required to meet the design loads calculated above.
3. Based on slat, span and number of storm bars determine the deflection of the slat for 10 psf and determine the actual deflection for the Design Loads by proportion. Enter this deflection in step 2 of sheet 17.
4. From the shutter height and width dimensions determine the storm bar spacing and height.
5. Determine the deflection of the storm bar at 10 psf from the deflection chart and obtain storm bar deflection by proportion to the design loads. Enter this deflection in step 4 of sheet 17.
6. Determine the deflection of the header at 10 psf from the deflection chart and obtain header deflection by proportion to the design loads. Enter this deflection in step 6 of sheet 17.
7. Complete form on sheet 17 and check the deflection requirements. If deflection exceeds the allowable deflection increase the size of storm bar and/or header to bring the overall deflection under the allowable limits.
8. Repeat the procedure items 2 to 7 for both positive and negative loads for any given shutters.

PRODUCT REVISED
as complying with the Florida Building Code
Application No. 02-0828.02
Expiration Date 01/14/08
By
Miami Dade Product Control Division

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

AL-FAROOQ CORPORATION
ENGINEERS, PLANNERS & PRODUCT DESIGN
1235 SW 87 AVE
MIAMI, FLORIDA 33174
TEL. (305) 264-8100 FAX. (305) 262-6978

ROLLUP\99-10FSC

ROLL UP SHUTTER DETAILS

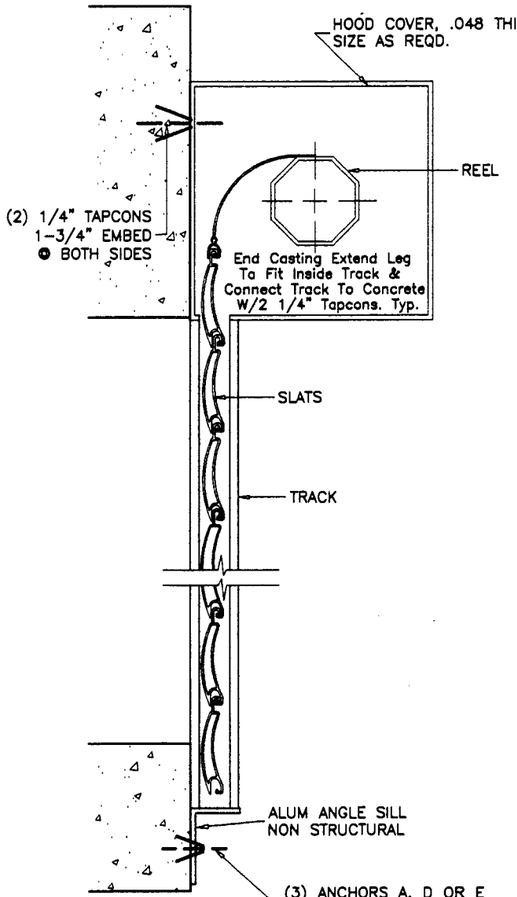
FOLDING SHUTTER CORP.
7089 HEMSTREET PLACE
WEST PALM BEACH, FL 33413
TEL(561) 683-4811 FAX.(561) 640-8204

revisions:			
no	date	by	description

date: 03-15-99
scale: 1/2" = 1"
dr. by: HAMID
chk. by:

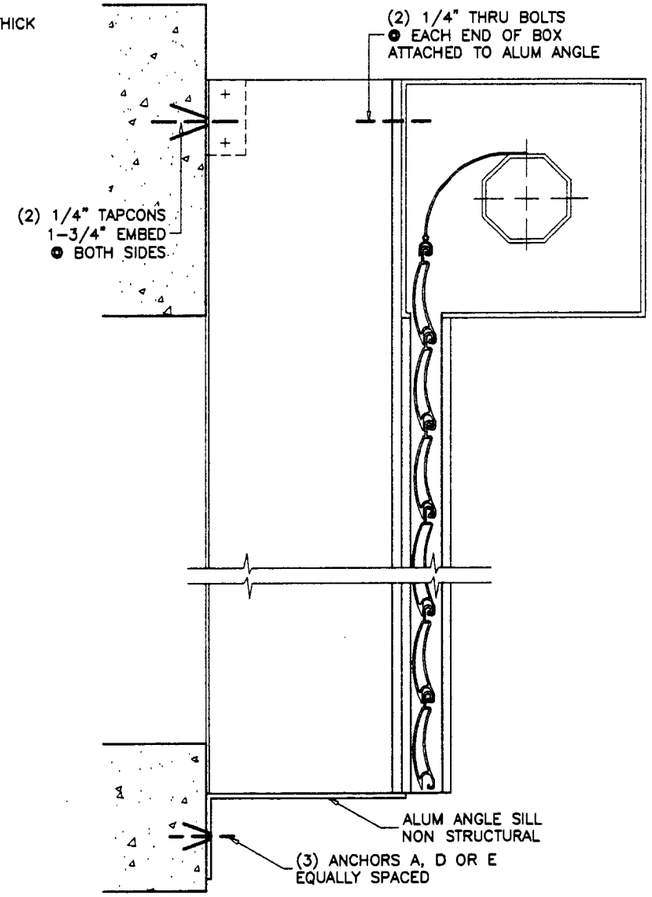
drawing no.
99-10

WALL MOUNTS



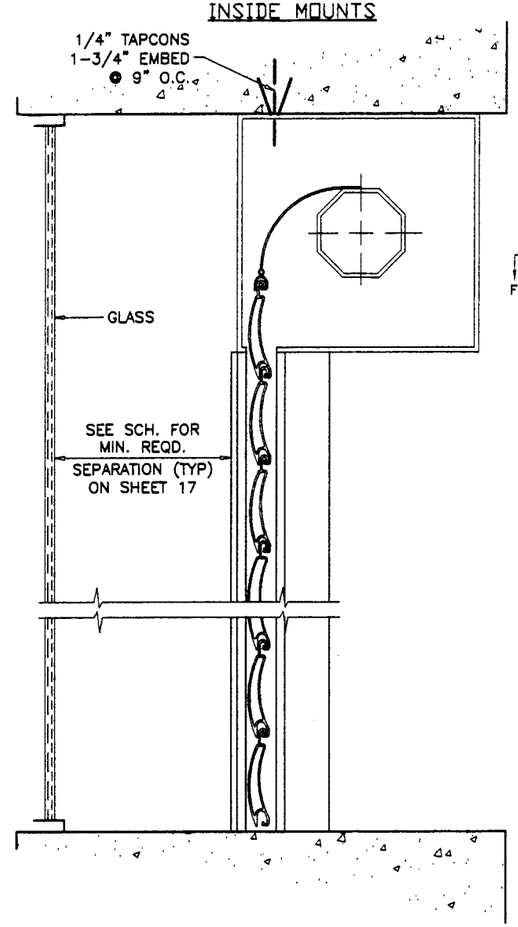
SECTION A-A

BUILT-OUT CONDITION

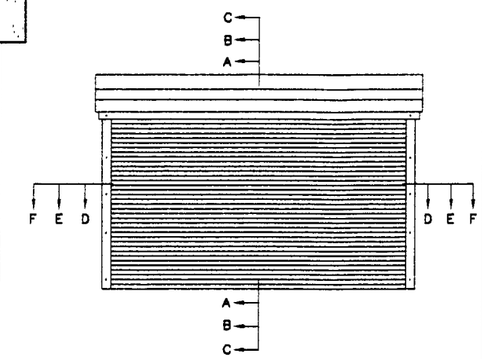


SECTION B-B

INSIDE MOUNTS



SECTION C-C



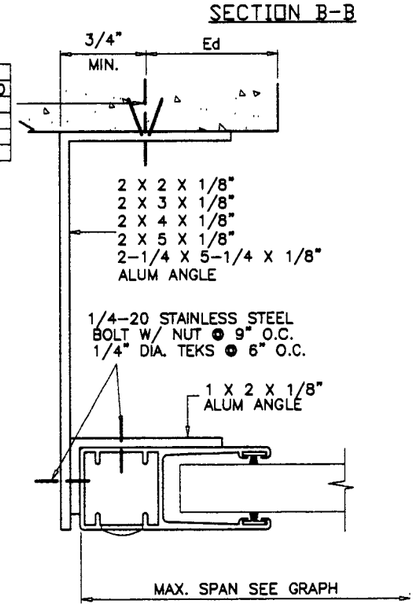
TYPICAL ELEVATION
SINGLE SPAN

ANCHORS: EMBEDMENT & EDGE DISTANCES SHOWN ARE BEYOND THE WALL & FLOOR COVERING (STUCCO, TILES, ETC.)

TYPICAL SLAT ENGAGEMENT INSIDE TRACK = 1-1/4" MIN.

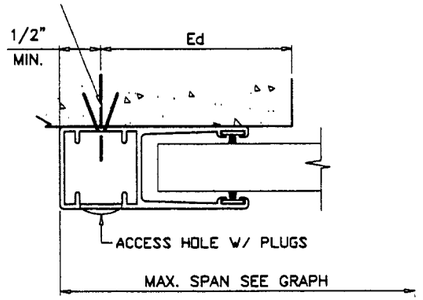
Ed = TYPICAL EDGE DISTANCE
CONC. & BLOCK = 12d (12 ANCHOR DIAMETERS)
WOOD = 5d
FOR LESSER EDGE DISTANCES SEE SHEET 9 OF 17.

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	4	2	–
D	4	2	–
E1	–	–	3
E2	–	–	3



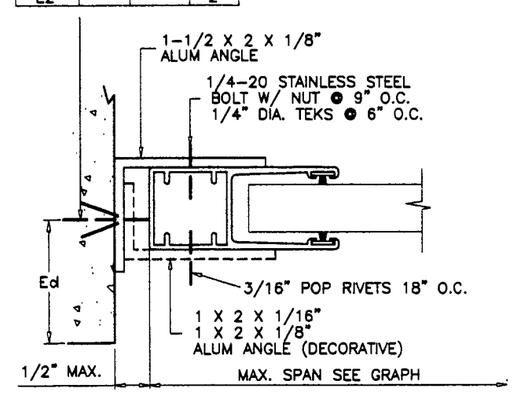
SECTION E-E

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	3	1	–
D	3	2	–
E1	–	–	2
E2	–	–	3



SECTION D-D

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	2	1	–
D	2	1	–
E1	–	–	2
E2	–	–	2



SECTION F-F

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

PRODUCT REVISED
as complying with the Florida Building Code
Application No. 02-0826.02
Expiration Date 01/14/08
By
Miami Dade Product Control Division

AL-FAROOQ CORPORATION
ENGINEERS, PLANNERS & PRODUCT DESIGN
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ROLLUP\99-10FSC

ROLL UP SHUTTER DETAILS

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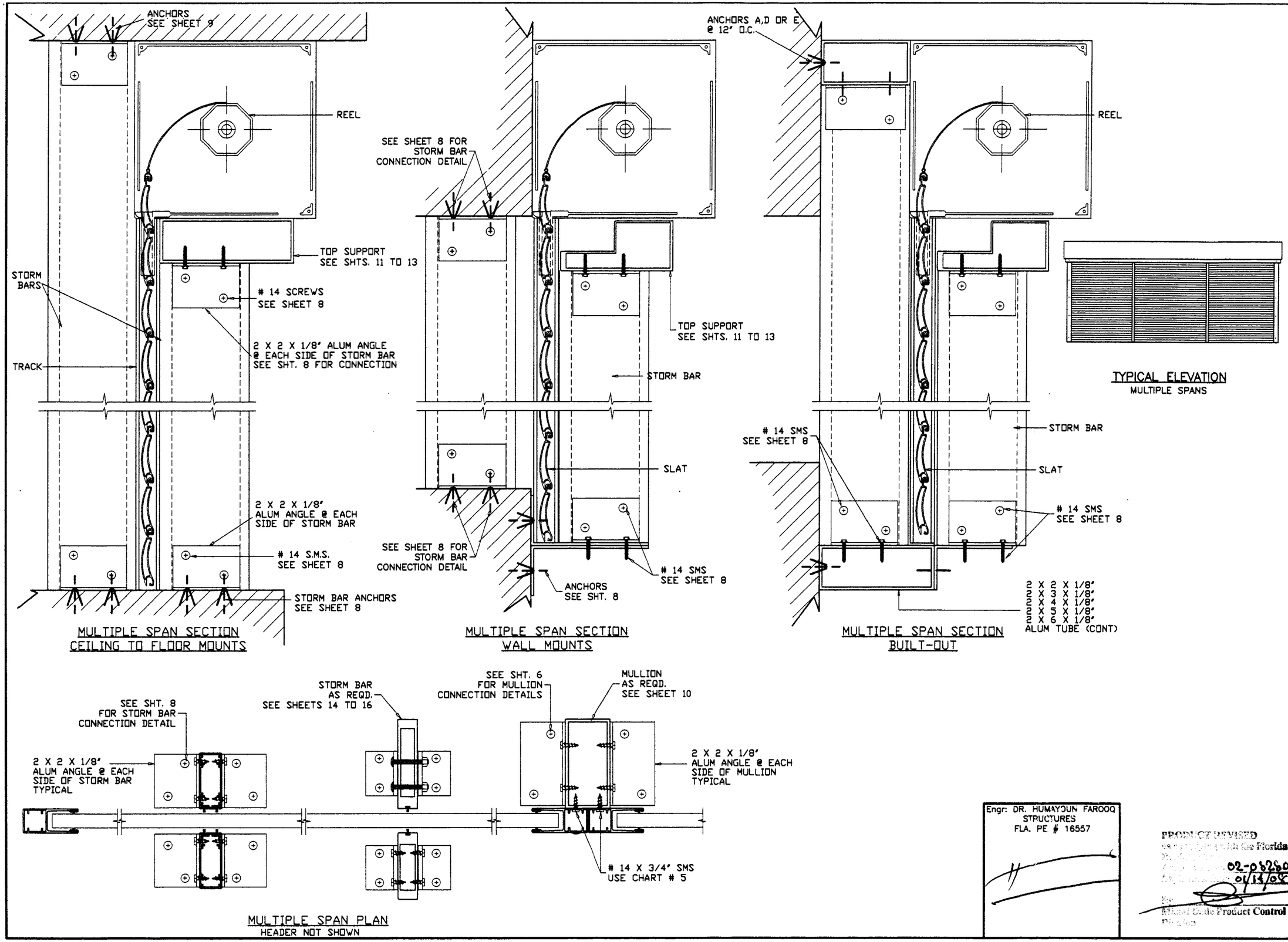
revisions:			
no	date	by	description

date: 03-15-99
scale: 1/2" = 1"
dr. by: HAMID
chk. by:

drawing no.
99-10



Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

PRODUCT REVISED
as [illegible] with the Florida
02-082802
01/14/08
By
Miami Dade Product Control
Division

