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)

Southern Metal Products, LLC.
450 W. McNab Road
Fort Lauderdale, FL 33309

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. 94-52, titled "Rolling Shutter Details", prepared by Al-Farooq Corporation. dated 07/20/94, with last revision on 05/01/03, sheets 1 through 12 of 12 including 1A, 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 the 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 # 00-0501.10** and consists of this page 1 as well as approval document mentioned above.
The submitted documentation was reviewed by **Candido F. Font, P.E.**

7/10/03

PRODUCT CONTROL ACCEPTED

Southern Metal Products, LLC.

NOTICE OF ACCEPTANCE: EVIDENCE SUBMITTED

(For File ONLY. Not part of NOA)

A. DRAWINGS

1. *Drawing prepared by Al-Farooq Corporation, titled "Rolling Shutter Details," Drawing No. 94-52, dated July 20, 1994, last revised May 01, 2003, sheets 1 through 12 of 12,including 1A signed and sealed by Dr. Humayoun Farooq, P.E. on May 23, 2003.*

B. TESTS

1. *Test report on Uniform Static Air Pressure Test of extruded aluminum roll-up shutters, prepared by Hurricane Engineering & Testing, Inc., Report No. HETI-94-214, dated June 29, 1994, signed and sealed by Arshad Viqar, P.E.*
2. *Test report on Large Missile Impact Test and Cyclic Wind Pressure Test of extruded aluminum roll-up shutters, prepared by Hurricane Engineering & Testing, Inc., Report No. HETI-94-169, dated June 29, 1994, signed and sealed by Arshad Viqar, P.E.*
3. *Test report on Large Missile Impact Test and Cyclic Wind Pressure Test of extruded aluminum roll-up shutters prepared by Hurricane Engineering & Testing Inc., Report No. HETI 94-383, dated November 30, 1994, signed and sealed by Hector M. Medina, P.E.*
4. *Test report on Uniform Static Air Pressure Test of extruded aluminum roll-up shutters prepared by Hurricane Engineering & Testing, Inc., Report No. HETI-94-381, dated November 28, 1994, signed and sealed by Hector M. Medina, P.E.*
5. *Test Report on Large Missile Impact Test of H.D. extruded aluminum roll-up shutter prepared by Hurricane Engineering & Testing Inc., Report No. HETI 94-381i, dated November 28, 1994, signed and sealed by Hector M. Medina, P.E.*

C. CALCULATIONS

1. *Comparative analysis, slat, storm bar, header, mullion and anchor calculations, 142 total pages, dated July 28, 1995, signed and sealed by Humayoun Farooq, P.E.*

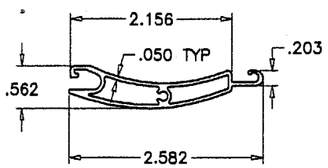
D. MATERIAL CERTIFICATIONS

1. *Mill Certified Inspection Report issued by The William Bonnell Co., dated July 21, 1994, with chemical composition and mechanical properties for aluminum alloy 6364-T5.*
2. *Tensile Test Report No. HETI-94-18 prepared by Hurricane Engineering & Testing, Inc. dated September 7, 1994, tested as per ASTM E8-93, signed and sealed by Hector M. Medina, P.E.*

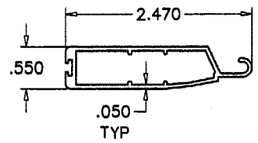
E. STATEMENTS

1. *Letter issued by the All Broward Hurricane Panel, Inc., dated June 10, 1998, signed by Mr. LeRoy Peterson, informing Mr. Raul Rodriguez that they purchased the Miami-Dade Product Approvals for the Wrono Enterprises Corporation's products. Additionally, they are requesting to replace the Wrono Enterprises Corporation's name with All Broward Hurricane Panel, Inc.*
2. *Copy of the United States Bankruptcy Court, Southern District of Florida, Case No. 98-20840-BKC-PGH, Chapter 7, in reference to Wrono Enterprise Corporation.*
3. *Articles of Merger, filed with the State of Florida on 05/25/01signed by L. A. Paterson from All Broward Hurricane Panel, Inc. and M. Iseneich from Southern Metal Products, LLC.*

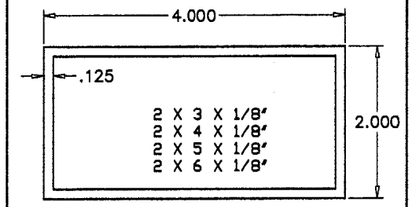
Candido F. Font, P. E.
Senior Product Control Examiner
NOA No 02-0904.04
Expiration Date: July 23, 2008
Approval Date: July 10, 2003