AL-FAROOQ CORPORATION
ENGINEERS, PLANNERS & PRODUCT DESIGN
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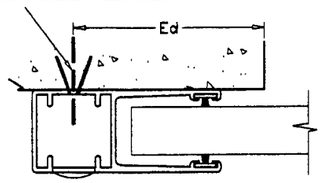
revisions:

no	date	by	description

date: 03-15-99
scale: 1/4" = 1"
dr. by: HAMID
chk. by:

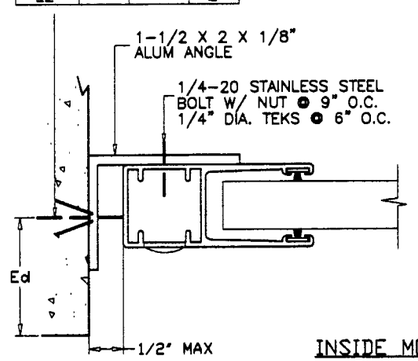
drawing no.
99-10

ANCHOR TYPE	CHART TO USE CONC.	BLOCK	WOOD
A	3	1	–
D	3	2	–
E1	–	–	2
E2	–	–	3

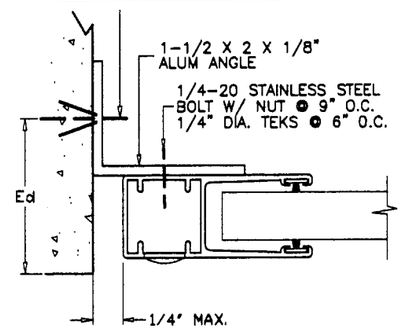


WALL MOUNTS

ANCHOR TYPE	CHART TO USE CONC.	BLOCK	WOOD
A	2	1	–
D	2	1	–
E1	–	–	2
E2	–	–	2

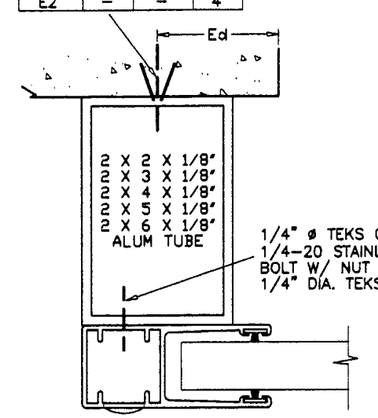


ANCHOR TYPE	CHART TO USE CONC.	BLOCK	WOOD
A	2	1	–
D	3	1	–
E1	–	–	2
E2	–	–	2

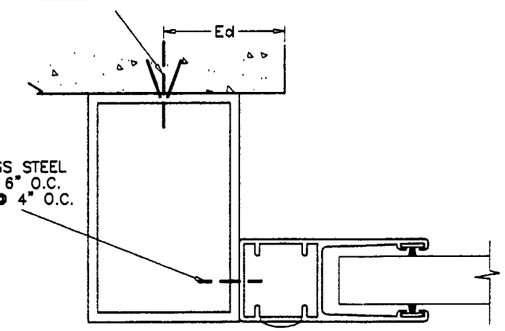


INSIDE MOUNTS

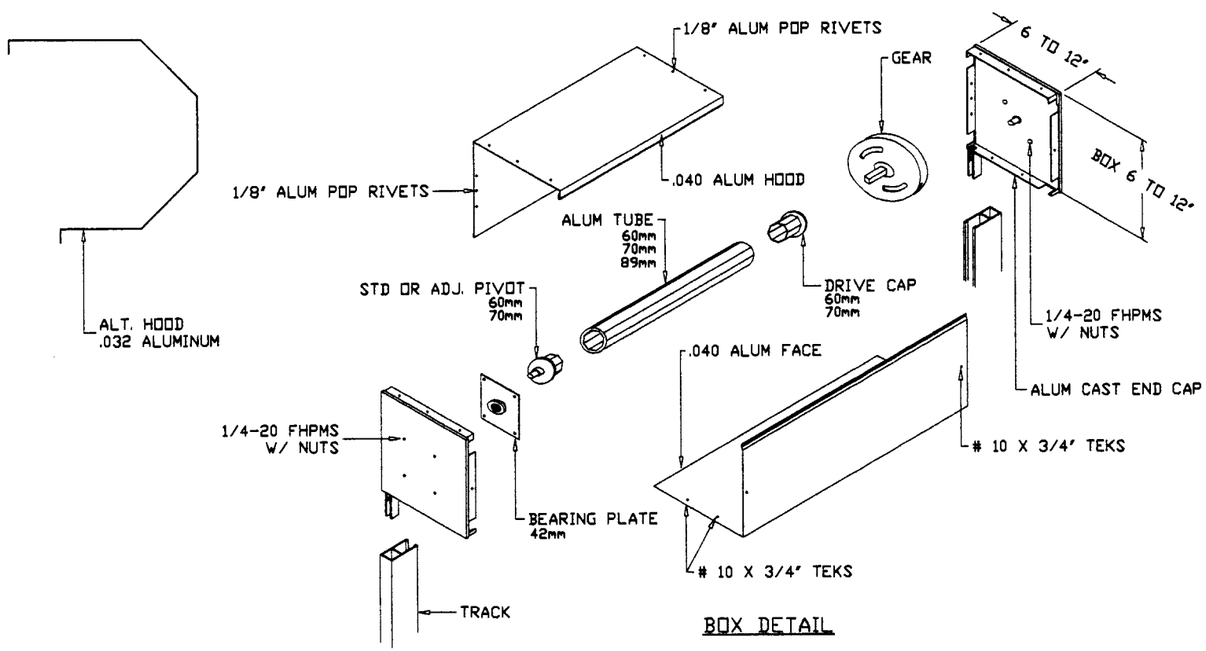
ANCHOR TYPE	CHART TO USE CONC.	BLOCK	WOOD
A	5	2	–
D	5	3	–
E1	–	–	4
E2	–	–	4



ANCHOR TYPE	CHART TO USE CONC.	BLOCK	WOOD
A	3	1	–
D	4	2	–
E1	–	–	2
E2	–	–	3



BUILT-OUT INSTALLATIONS



BOX DETAIL

FOR CHARTS REFERED ON DETAILS
SEE SHEET 9 OF 17

Ed = TYPICAL EDGE DISTANCE
CONC. & BLOCK = 12d (12 ANCHOR DIAMETERS)
WOOD = 5d
FOR LESSER EDGE DISTANCES SEE SHEET 9 OF 17.

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

PRODUCT APPROVED
08-0826.02
01/14/08
By
Miami-Dade Product Control Division

AL-FAROOQ CORPORATION
ENGINEERS, PLANNERS & PRODUCT DESIGN
1235 SW 87 AVE
MIAMI, FLORIDA 33174
TEL. (305) 264-8100 FAX. (305) 262-6978

ROLLUP\99-10FSC

ROLL UP SHUTTER DETAILS

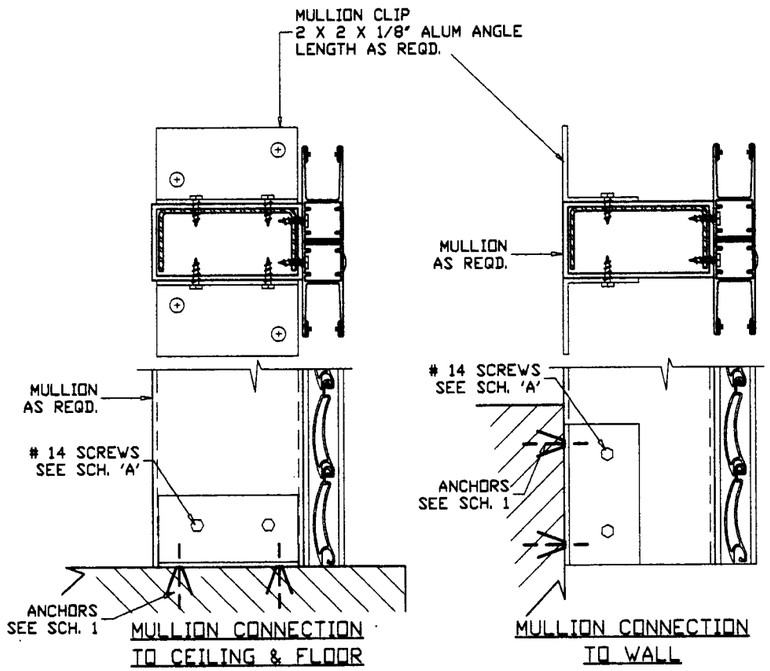
FOLDING SHUTTER CORP.
7089 HEMSTREET PLACE
WEST PALM BEACH, FL 33413
TEL(561) 683-4811 FAX.(561) 640-8204

revisions:

no	date	by	description

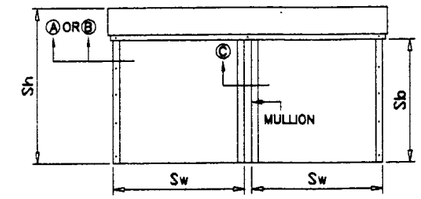
date: 03-15-99
scale: 1/2" = 1"
dr. by: HAMID
chk. by:

drawing no.
99-10



MULLION CONNECTION TO CEILING & FLOOR

MULLION CONNECTION TO WALL



TOTAL LOAD ON CENTER MULLION

P = Sh X Sw X Pd = Lbs

TOTAL LOAD ON END MULLION

P = Sh X Sw/2 X Pd = Lbs

TOTAL LOAD ON HEADER

P = Sh/2 X Sw/2 X Pd = Lbs

LOAD AT ANCHOR

AT TOP = Pt = $\frac{P * Sb}{Sh}$ = Lbs

AT BOTTOM = Pb = P − Pt = Lbs

IF Pt OR Pb > ANCHOR CAPACITY OF FASTENER SHOWN
ANCHORAGE SYSTEM SHALL BE DESIGNED ON JOB TO JOB BASIS.

SCHEDULE 1

MULLION CONNECTION TO CEILING AND FLOOR			
ANCHOR PER SIDE	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
1	A	CONC.	1164
	A	BLOCK	706
	D	CONC.	1176
	D	BLOCK	892
	E1	WOOD	402
	E2	WOOD	284
2	A	CONC.	2328
	A	BLOCK	1412
	D	CONC.	2348
	D	BLOCK	1784
	E1	WOOD	804
	E2	WOOD	568
3	A	CONC.	3492
	A	BLOCK	2118
	D	CONC.	3522
	D	BLOCK	2676
	E1	WOOD	1206
	E2	WOOD	852
4	A	CONC.	4656
	A	BLOCK	2824
	D	CONC.	4696
	D	BLOCK	3568
	E1	WOOD	1608
	E2	WOOD	1136

SCHEDULE 2

MULLION CONNECTION TO WALL				
CLIP ANGLE LENGTH–IN.	ANCHOR PER SIDE	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
6	4	A	CONC.	586
		A	BLOCK	410
		D	CONC.	586
		D	BLOCK	586
		E1&E2	WOOD	586
9	6	A	CONC.	879
		A	BLOCK	615
		D	CONC.	879
		D	BLOCK	879
		E1&E2	WOOD	879
12	8	A	CONC.	1172
		A	BLOCK	820
		D	CONC.	1172
		D	BLOCK	1172
		E1&E2	WOOD	1172
15	10	A	CONC.	1465
		A	BLOCK	1025
		D	CONC.	1465
		D	BLOCK	1465
		E1&E2	WOOD	1465

SCHEDULE A

MULLION ANGLE CONNECTION			
CLIP ANGLE LENGTH–IN.	# OF SCREWS EACH LEG	SPACING BETWEEN SCREWS –IN.	CONNECTION CAPACITY–lbs
2"	2	1.5	1640
	3	.75	1968
3"	2	2	1874
	3	2	2315
	4	.75	2981
4"	2	3	2186
	3	1.5	2811
	4	1	3450
	5	.75	4099
5"	2	4	2385
	3	2	3148
	4	1.25	3813
	5	1	4685

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

PRODUCT REVISED
as complete with the Florida
Building Code
Accepted 02-0526.02
Expiration Date 01/14/08
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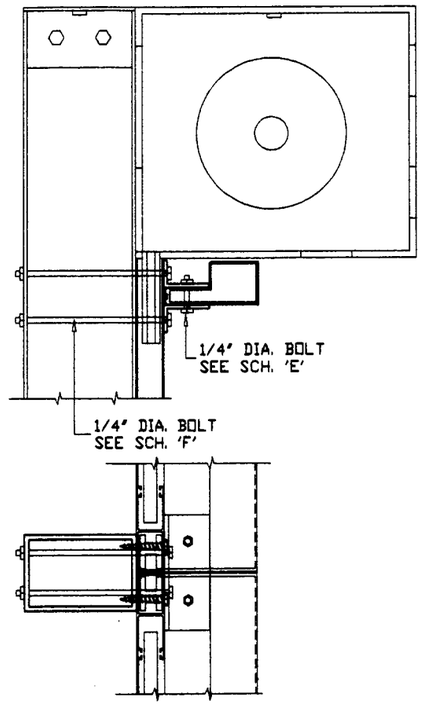
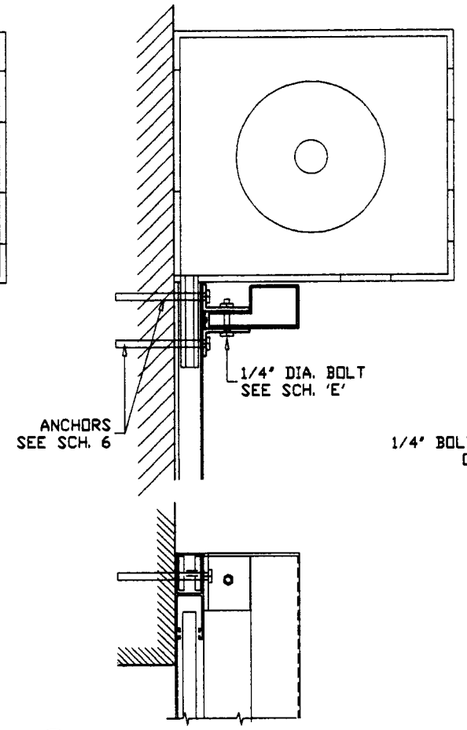
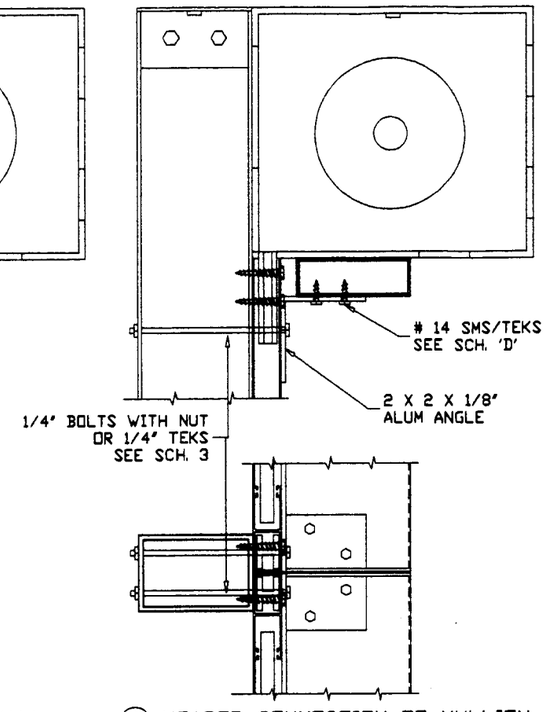


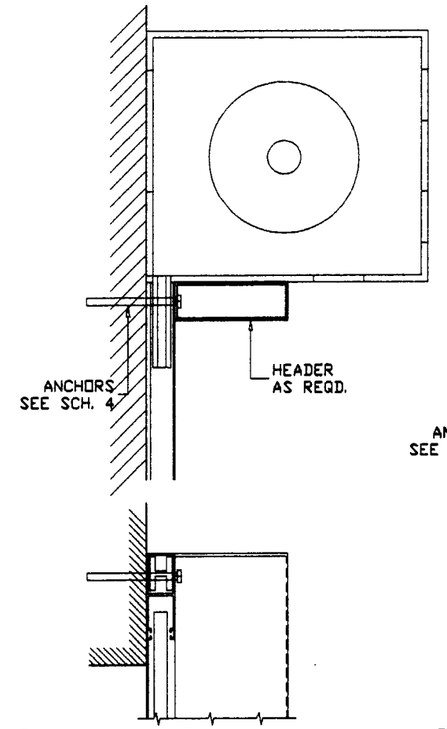
(E) HEADER CONNECTION TO MULLION
PLAN



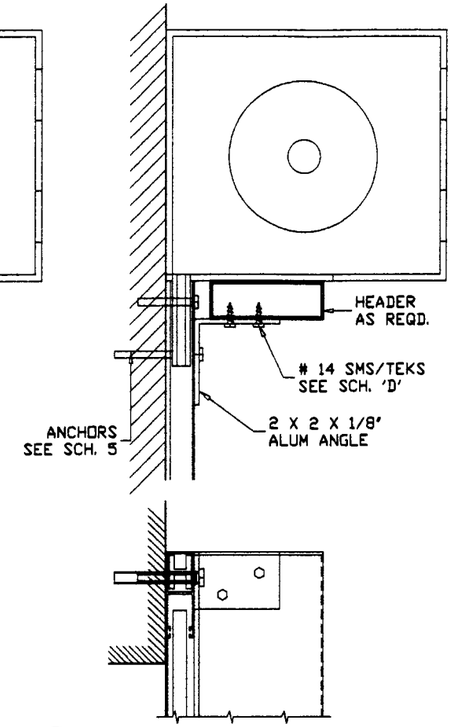
(D) HEADER CONNECTION TO WALL
PLAN



(C) HEADER CONNECTION TO MULLION
PLAN



(B) HEADER CONNECTION TO WALL WITHOUT END ANGLE
PLAN



(A) HEADER CONNECTION TO WALL WITH END ANGLE
PLAN

SCHEDULE F

HEADER CONNECTION	
NO. OF BOLTS	CONNECTION CAPACITY–lbs
2	1995
4	3990
6	5985
8	7980

SCHEDULE 6

HEADER CONNECTION TO WALL			
# OF ANCHORS PER CONNECTION	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
2	A	CONC.	1122
	A	BLOCK	410
	D	CONC.	1402
	D	BLOCK	586
	E1	WOOD	832
	E2	WOOD	1040
4	A	CONC.	2244
	A	BLOCK	820
	D	CONC.	2804
	D	BLOCK	1172
	E1	WOOD	1664
	E2	WOOD	2080
6	A	CONC.	3366
	A	BLOCK	1230
	D	CONC.	4206
	D	BLOCK	1758
	E1	WOOD	2496
	E2	WOOD	3120

SCHEDULE E

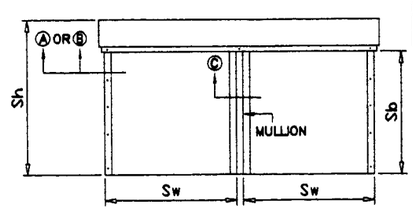
HEADER CONNECTION	
NO. OF BOLTS	CONNECTION CAPACITY–lbs
1	622
2	1244
3	1866
4	2488
5	3110
6	3732

SCHEDULE 3

ANGLE CONNECTION TO MULLION		
NO. OF BOLTS/TEKS	ANGLE LENGTH IN.	CONNECTION CAPACITY–lbs
2	4	260
3	6	391
4	9	586
6	12	781

SCHEDULE D

HEADER CONNECTION	
# OF SCREWS EACH LEG	CONNECTION CAPACITY–lbs
1	1642
2	3284
3	4926
4	6568



SCHEDULE 4

HEADER CONNECTION TO WALL			
# OF ANCHORS PER CONNECTION	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
1	A	CONC.	561
	A	BLOCK	205
	D	CONC.	701
	D	BLOCK	293
	E1	WOOD	415
	E2	WOOD	519
2	A	CONC.	1122
	A	BLOCK	410
	D	CONC.	1402
	D	BLOCK	586
	E1	WOOD	830
	E2	WOOD	1038
4	A	CONC.	2244
	A	BLOCK	820
	D	CONC.	2804
	D	BLOCK	1172
	E1	WOOD	1660
	E2	WOOD	2076

SCHEDULE 5

HEADER CONNECTION TO WALL				
CLIP ANGLE LENGTH–IN.	# OF ANCHORS PER CONNECTION	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
4	2	A	CONC.	260
		A	BLOCK	256
		D	CONC.	260
		D	BLOCK	260
		E1&E2	WOOD	260
6	3	A	CONC.	391
		A	BLOCK	384
		D	CONC.	391
		D	BLOCK	391
		E1&E2	WOOD	391
9	4	A	CONC.	586
		A	BLOCK	513
		D	CONC.	586
		D	BLOCK	586
		E1&E2	WOOD	586
12	5	A	CONC.	781
		A	BLOCK	641
		D	CONC.	781
		D	BLOCK	781
		E1&E2	WOOD	781

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

PRODUCT APPROVED
as c[illegible]
Ba[illegible]
Ac[illegible] 02-0426.02
Expi[illegible] 01/14/08
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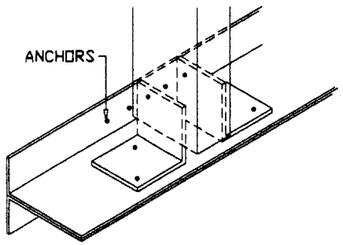
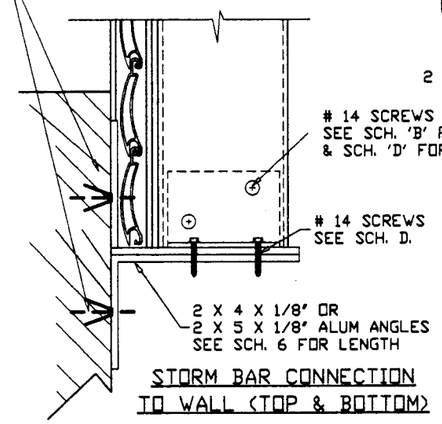


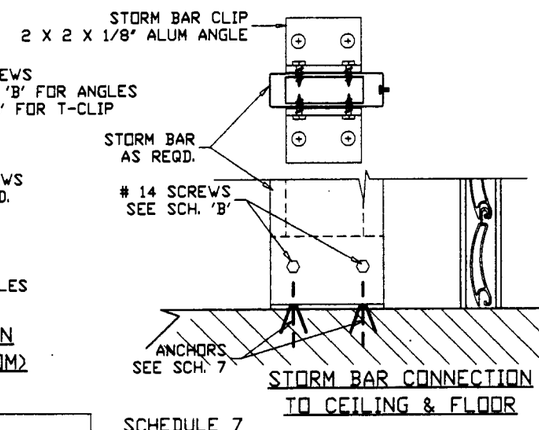
SCHEDULE B

STORM BAR BRACKET CONNECTION			
CLIP ANGLE LENGTH–IN.	# OF SCREWS EACH LEG	SPACING BETWEEN SCREWS –IN.	CONNECTION CAPACITY–lbs
2"	2	1.5	1640
	3	.75	1968
3"	2	2	1874
	3	2	2315
	4	.75	2981
4"	2	3	2186
	3	1.5	2811
	4	1	3450
	5	.75	4099
5"	2	4	2385
	3	2	3148
	4	1.25	3813
	5	1	4685
* 2"	2	1.5	1031
	3	.75	1237

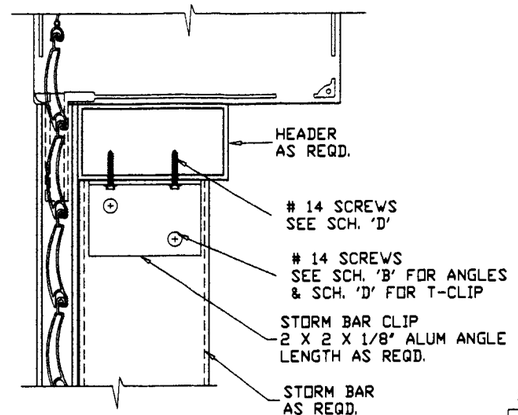
* FOR 2" & 2-1/2" STORM BARS WITH 1/16" WALL THICKNESS



STORM BAR CONNECTION TO WALL (TOP & BOTTOM)

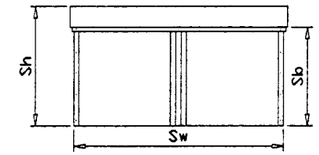


STORM BAR CONNECTION TO CEILING & FLOOR



STORM BAR CONNECTION TO HEADER

ALL DIMENSIONS SHOWN Sh, Sw, Sb ETC. ARE IN FEET.



FACTOR = 1.25 FOR 2 SPANS
= 1.10 FOR 3 SPANS
Sb = STORM BAR HEIGHT

LOAD ON STORM BAR ANCHOR = $P = \frac{Sw * Sb \times Pd \times FACTOR}{2 * (\# \text{ OF SPANS})}$

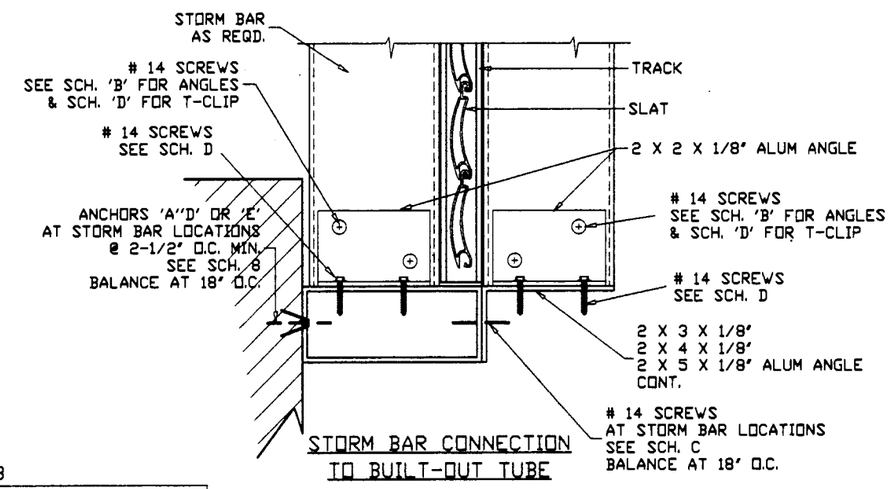
IF P > CAPACITY OF FASTENERS SHOWN, ANCHORAGE SYSTEM SHALL BE DESIGNED ON JOB TO JOB BASIS.

SCHEDULE D

STORM BAR CONNECTION	
# OF SCREWS EACH LEG	CONNECTION CAPACITY–lbs
1	1642
2	3284
3	4926
4	6568

SCHEDULE C

ANGLE CONNECTION TO TUBE AT STORM BAR LOCATION	
# OF SCREWS	CONNECTION CAPACITY–lbs
2	353
3	530
4	586



STORM BAR CONNECTION TO BUILT-OUT TUBE

SCHEDULE 6

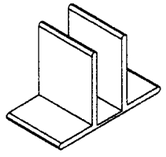
STORM BAR CONNECTION TO WALL				
ALUM ANGLE LENGTH IN.	# OF ANCHORS PER CONNECTION	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
9"	4	A	CONC.	780
		A	BLOCK	780
		D	CONC.	780
		D	BLOCK	780
		E1 & E2	WOOD	780
12"	4	A	CONC.	1040
		A	BLOCK	820
		D	CONC.	1040
		D	BLOCK	1040
		E1 & E2	WOOD	1040
15"	6	A	CONC.	1300
		A	BLOCK	1230
		D	CONC.	1300
		D	BLOCK	1300
		E1 & E2	WOOD	1300
18"	6	A	CONC.	1560
		A	BLOCK	1230
		D	CONC.	1560
		D	BLOCK	1560
		E1 & E2	WOOD	1560
24"	8	A	CONC.	2080
		A	BLOCK	1640
		D	CONC.	2080
		D	BLOCK	2080
		E1 & E2	WOOD	2080

SCHEDULE 7

STORM BAR CONNECTION TO CEILING AND FLOOR				
ALUM ANGLE LENGTH IN.	# OF ANCHORS PER CONNECTION	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
2"	2	A	CONC.	1162
		A	BLOCK	704
		D	CONC.	1172
		D	BLOCK	890
		E1	WOOD	400
		E2	WOOD	284
3-1/2"	4	A	CONC.	2324
		A	BLOCK	1408
		D	CONC.	2344
		D	BLOCK	1780
		E1	WOOD	800
		E2	WOOD	568
6-1/2"	6	A	CONC.	3486
		A	BLOCK	2112
		D	CONC.	3516
		D	BLOCK	2670
		E1	WOOD	1200
		E2	WOOD	852
9"	8	A	CONC.	4648
		A	BLOCK	2816
		D	CONC.	4688
		D	BLOCK	3560
		E1	WOOD	1600
		E2	WOOD	1136

SCHEDULE 8

TUBE CONNECTION TO WALL @ STORM BAR LOCATION			
NO. OF ANCHORS	ANCHOR TYPE	BASE MATERIAL	CONNECTION CAPACITY–lbs
2	A	CONC.	561
	A	BLOCK	205
	D	CONC.	586
	D	BLOCK	293
	E1	WOOD	415
	E2	WOOD	519
3	A	CONC.	586
	A	BLOCK	308
	D	CONC.	586
	D	BLOCK	440
	E1	WOOD	586
	E2	WOOD	586
4	A	CONC.	586
	A	BLOCK	410
	D	CONC.	586
	D	BLOCK	586
	E1	WOOD	586
	E2	WOOD	586



'T' CLIP (ALT. TO ANGLES)
CLIP LENGTH AND NO. OF FASTENERS SAME AS SHOWN IN SCHEDULES.