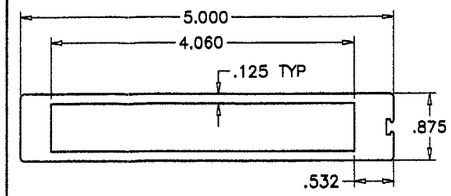
EXTRUDED ALUMINUM SLAT
6463-T5



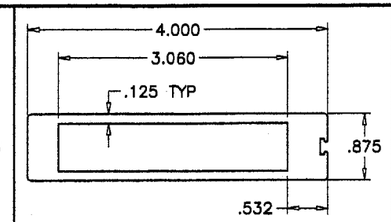
BOTTOM SLAT
6063-T6



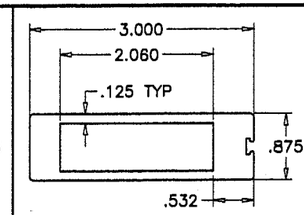
MULLION
6063-T6



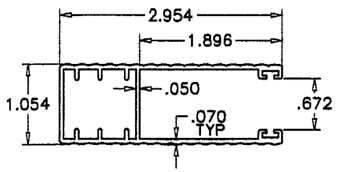
1 X 5 STORM BAR
6005-T5



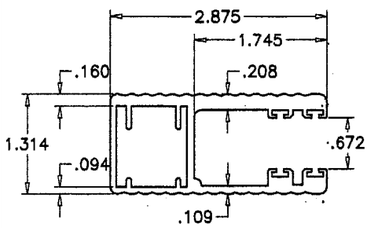
1 X 4 STORM BAR
6005-T5



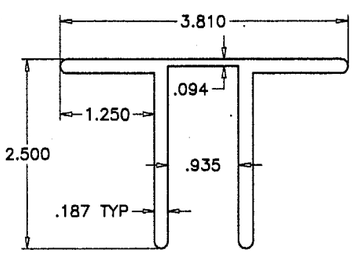
1 X 3 STORM BAR
6005-T5



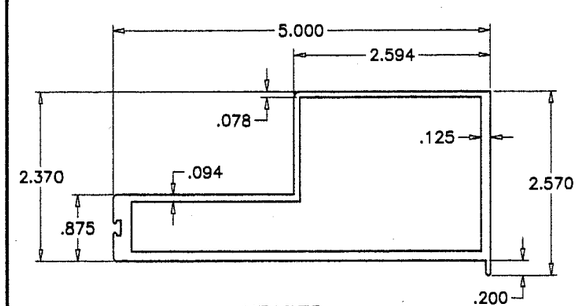
TRACK A
6063-T6



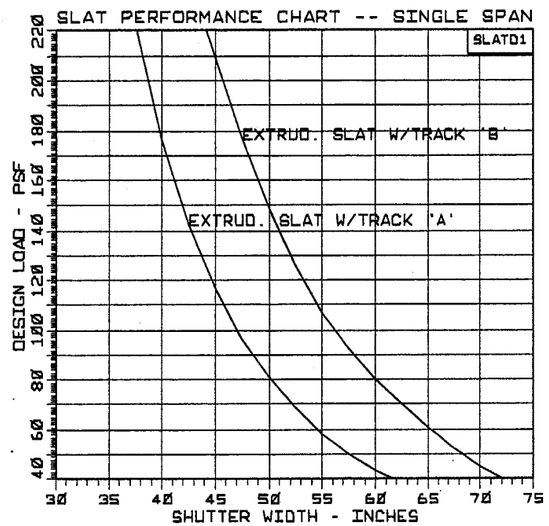
TRACK B
6063-T6

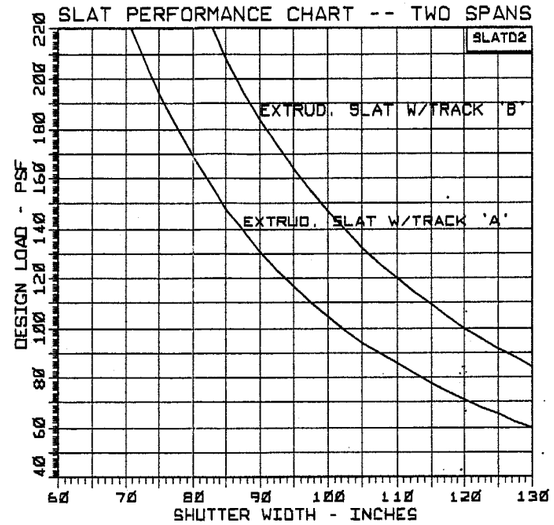


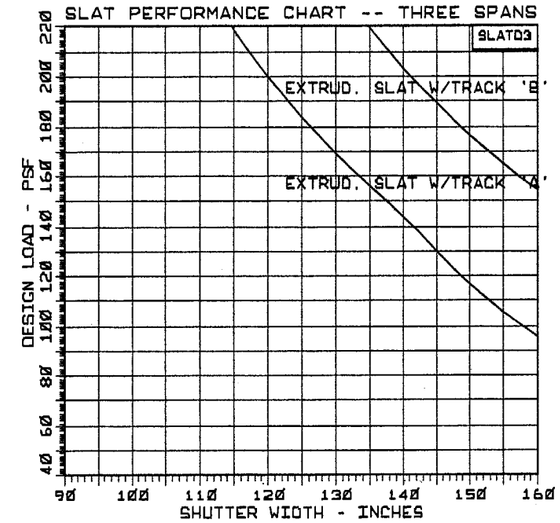
ALUM CLIP
6005-T5

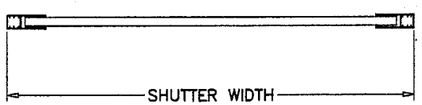


HEADER
6005-T5

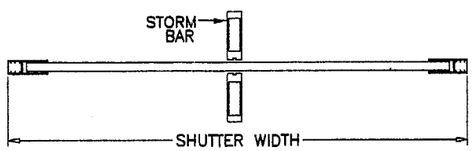




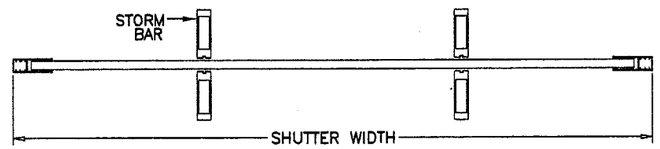




SINGLE SPANS



TWO SPANS



THREE SPANS

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 7-88. ASCE 7-93, ASCE 7-95 OR ASCE 7-98 AS REQUIRED BY PREVAILING BUILDING CODE.
2. DESIGN CRITERIA FOR ALUMINUM, MINIMUM MECHANICAL PROPERTIES, AND SAFETY FACTORS ARE IN ACCORDANCE WITH THE "ALUMINUM CONSTRUCTION MANUAL" LATEST EDITION.
3. ALL EXTRUSIONS SHALL BE ALLOYS AS SHOWN ON DETAILS.
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.
10. ROLL UP MECHANISM IS NOT PART OF THIS APPROVAL IF SHALL BE CERTIFIED BY AN INDEPENDENT TESTING AGENCY.

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

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

FOR INSTALLATION DETAILS SEE SHEETS 1 THRU 5.
FOR COMPONENT SIZES/SPANS/DESIGN LOAD RATING SEE SHEET 7 THRU 12.

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557
C.A.N. 3538
MAY 28 2003

PRODUCT REVISED
as complying with the Florida Building Code
Acceptance No. 02-0904.04
Expiration Date 07/23/08
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\94-52ABH