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16357

PRODUCT REVIEWED
as conforming to the Florida
Building Code
Acceptance: 02-0626.02
Expiration: 01/14/07
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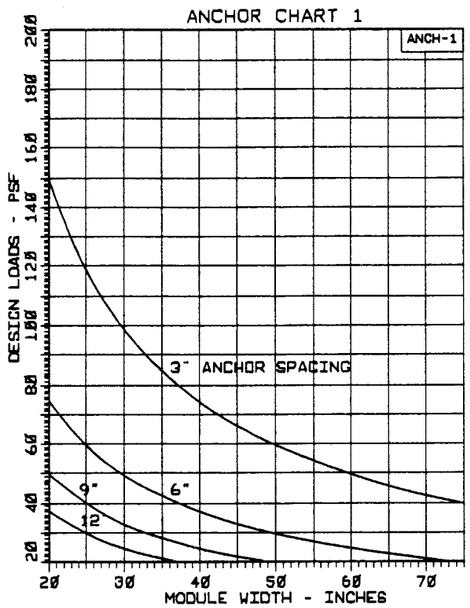
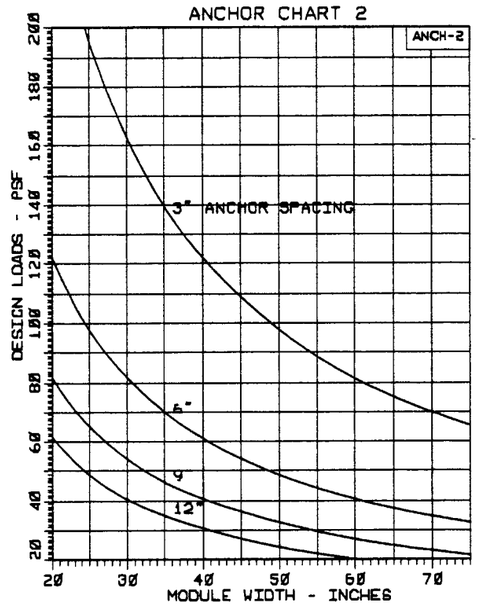
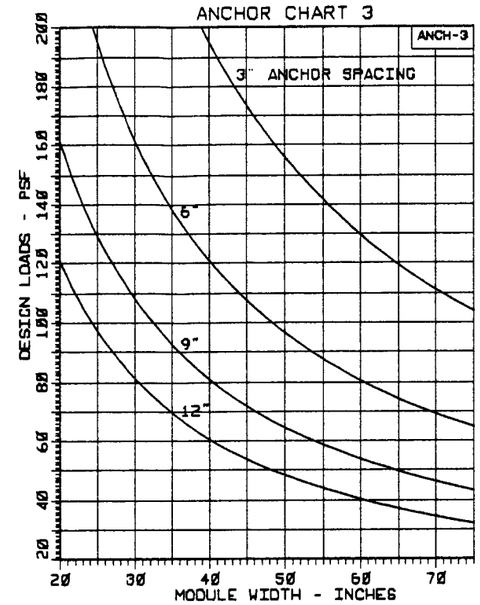
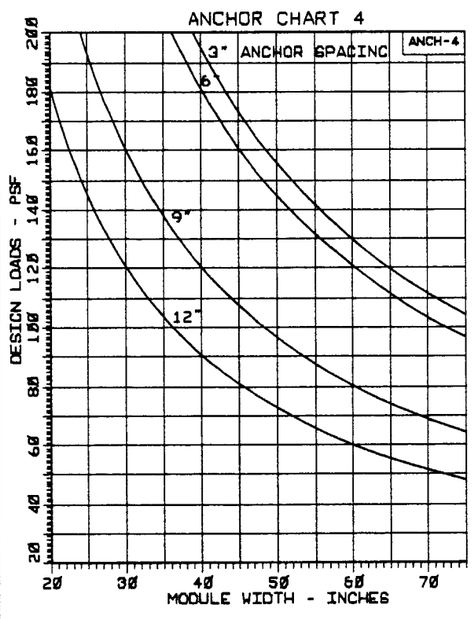
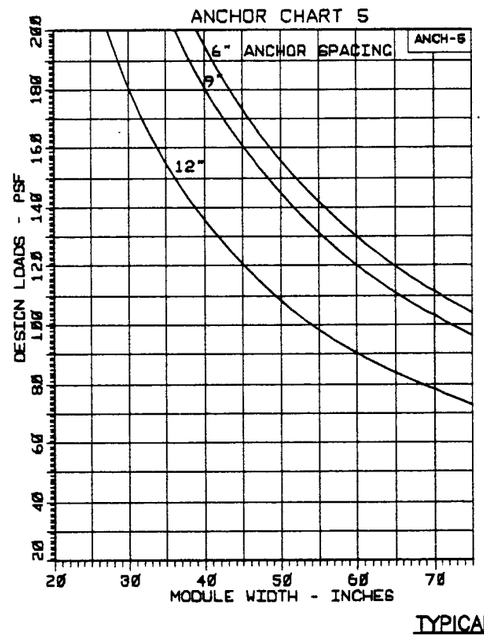




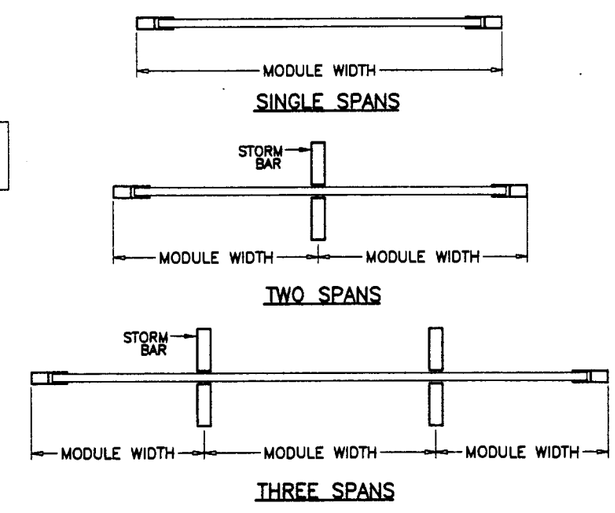






USE CHARTS 1 THRU 5 TO VERIFY ANCHOR REQUIREMENTS AND STRESS LIMITATIONS OF LOAD/SPAN COMBINATIONS.

$$\text{MODULE WIDTH} = \frac{\text{SHUTTER WIDTH}}{\text{\# OF SPANS}}$$



FASTENER SPACING IN MASONRY					
CHARTS ARE BASED ON TYPICAL EDGE DISTANCE = 12d. FOR LESSER EDGE DISTANCE DECREASE SPACING BY MULTIPLYING WITH THE FACTOR BELOW					
EDGE DIST.	12d=3"	10d=2-1/2"	8d=2"	6d=1-1/2"	5d=1-1/4"
FACTOR	1.00	0.86	0.71	0.57	0.50
EXAMPLE: FOR 3" EDGE DIST. SPACING = 12" O.C. (FROM CHART) FOR 2" EDGE DIST. SPACING = 12 X .71 = 8.5 O.C.					

TYPICAL EDGE DISTANCE IN WOOD = 1-1/4"
NO REDUCTION FACTOR IS REQUIRED

TYPICAL ANCHORS

ANCHOR (A) = 1/4" TAPCON (ITW BUILDEX)
1-3/4" EMBEDMENT TO CONC. (3000 PSI MIN.)
1-1/4" EMBEDMENT TO BLOCK

ANCHOR (D) = 1/4" RAWL CALK-IN.
7/8" MIN. EMBED INTO CONC. (3000 PSI) OR BLOCK

ANCHOR (E1) = #14 S.M.S. INTO WOOD. (SYP MIN. S.G.= 0.55)
1-1/2" MIN. PENETRATION.

ANCHOR (E2) = 1/4" LAG SCREWS INTO WOOD. (SYP MIN. S.G.= 0.55)
1-1/2" MIN. PENETRATION.

NOTE: ANCHORS, USE FULL EMBEDMENT IN CONCRETE BEYOND THE COVERING (STUCCO, TILES, ETC.)

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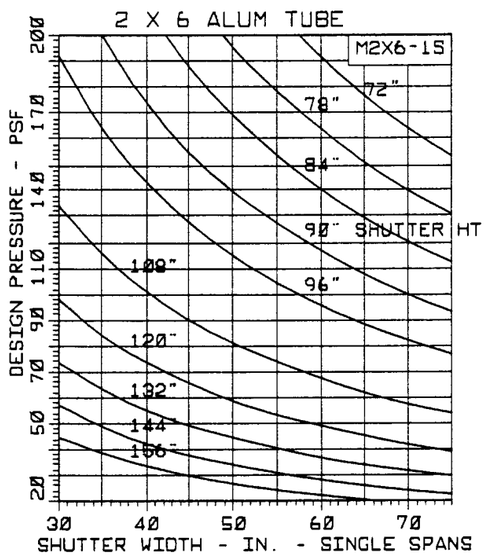

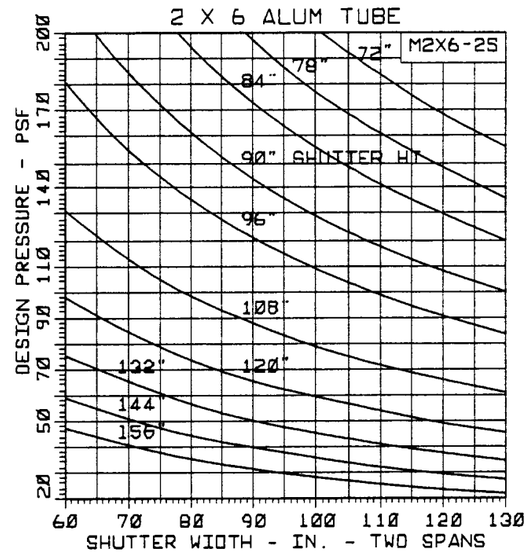

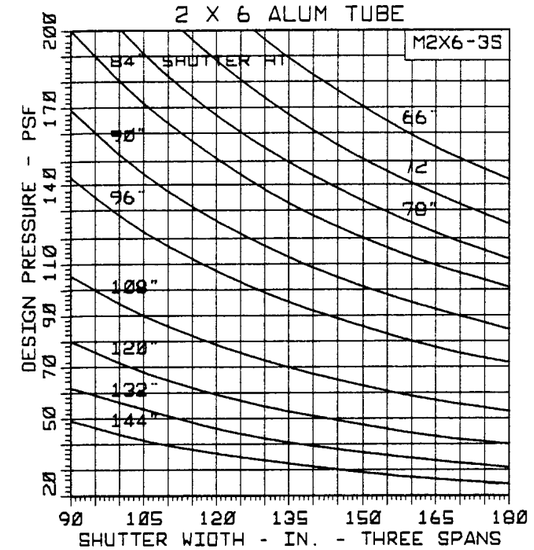

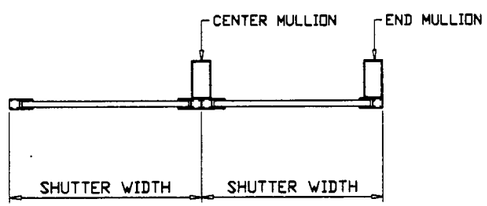

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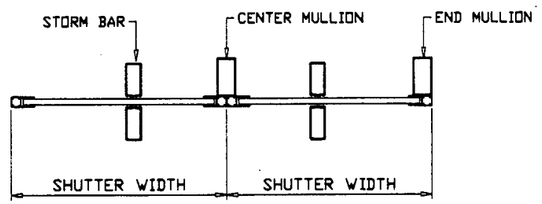

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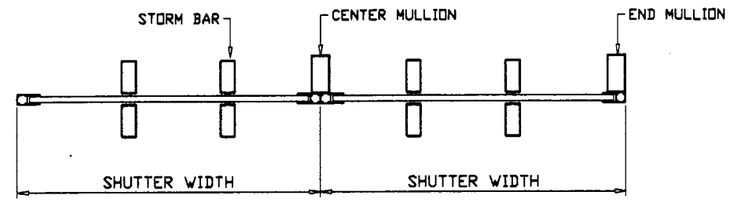

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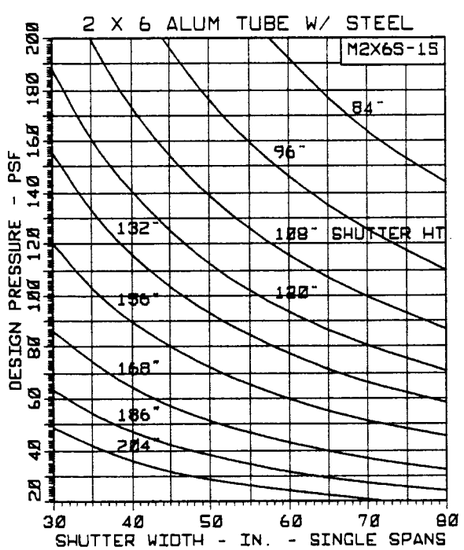