ROLLING SHUTTER DETAILS

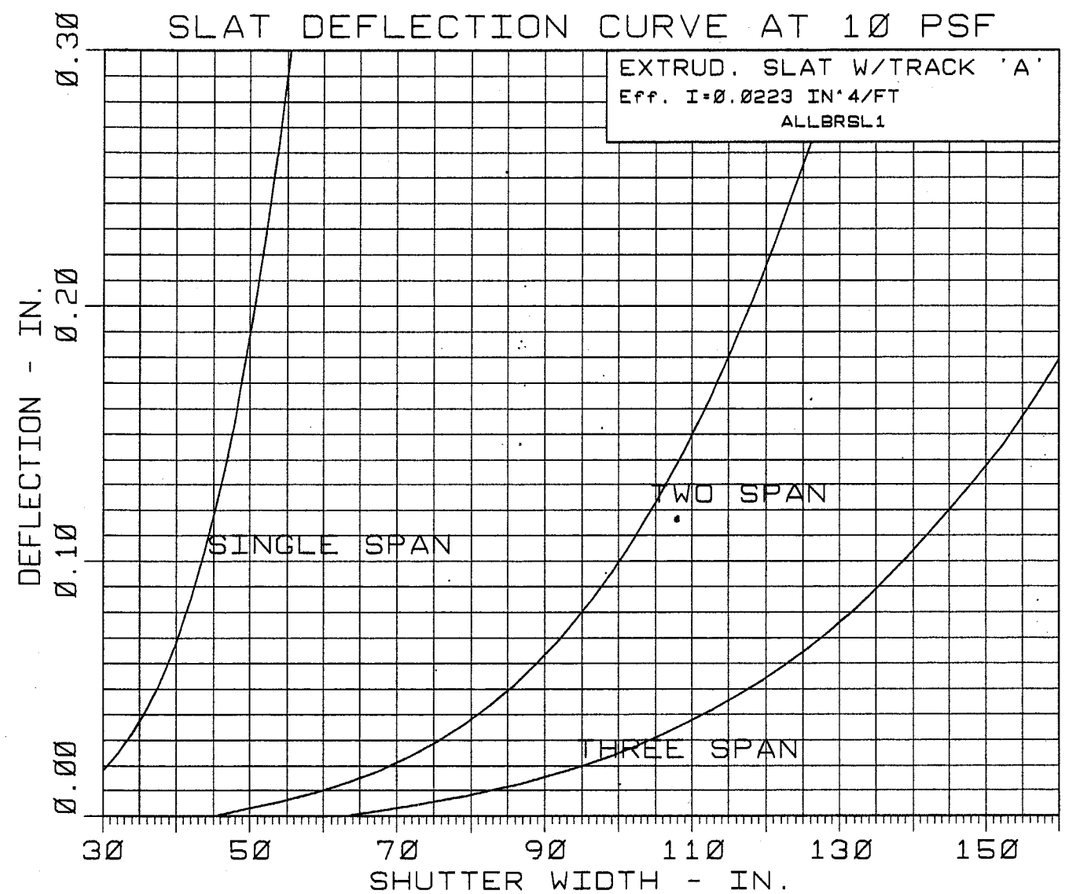
SOUTHERN METAL PRODUCTS, LLC - D.B.A.
ALL BROWARD HURRICANE PANEL INC.
450 WEST McNAB ROAD
FT. LAUDERDALE, FL. 33309
TEL. 1-800-432-1803 FAX. 954-973-3928

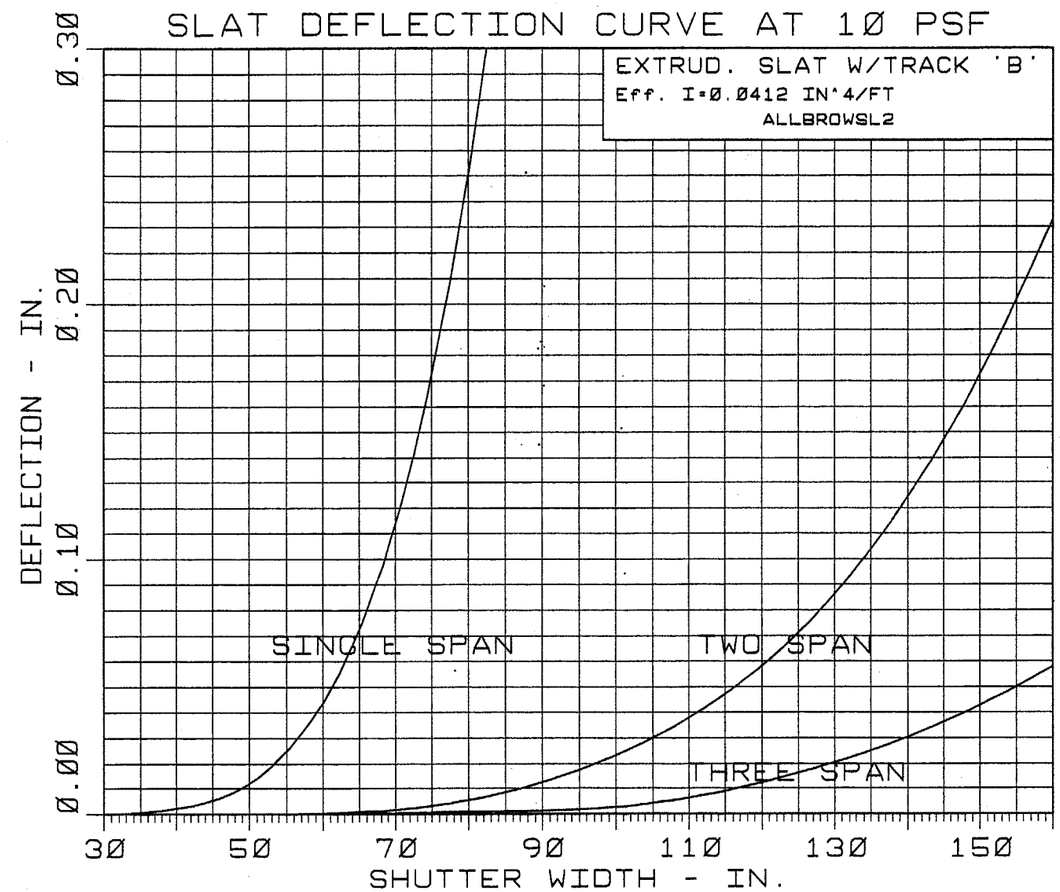
revisions:

no	date	by	description
B	1.11.95	T.H.	COMPLETE REVISION
C	11.01.95	T.H.	CHARTS REVISED
D	01.23.96	T.H.	SLAT ALLOY REV. NOTE ADDED
E	3.15.98	T.H.	CO. NAME CHANGED
F	05.01.03	T.H.	UPDATED FOR FBC, CO. NAME REV

date: 07-20-94
scale: 1/2" = 1"
dr. by: HAMID
chk. by:

drawing no.
94-52





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revisions:

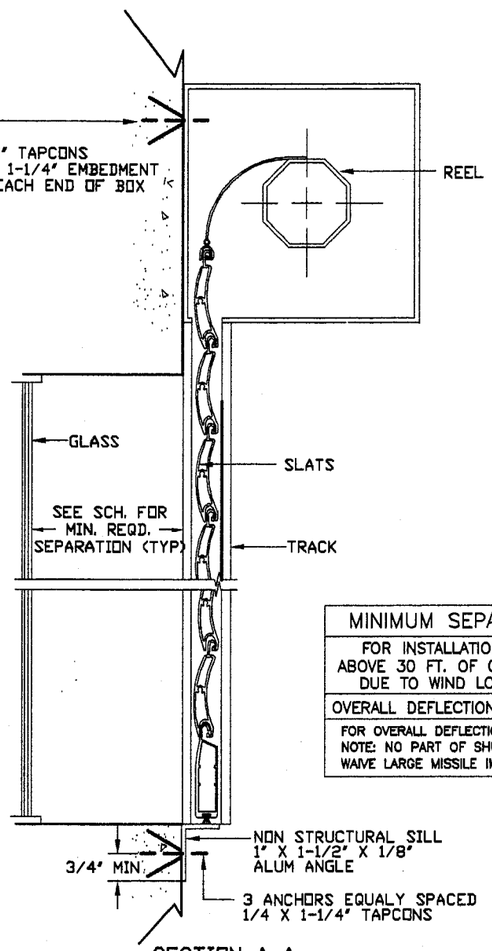
no	date	by	description
F	05.01.03	T.H.	DEFL. GRAPHS ADD.