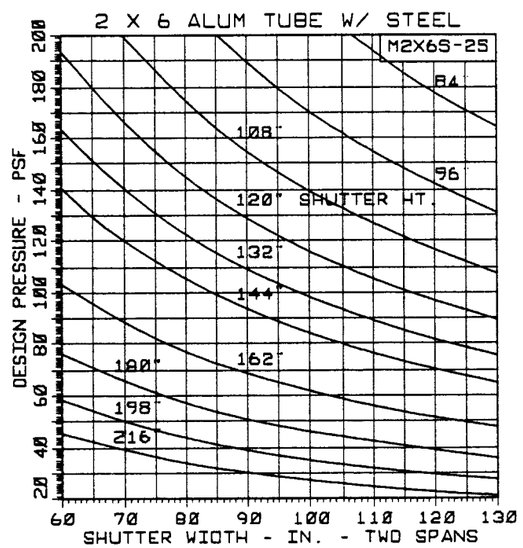

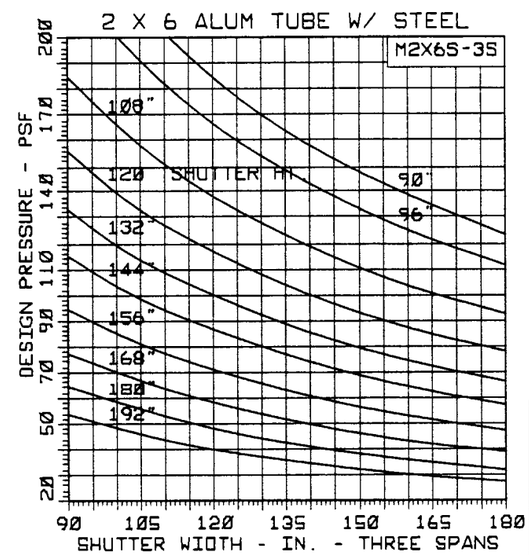

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Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

AL-FAROOQ CORPORATION
ENGINEERS, PLANNERS & PRODUCT DESIGN
1235 SW 87 AVE
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TEL. (305) 264-8100 FAX. (305) 262-6978

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7089 HEMSTREET PLACE
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chk. by:

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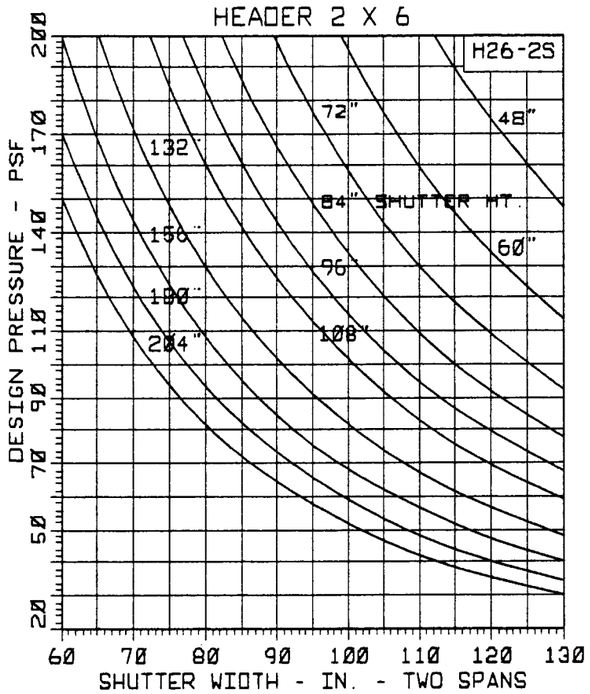

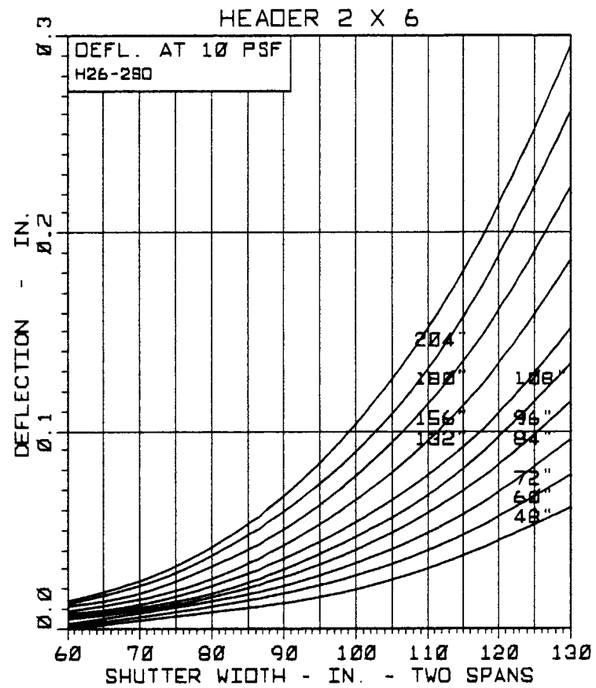

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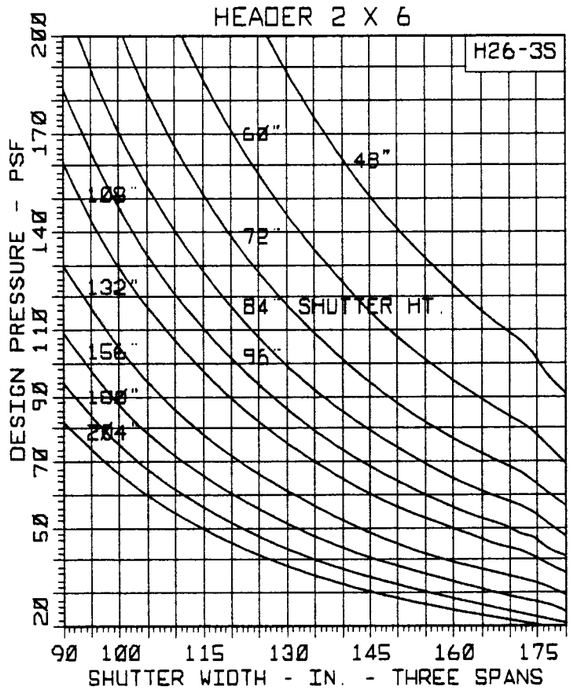

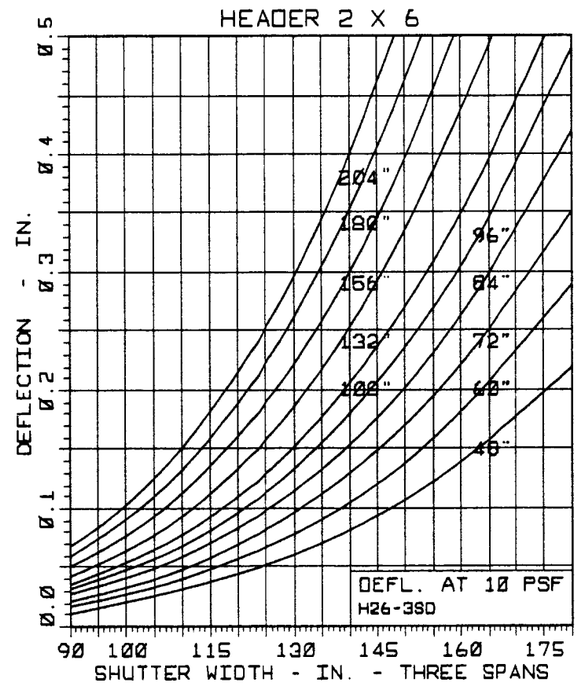

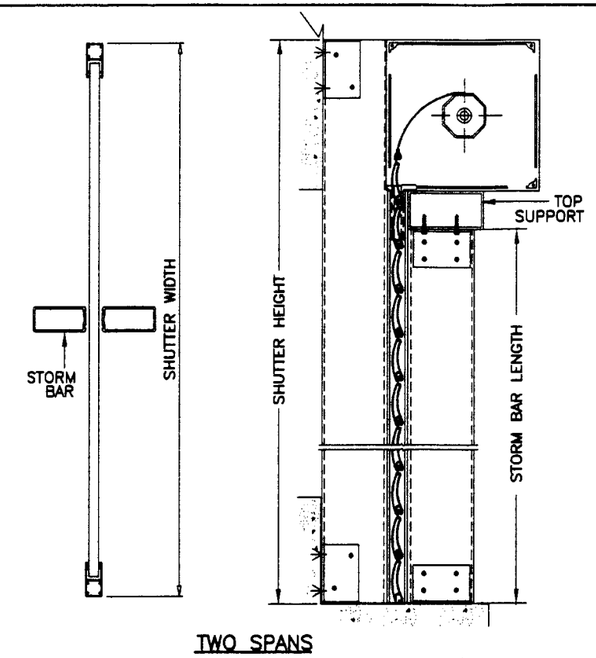

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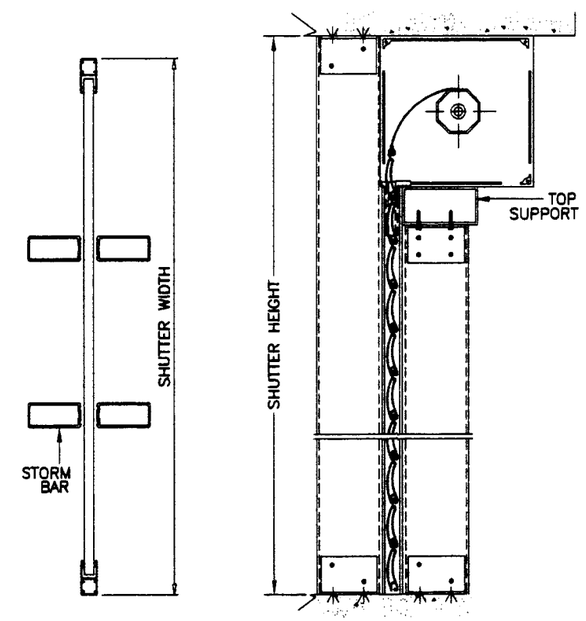

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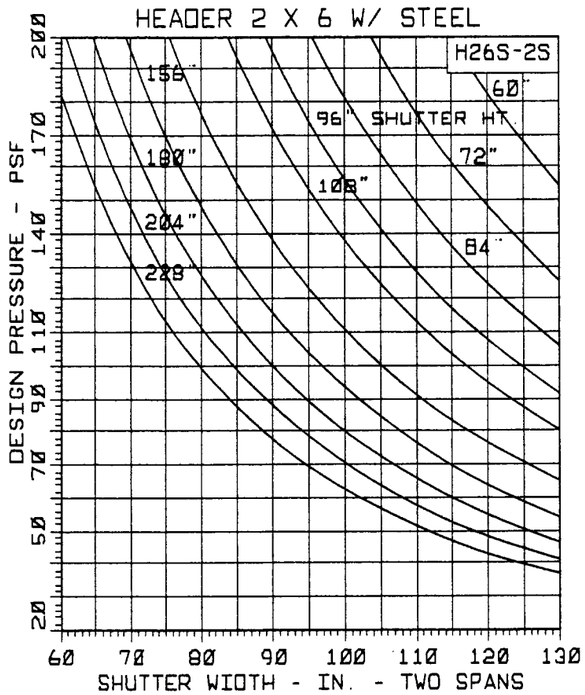
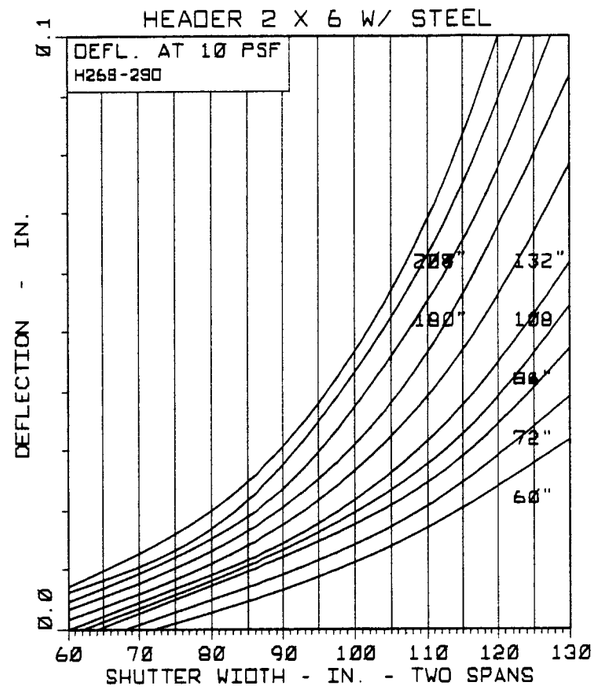
99-10

sheet 11 of 17





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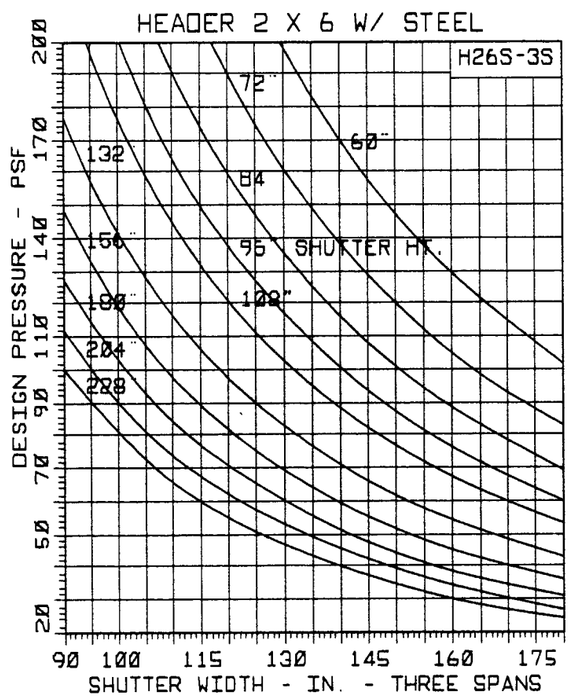

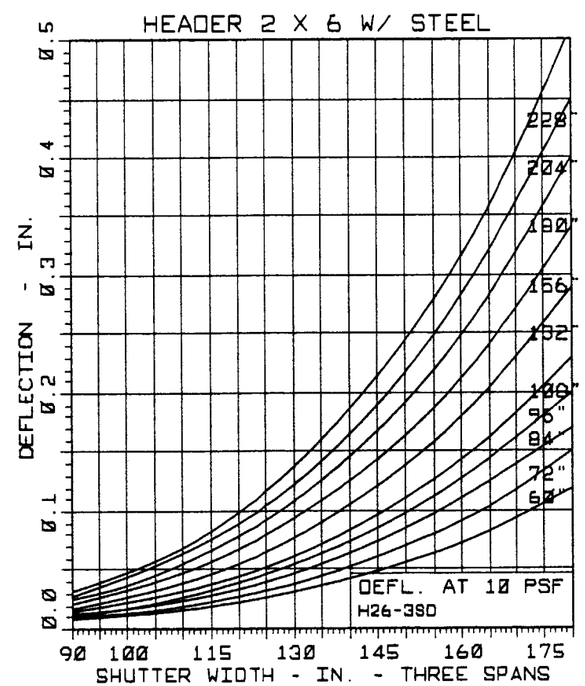

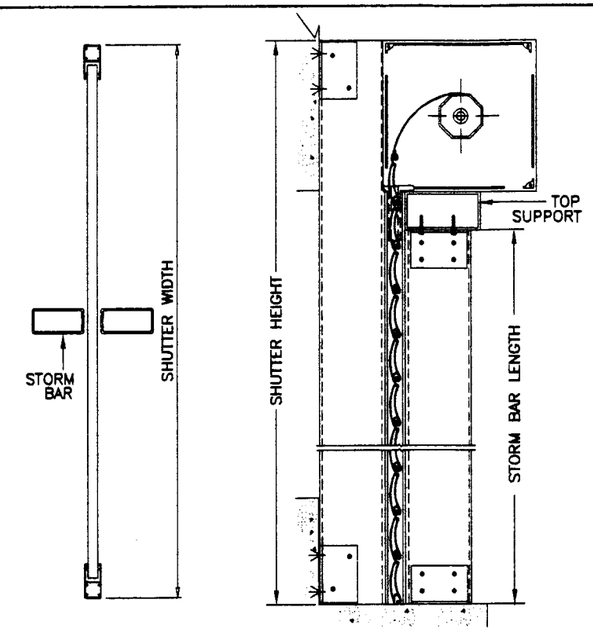

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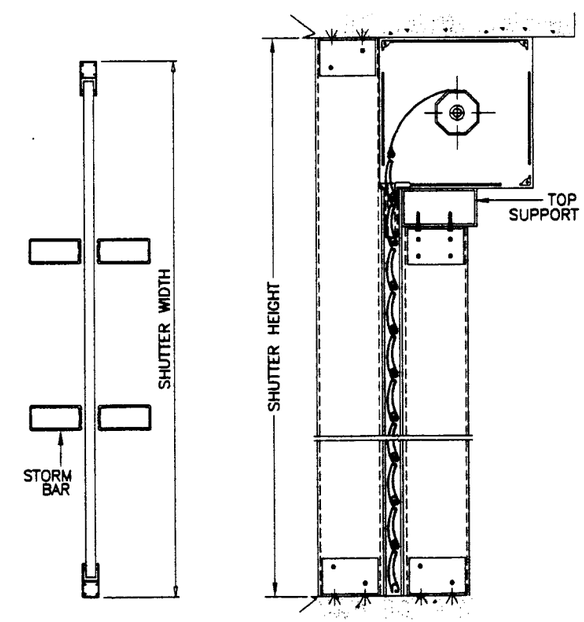

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drawing no.
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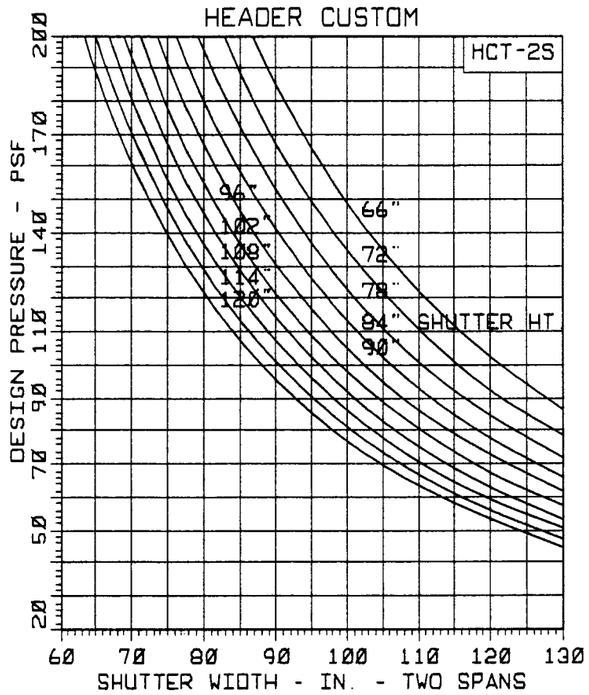
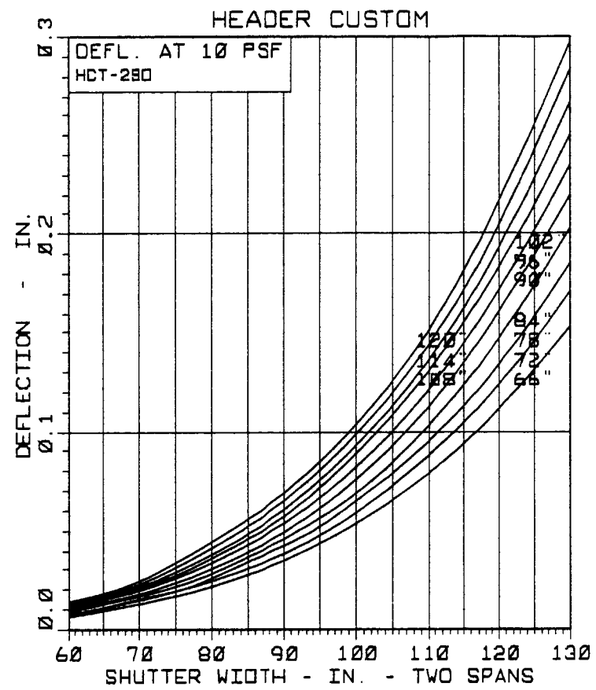
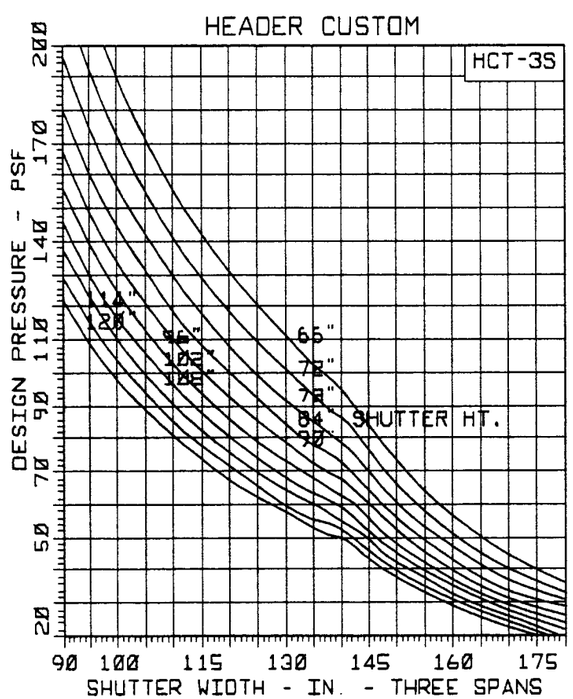
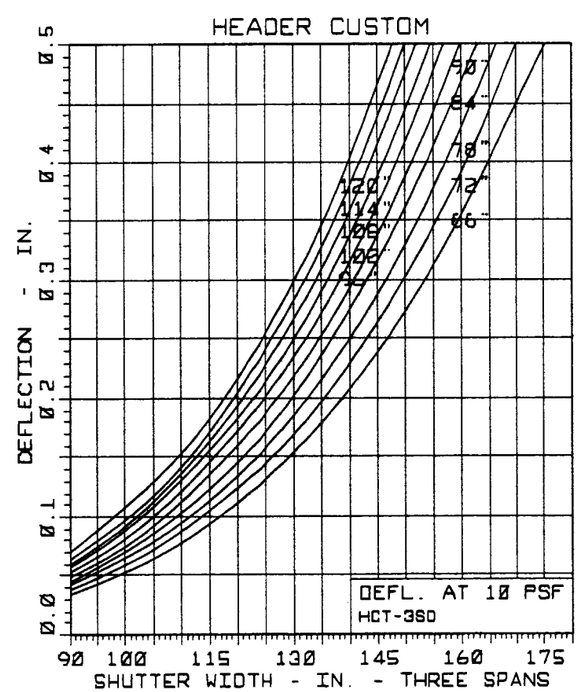
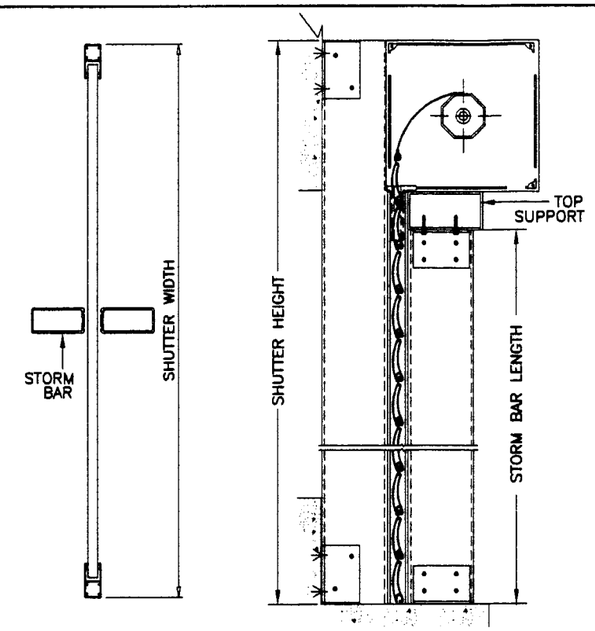
sheet 12 of 17











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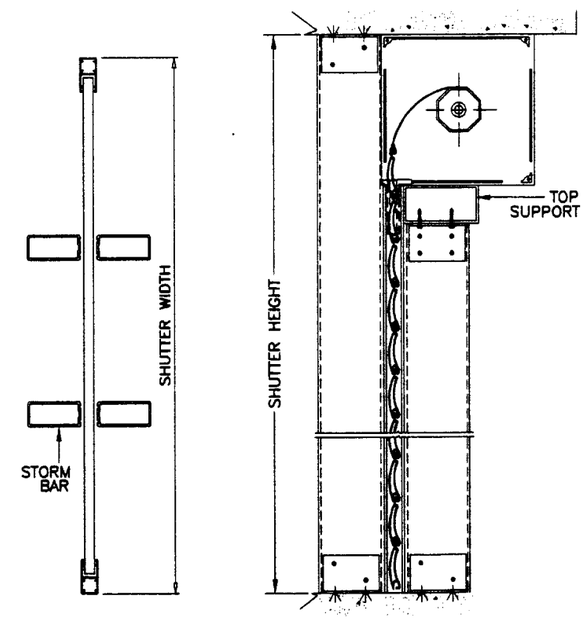

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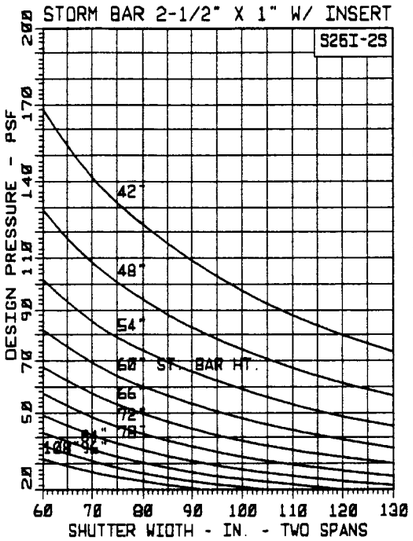
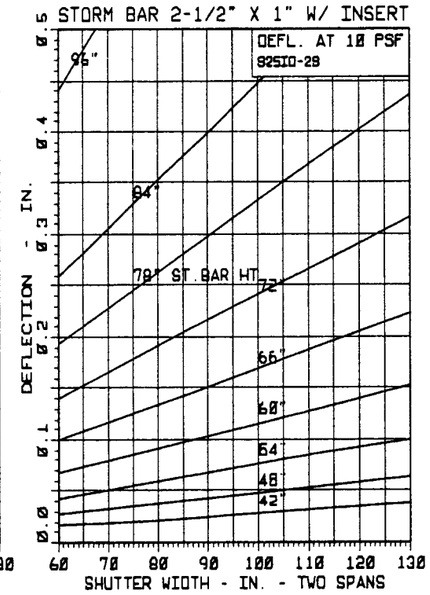
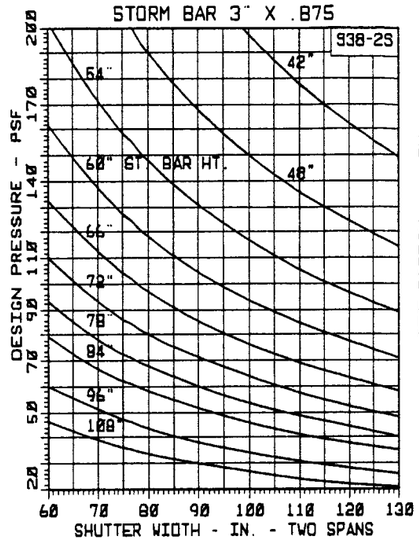
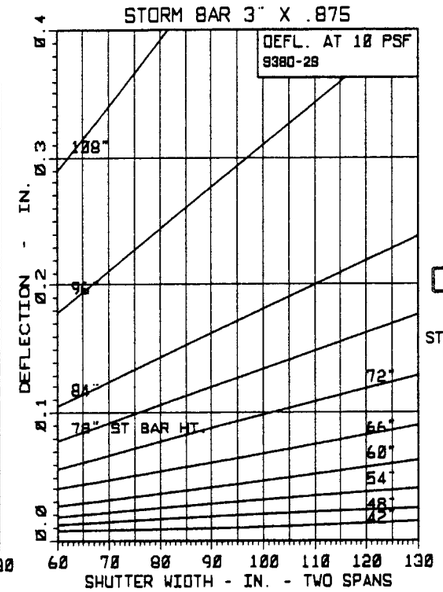
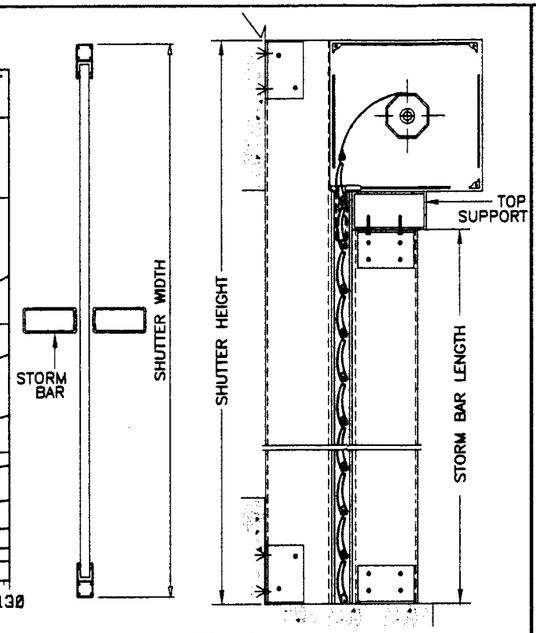
sheet 13 of 17