date: 07-20-94
scale: 1/2" = 1"
dr. by: HAMID
chk. by:

drawing no.
94-52

sheet 1A of 12

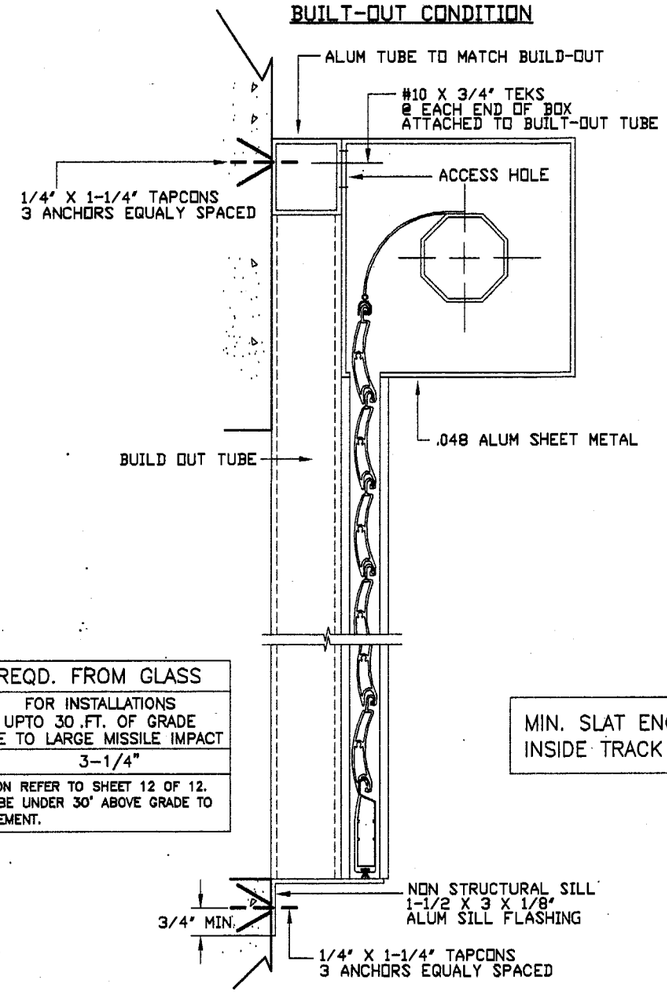
WALL MOUNTS



SECTION A-A

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
OVERALL DEFLECTION + 1"	3-1/4"
FOR OVERALL DEFLECTION CALCULATION REFER TO SHEET 12 OF 12. NOTE: NO PART OF SHUTTER SHALL BE UNDER 30' ABOVE GRADE TO WAIVE LARGE MISSILE IMPACT REQUIREMENT.	

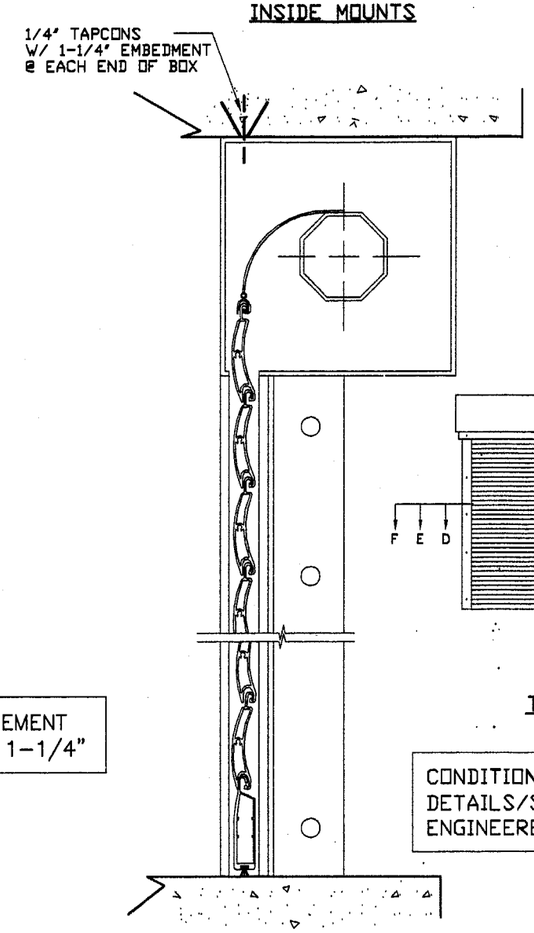
BUILT-OUT CONDITION



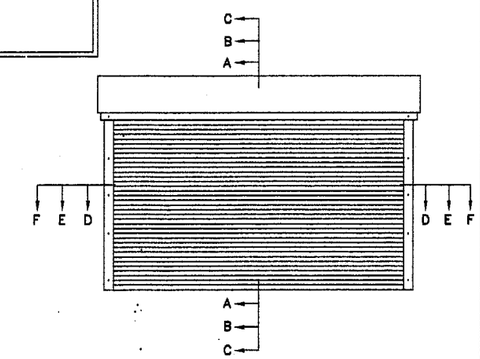
SECTION B-B

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

INSIDE MOUNTS



SECTION C-C



TYPICAL ELEVATION

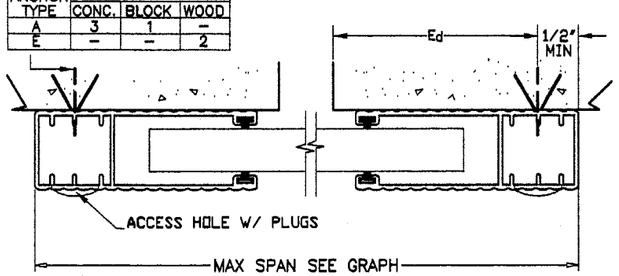
CONDITIONS NOT COVERED BY DETAILS/SCHEDULES SHALL BE ENGINEERED ON JOB TO JOB BASIS.

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

Ed = TYPICAL EDGE DISTANCE
CONC. & BLOCK = 12d (12 ANCHOR DIAMETERS)
WOOD = 5d
FOR LESSER EDGE DISTANCES SEE SHEET 6 OF 12.

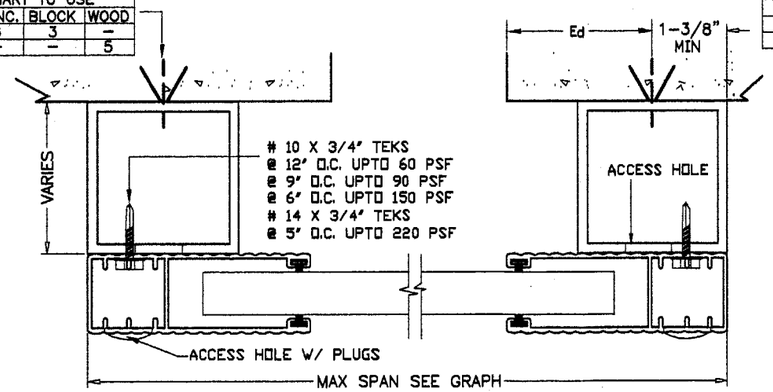
FOR CHARTS REFERED ON DETAILS SEE SHEET 6.

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	3	1	–
E	–	–	2



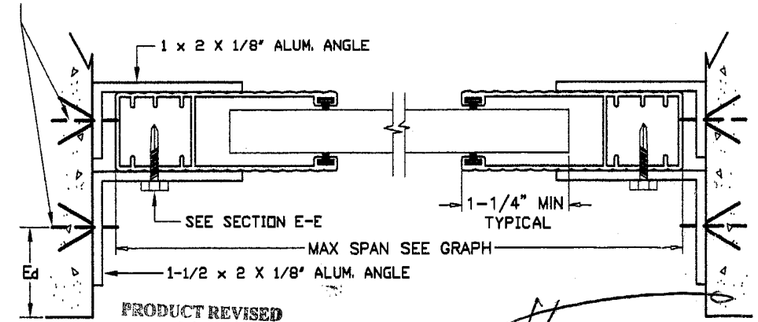
SECTION D-D

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	6	3	–
E	–	–	5



SECTION E-E

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	5	1	–
E	–	–	2



SECTION F-F

PRODUCT REVISED
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By
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MAY 23 2003

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revisions:

no	date	by	description
F	05.01.03	T.H.	CO. NAME REV.

date: 07-20-94
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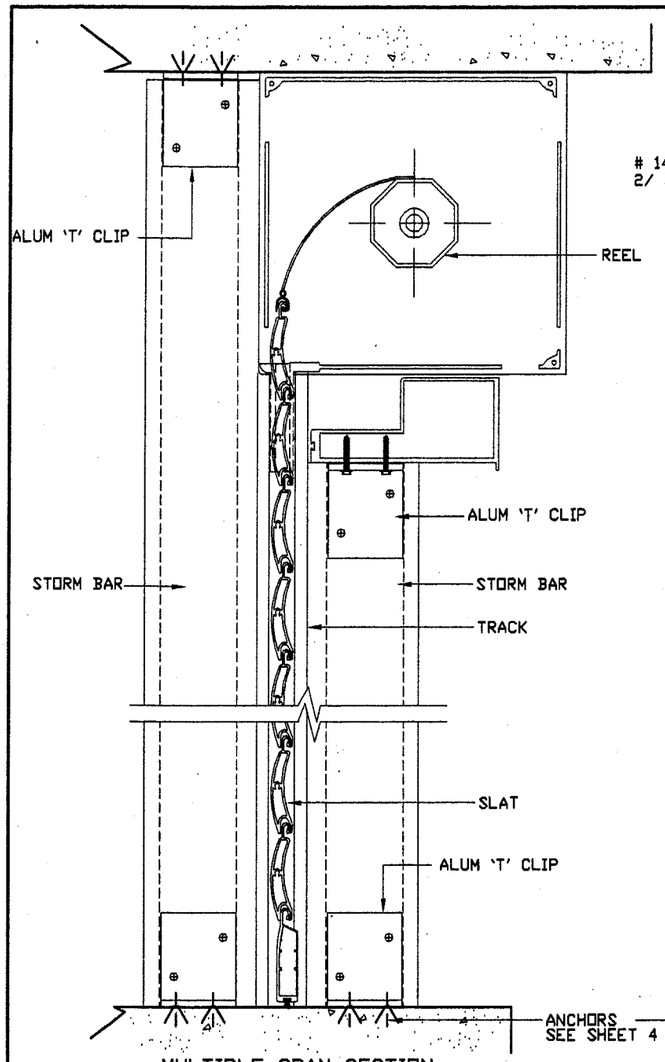
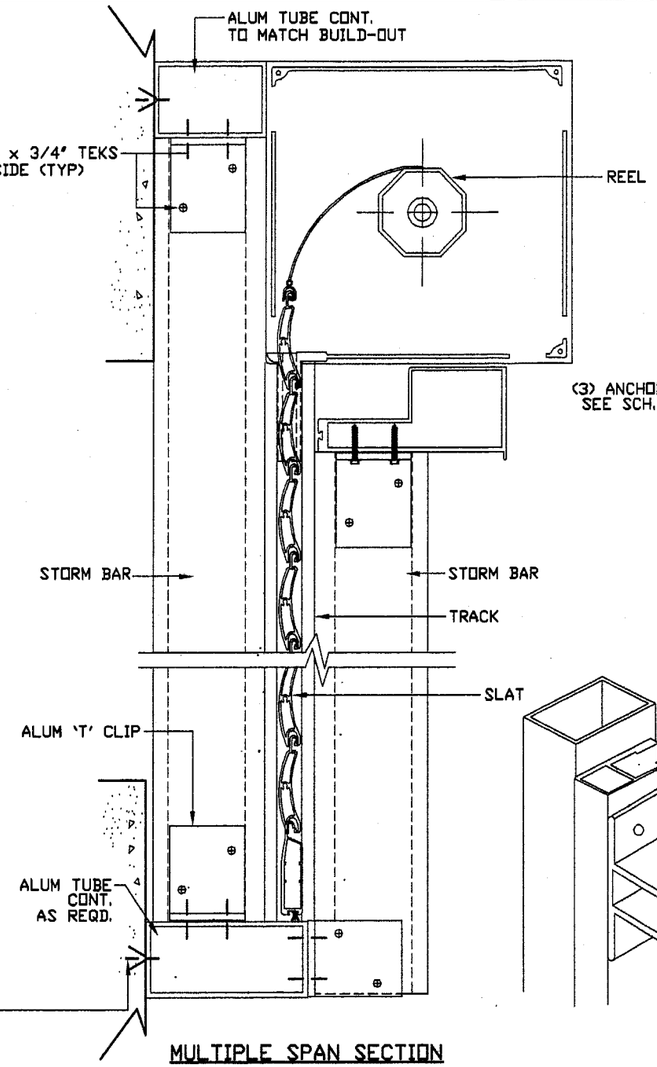
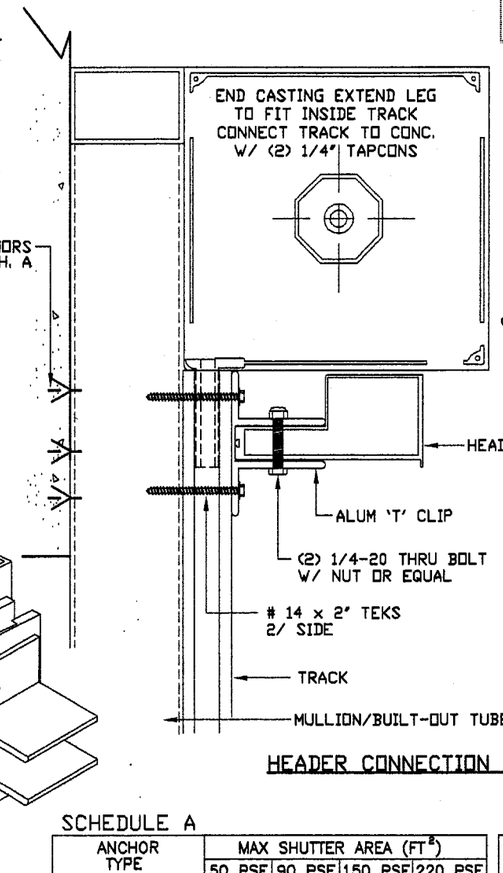