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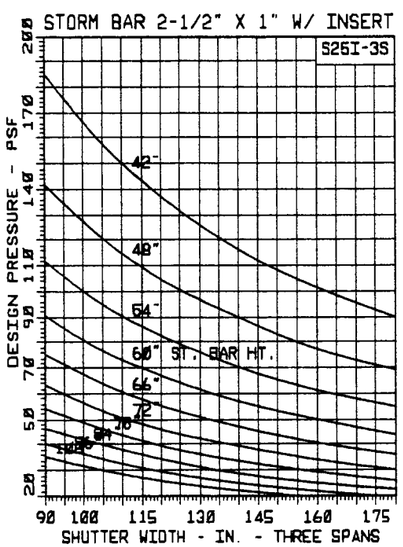

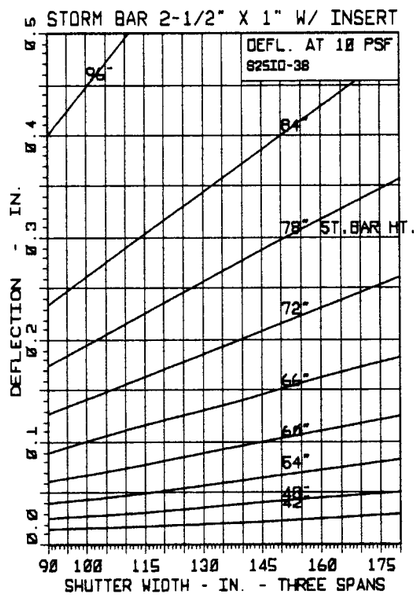

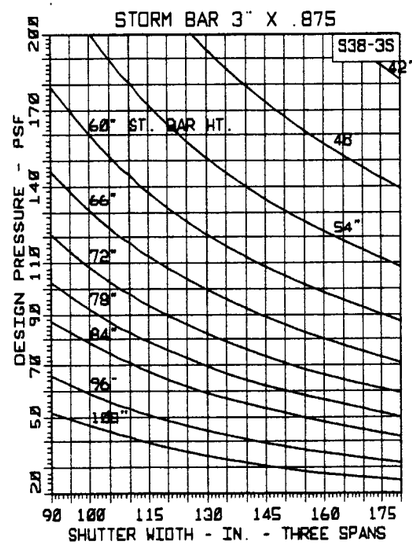

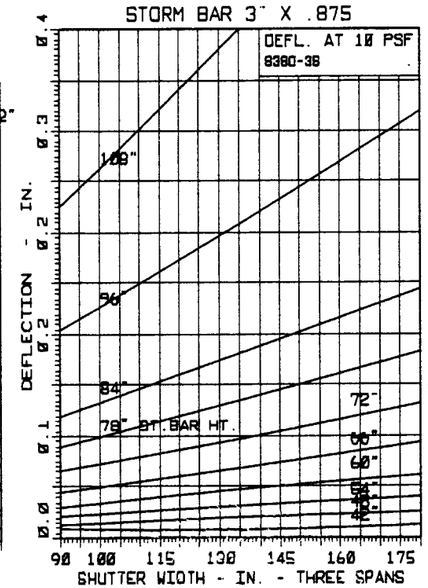

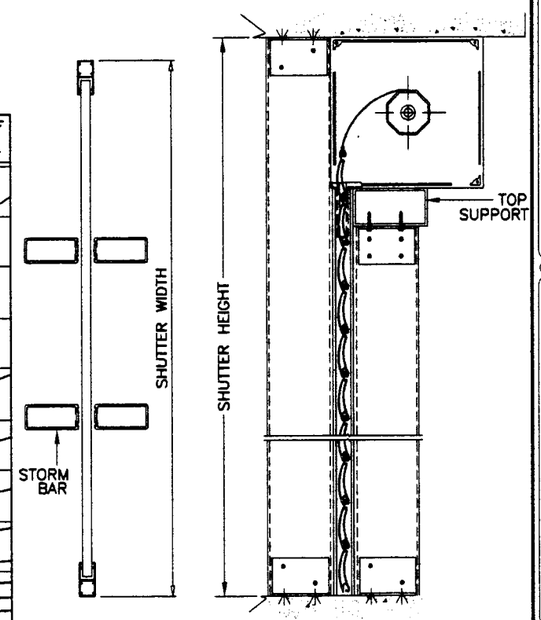

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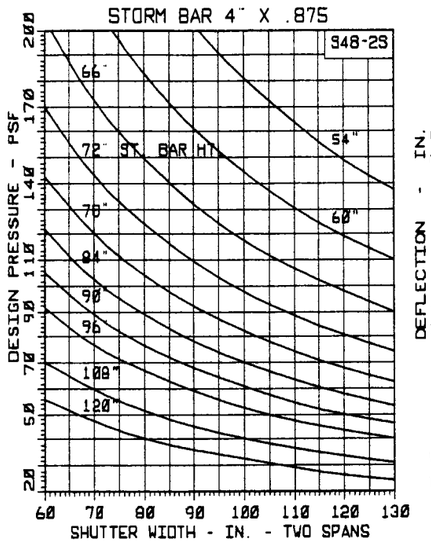
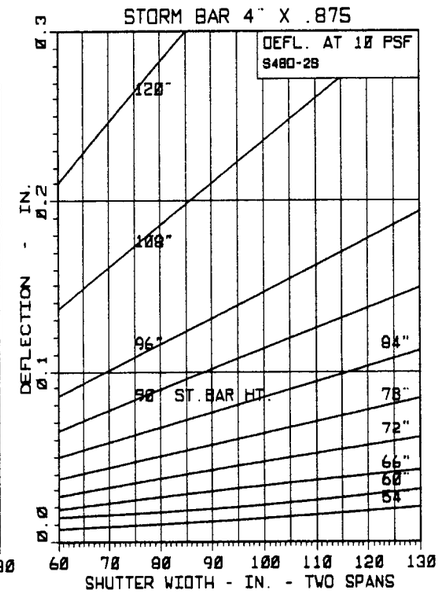
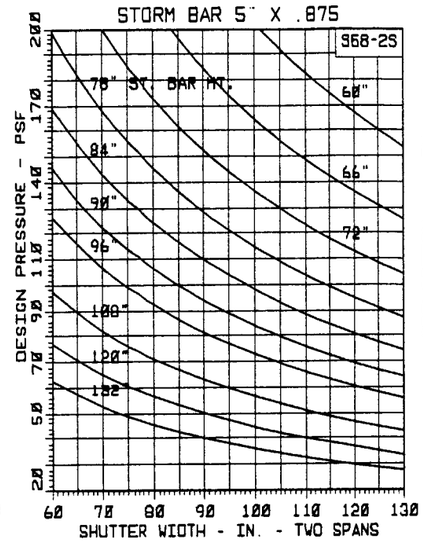
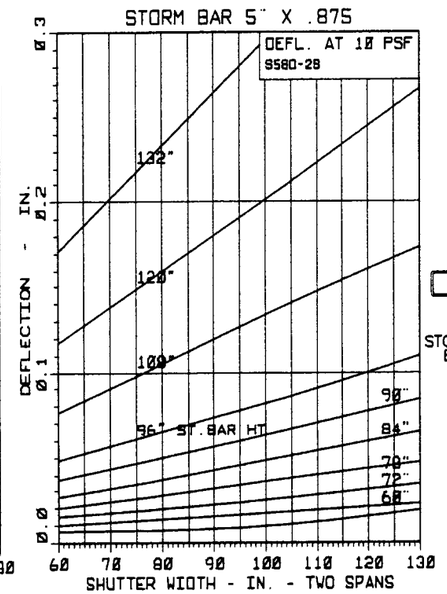
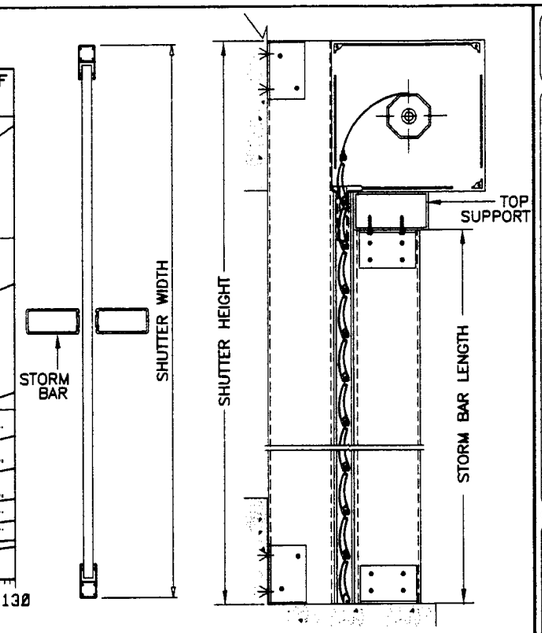
sheet 14 of 17











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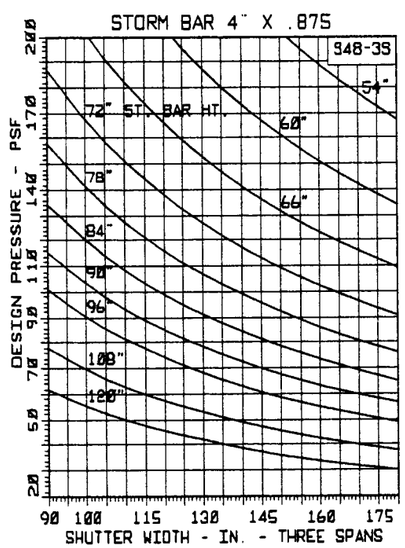