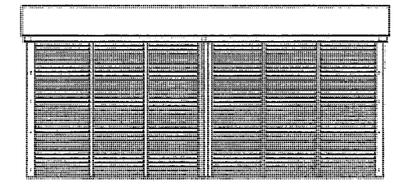
MULTIPLE SPAN SECTION
CEILING TO FLOOR MOUNTS



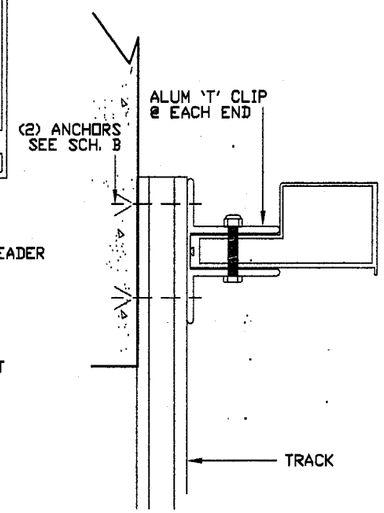
MULTIPLE SPAN SECTION
WALL MOUNTS



HEADER CONNECTION DETAIL



TYPICAL ELEVATION



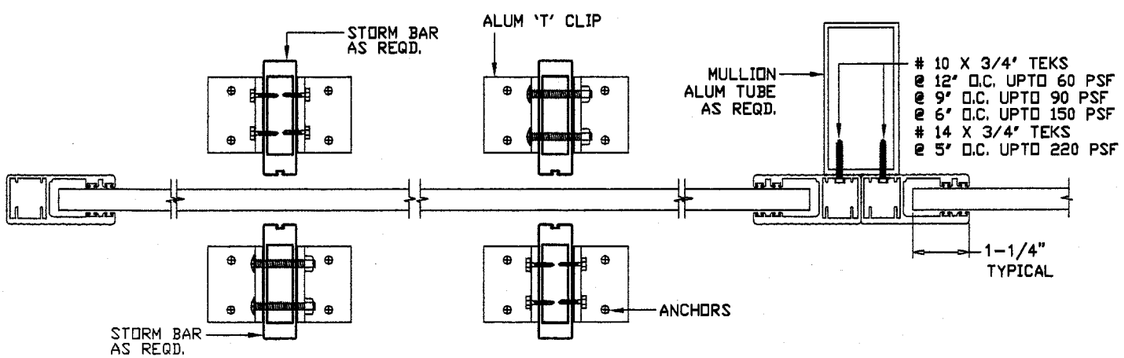
SCHEDULE A

ANCHOR TYPE		MAX SHUTTER AREA (FT^2)			
		50 PSF	90 PSF	150 PSF	220 PSF
1/4" ø TAPCONS	CONC.	136.4	75	45	31
	BLOCK	45	25	15	10
3/8" ø RAWL BOLT	CONC.	649	360	216	147
	BLOCK	134.8	74.8	44.9	30.6
#14 S.M.S.	WOOD	114	63.6	38.1	26

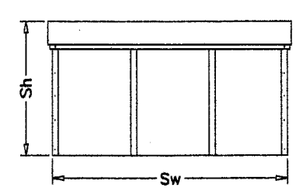
SCHEDULE B

ANCHOR TYPE		MAX SHUTTER AREA (FT^2)
		Pd = 60 PSF
1/4" ø TAPCONS	CONC.	82.6
	BLOCK	27.3
#14 S.M.S.	WOOD	69.3

ALSO REFER TO HEADER CAPACITY GRAPH TO DECIDE THE SHUTTER AREA.
ANCHORS FOR HEADER SHOULD NOT INTERFERE WITH TYPICAL TRACK ANCHORS



MULTIPLE SPAN PLAN
HEADER NOT SHOWN



$$\text{SHUTTER AREA} = FT^2 = \frac{Sw \times Sh}{144}$$

Sh = SHUTTER HEIGHT INCHES
Sw = SHUTTER WIDTH INCHES

Engr: DR. HUMAYOUN FAROOQ
STRUCTURES
FLA. PE # 16557
C.A.N. 3538

MAY 23 2003

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1235 SW 87 AVE
MIAMI, FLORIDA 33174
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ROLLUP\94-52ABH

ROLLING SHUTTER DETAILS

SOUTHERN METAL PRODUCTS, LLC - D.B.A.
ALL BROWARD HURRICANE PANEL INC.
450 WEST McNAB ROAD
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F	05.01.03	T.H.	ANCHOR SCH. REV, CO. NAME REV

date: 07-20-94
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chk. by:

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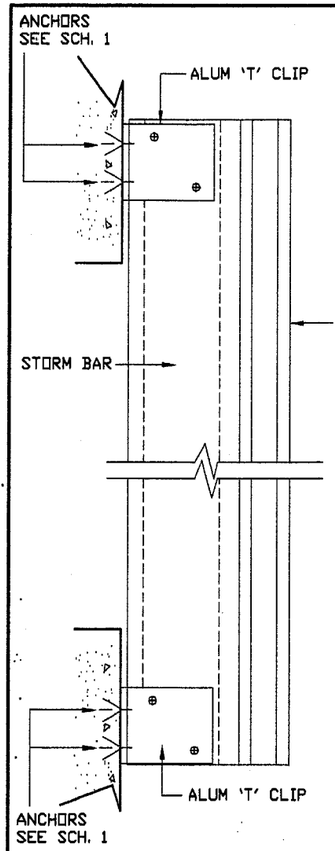
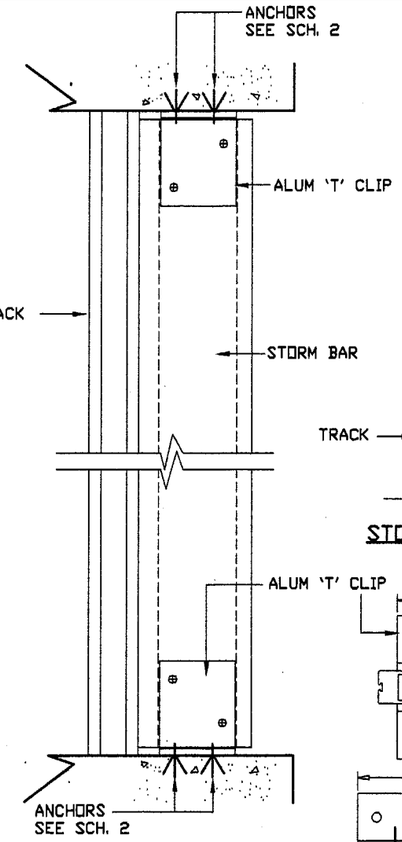
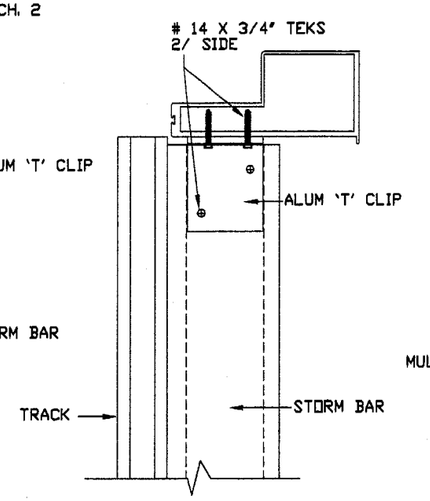


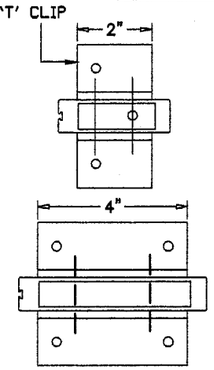
STORM BAR CONNECTION TO WALL



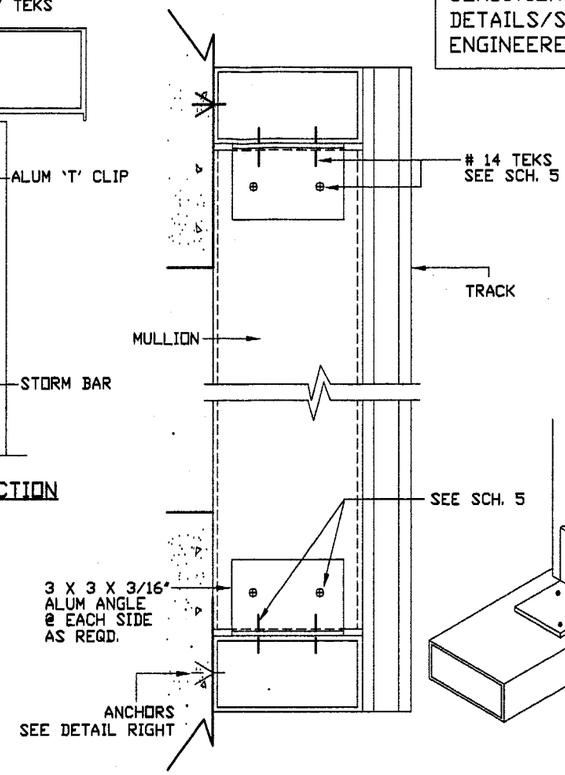
STORM BAR CONNECTION TO CEILING & FLOOR

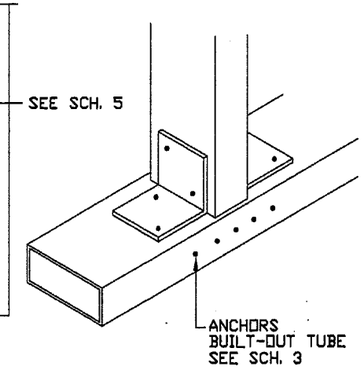


STORM BAR CONNECTION TO HEADER

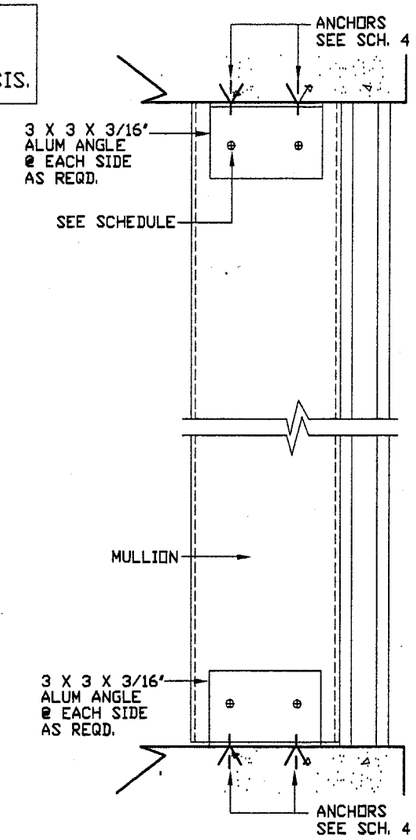


CONDITIONS NOT COVERED BY DETAILS/SCHEDULES SHALL BE ENGINEERED ON JOB TO JOB BASIS.





MULLION CONNECTION TO WALL



MULLION CONNECTION TO CEILING & FLOOR

SCHEDULE 1

STORM BAR CONNECTION TO WALL NO. OF FASTENERS REQD. EACH SIDE				
STORM BAR SIZE	FASTENER TYPE	BASE MATERIAL		
		CONC.	BLOCK	WOOD
1 X 3 X 1/8"	A	2	4	–
	B	3	–	–
	C	3	5	–
	D	2	3	–
	E	–	–	2
1 X 4 X 1/8"	A	2	6	–
	B	5	–	–
	C	5	7	–
	D	2	5	–
	E	–	–	3
1 X 5 X 1/8"	A	3	9	–
	B	6	–	–
	C	6	9	–
	D	3	6	–
	E	–	–	4

SCHEDULE 2

STORM BAR FLOOR/CEILING CONNECTION NO. OF FASTENERS REQD.			
STORM BAR SIZE	FASTENER TYPE	CONC.	WOOD
1 X 3 X 1/8"	A	3	–
	D	3	–
1 X 4 X 1/8"	A	5	–
	D	5	–
1 X 5 X 1/8"	A	7	–
	D	6	–

SCHEDULE 3

BUILT-OUT TUBE CONNECTION TO WALL NO. OF ANCHORS REQD. @ EACH MULLION							
MULLION SIZE	ANCHOR TYPE	TOP			BOTTOM		
		CONC.	BLOCK	WOOD	CONC.	BLOCK	WOOD
2 X 3 X 1/8"	A	2	6	–	2	4	–
	B	4	–	–	3	–	–
	C	5	6	–	3	4	–
	D	2	4	–	1	3	–
	E	–	–	3	–	–	2
2 X 4 X 1/8"	A	3	8	–	2	6	–
	B	6	–	–	4	–	–
	C	6	9	–	4	6	–
	D	3	6	–	2	4	–
	E	–	–	4	–	–	4
2 X 5 X 1/8"	A	4	–	–	3	7	–
	B	8	–	–	5	–	–
	C	8	–	–	5	7	–
	D	4	8	–	2	5	–
	E	–	–	5	–	–	3
2 X 6 X 1/8"	A	5	–	–	3	8	–
	B	–	–	–	6	–	–
	C	–	–	–	6	8	–
	D	4	–	–	3	6	–
	E	–	–	6	–	–	3