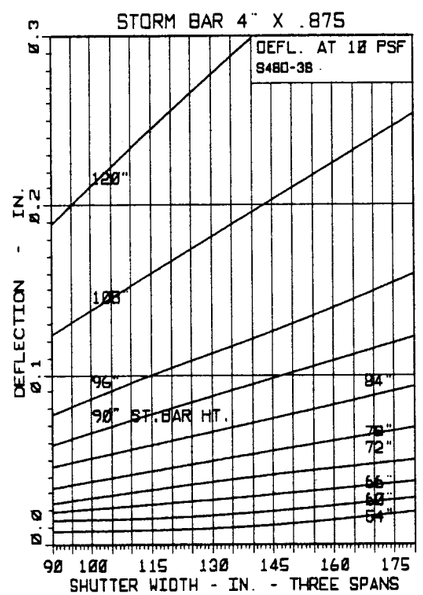

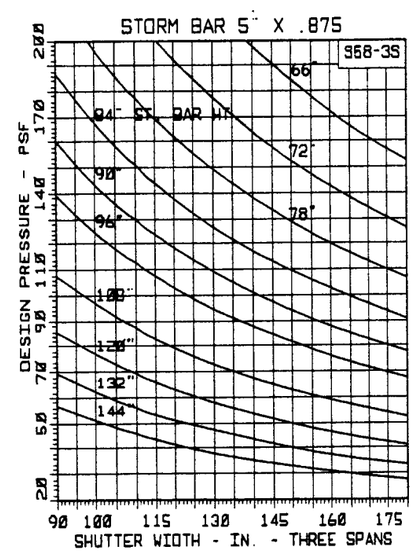

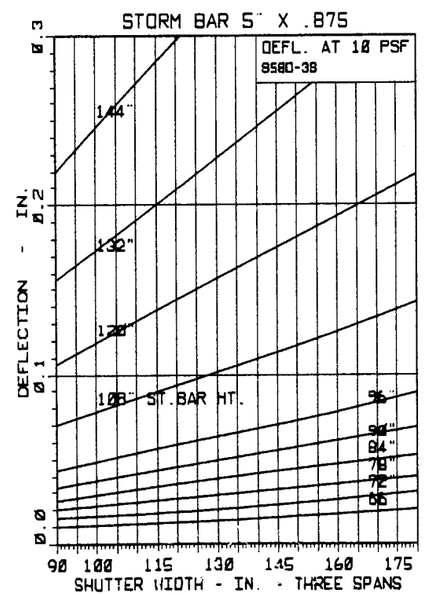

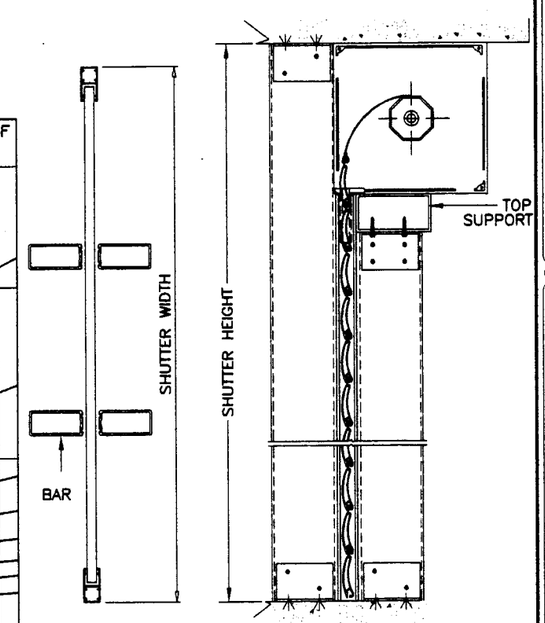

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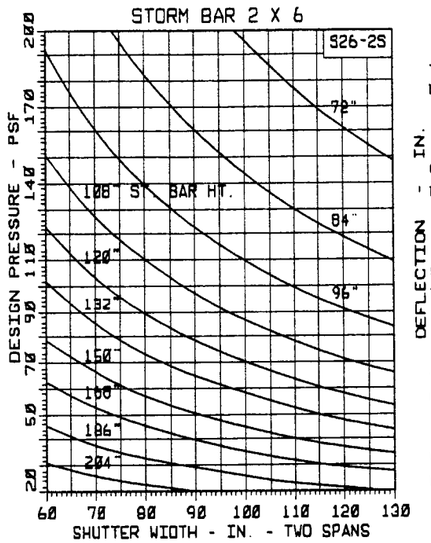
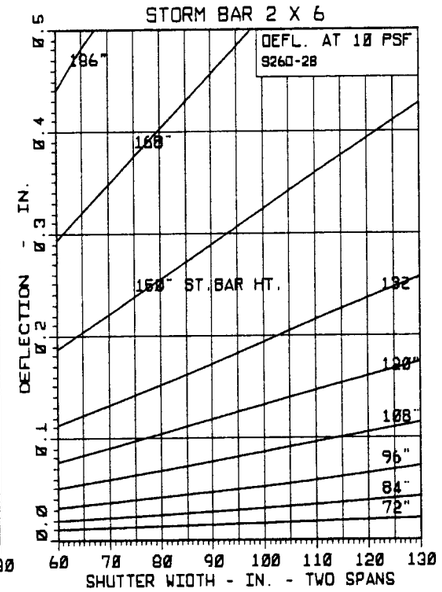
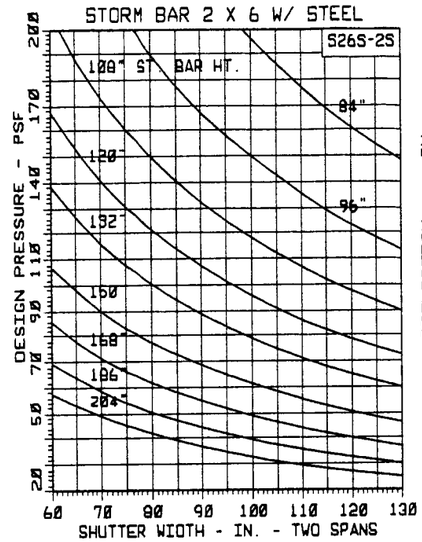
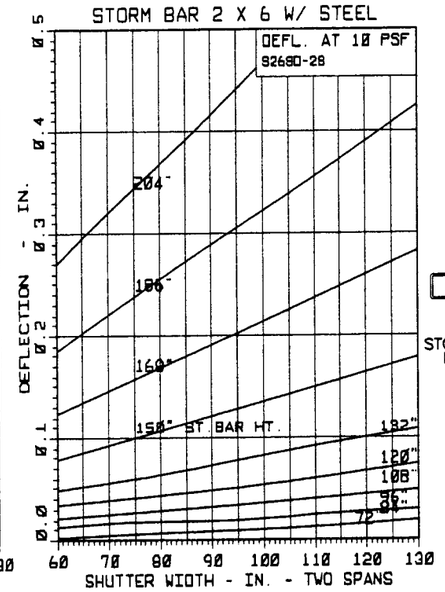
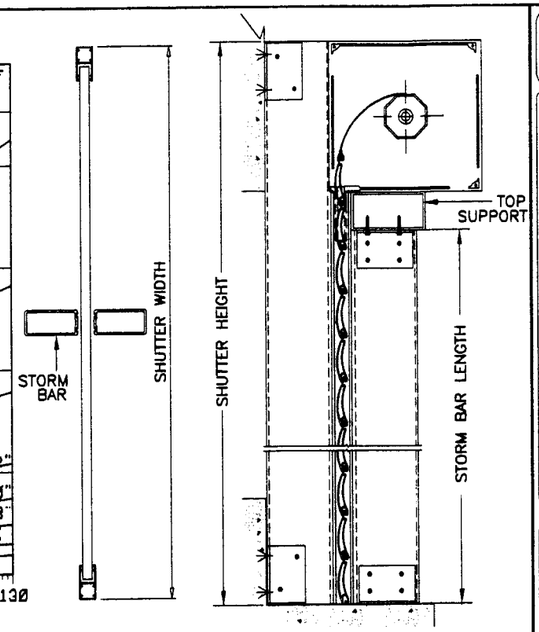
99-10





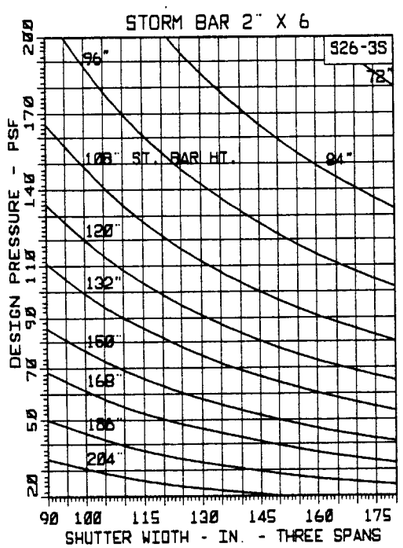


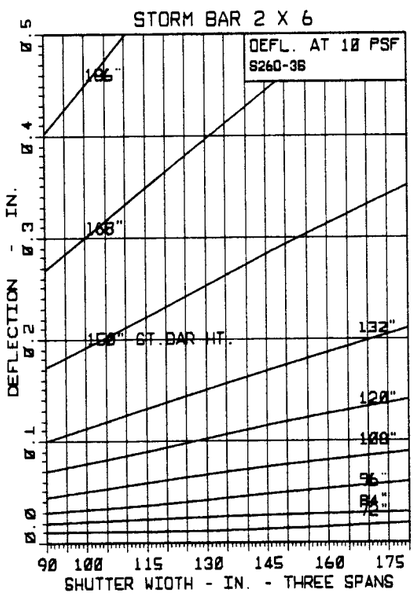


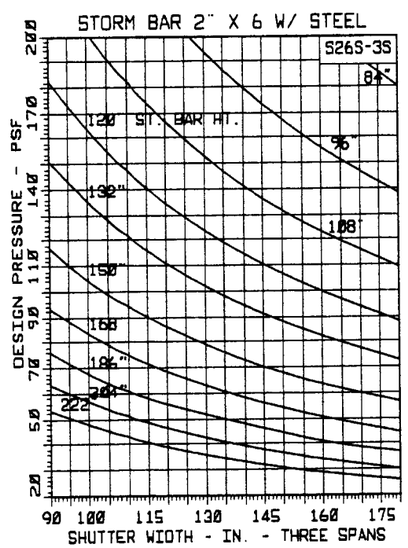


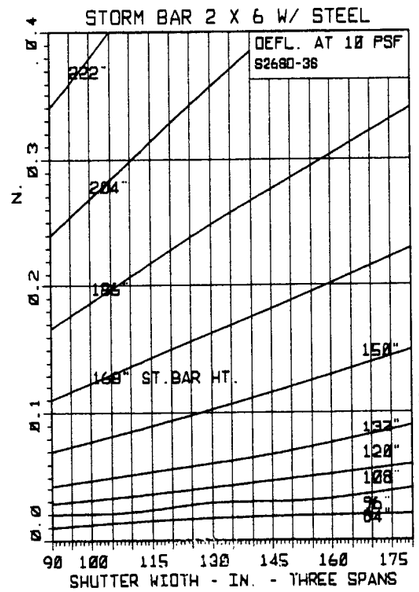
TWO SPANS

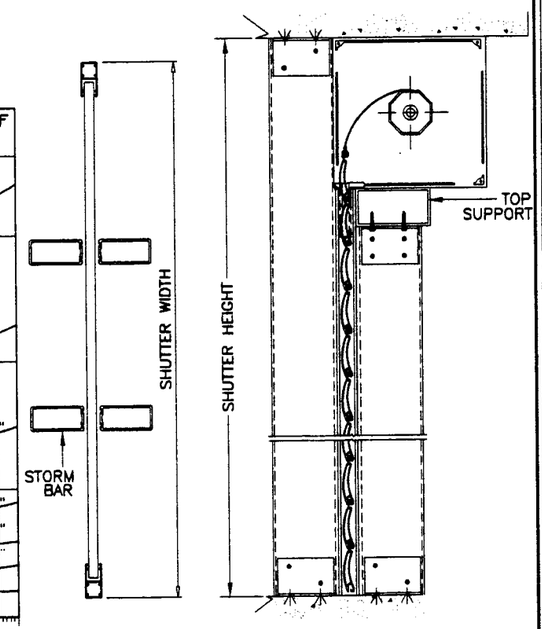
SEE SKETCH FOR REFERENCE
THE CURVES ON THESE GRAPHS SHOW STORM BAR LENGTHS











THREE SPANS

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557

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By
Miami Dade Product Control
Division

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revisions:

no	date	by	description

date: 03-15-99
scale: -
dr. by: HAMID
chk. by:

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99-10

sheet 16 of 17

ROLL SHUTTER OVERALL DEFLECTION CALCULATION SHEET

POSITIVE LOAD

ASCE 7-88: DESIGN LOAD = Pd = PSF
MULTIPLIER FACTOR = K = Pd/10 =

SHUTTER WIDTH = Sw = 1N.			
NO. OF STORM BARS USED = N =			
SPAN CONDITION = N+1 =			
SHUTTER HEIGHT = Sh = IN.			
BOX HEIGHT = BOXh = IN.			
STORM BAR HEIGHT = BL = SH-BOXh = IN.			
TRACK WIDTH = Tw = IN.			
	STEP		
SLAT	1	SLAT SPAN = Ls = (Sw − 2 * Tw)/(N + 1) FROM GRAPHS CHECK SLAT SPAN FOR DESIGN LOAD AND SPAN CONDITION TO MEET DEFLECTION < L/30 OR 2". AND STRESSES LESS THAN ALLOWABLE	
	2	FROM DEFLECTION GRAPH FOR 10 PSF READING FOR ABOVE SLAT SPAN = R1 DEFLECTION OF SLAT = D1 = K * R1	→
STORM BAR	3	FROM GRAPHS SELECT STORM BAR FOR ABOVE SHUTTER WIDTH, SHUTTER HEIGHT, DESIGN LOAD & SPAN CONDITION TO MEET DEFLECTION < L/30 OR 2". AND STRESSES LESS THAN ALLOWABLE TRY STORM BAR SIZE :	
	4	FROM DEFLECTION GRAPH FOR 10 PSF READING FOR ABOVE STORM BAR = R2 DEFLECTION OF STORM BAR = Db = K * R2 EFFECT ON SLATS = D2 = Db/2	→
HEADER (IF THERE IS NO HEADER SKIP STEPS 5 & 6.)	5	FROM GRAPHS SELECT HEADER SIZE FOR ABOVE SHUTTER WIDTH, SHUTTER HEIGHT, DESIGN LOAD & SPAN CONDITION TO MEET DEFLECTION < L/30 OR 2". AND STRESSES LESS THAN ALLOWABLE. TRY HEADER SIZE:	
	6	FROM DEFLECTION GRAPH FOR 10 PSF READING FOR ABOVE HEADER = R3 DEFLECTION OF HEADER = Dh = K * R3 EFFECT ON SLATS = D3 = Dh/4	→
	7	TOTAL DEFLECTION = D = D1+D2+D3 IN.	→
		Ls/30	→

NEGATIVE LOAD

ASCE 7-88: DESIGN LOAD = Pd = PSF
MULTIPLIER FACTOR = K = Pd/10 =

SHUTTER WIDTH = Sw = 1N.			
NO. OF STORM BARS USED = N =			
SPAN CONDITION = N+1 =			
SHUTTER HEIGHT = Sh = IN.			
BOX HEIGHT = BOXh = IN.			
STORM BAR HEIGHT = BL = SH-BOXh = IN.			
TRACK WIDTH = Tw = IN.			
	STEP		
SLAT	1	SLAT SPAN = Ls = (Sw − 2 * Tw)/(N + 1) FROM GRAPHS CHECK SLAT SPAN FOR DESIGN LOAD AND SPAN CONDITION TO MEET DEFLECTION < L/30 OR 2". AND STRESSES LESS THAN ALLOWABLE	
	2	FROM DEFLECTION GRAPH FOR 10 PSF READING FOR ABOVE SLAT SPAN = R1 DEFLECTION OF SLAT = D1 = K * R1	→
STORM BAR	3	FROM GRAPHS SELECT STORM BAR FOR ABOVE SHUTTER WIDTH, SHUTTER HEIGHT, DESIGN LOAD & SPAN CONDITION TO MEET DEFLECTION < L/30 OR 2". AND STRESSES LESS THAN ALLOWABLE TRY STORM BAR SIZE :	
	4	FROM DEFLECTION GRAPH FOR 10 PSF READING FOR ABOVE STORM BAR = R2 DEFLECTION OF STORM BAR = Db = K * R2 EFFECT ON SLATS = D2 = Db/2	→
HEADER	5	FROM GRAPHS SELECT HEADER SIZE FOR ABOVE SHUTTER WIDTH, SHUTTER HEIGHT, DESIGN LOAD & SPAN CONDITION TO MEET DEFLECTION < L/30 OR 2". AND STRESSES LESS THAN ALLOWABLE. TRY HEADER SIZE:	
	6	FROM DEFLECTION GRAPH FOR 10 PSF READING FOR ABOVE HEADER = R3 DEFLECTION OF HEADER = Dh = K * R3 EFFECT ON SLATS = D3 = Dh/4	→
	7	TOTAL DEFLECTION = D = D1+D2+D3 IN.	→
		Ls/30	→

NOTES:

1. IF FOR NEGATIVE LOAD D > Ls/30
   OR IF FOR POSITIVE LOAD D > Ls/30 OR 2".
   REPEAT ABOVE CALCULATIONS WITH LARGER STORM BARS AND OR LARGER HEADER.
2. DIFFERENT SIZE STORM BARS/HEADERS MAY BE USED FOR POSITIVE AND NEGATIVE LOADS.
3. USE ADDITIONAL CALCULATION SHEETS FOR DIFFERENT SHUTTERS ON THE SAME JOB.

MINIMUM SEPARATION REQD. FROM GLASS

FOR INSTALLATIONS ABOVE 30 FT. OF GRADE DUE TO WIND LOAD	FOR INSTALLATIONS UPTO 30 FT. OF GRADE DUE TO LARGE MISSILE IMPACT	
	MAX. SPAN UPTO	SEPARATION
OVERALL DEFLECTION + 1"	50"	2-1/4"
	58"	3"
	74"	3-1/4"

NOTE: NO PART OF SHUTTER SHALL BE UNDER 30' ABOVE GRADE TO WAIVE LARGE MISSILE IMPACT REQUIREMENT.

Engr: DR. HUMAYOUN FAROOQ
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as complies with the Florida
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