SCHEDULE 4

MULLION CONNECTION TO FLOOR & CEILING NO. OF FASTENERS REQD. EACH SIDE					
MULLION SIZE	FASTENER TYPE	TOP		BOTTOM	
		CONC.	WOOD	CONC.	WOOD
2 X 3 X 1/8"	A	3	–	2	–
	B	7	–	4	–
	C	3	–	2	–
	E	–	7	–	4
2 X 4 X 1/8"	A	3	–	3	–
	B	9	–	6	–
	C	4	–	3	–
	E	–	9	–	6
2 X 5 X 1/8"	1/2" ø KWIK BOLT	1	–	1	–
2 X 6 X 1/8"	1/2" ø KWIK BOLT	2	–	1	–

SCHEDULE 5

CLIP ANGLE CONNECTION TO MULLION AND BUILT-OUT TUBE	
MULLION SIZE	# 14 TEKS # REQD. EACH SIDE
2 X 3 X 1/8" 2 X 4 X 1/8"	2
2 X 5 X 1/8"	3
2 X 6 X 1/8"	4

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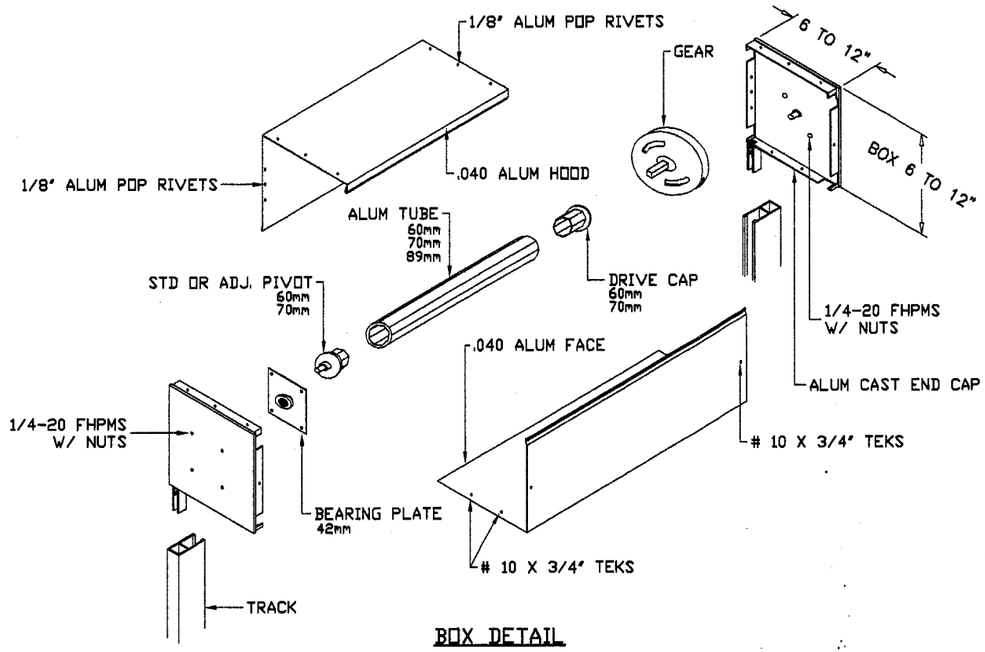
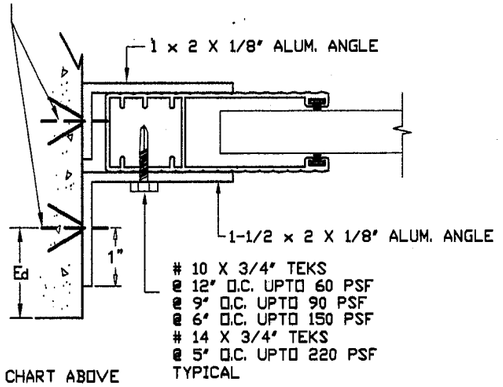


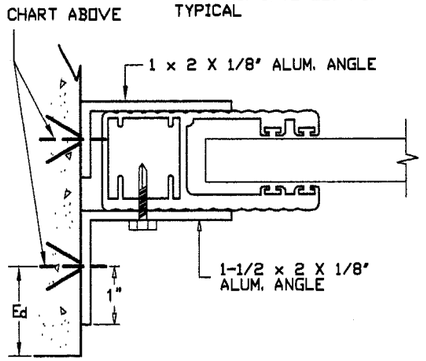
BOX DETAIL

INSIDE MOUNTS

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	5	1	–
E	–	–	3



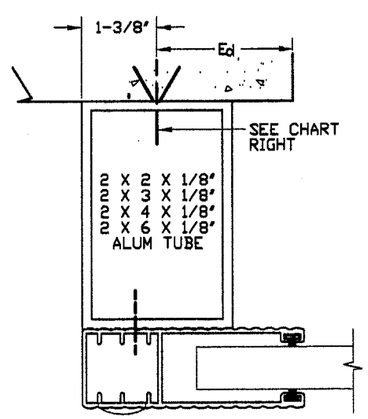
SEE CHART ABOVE



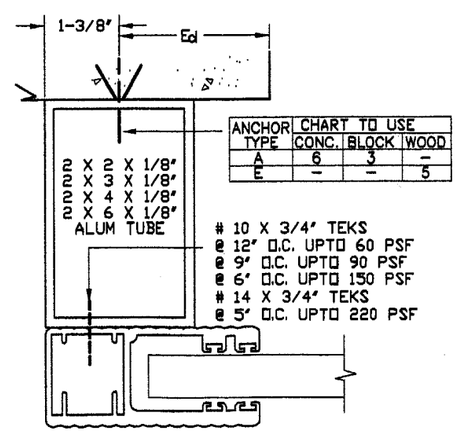
TRACK A&B

FOR CHARTS REFERED ON DETAILS SEE SHEET 6.

BUILT-OUT INSTALLATIONS



TRACK A

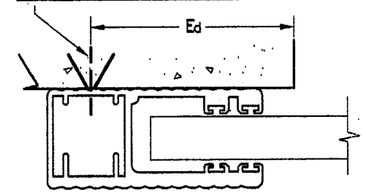


ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	6	3	–
E	–	–	5

TRACK B

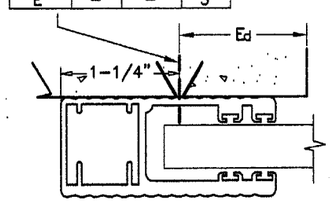
WALL MOUNTS

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	3	1	–
E	–	–	2



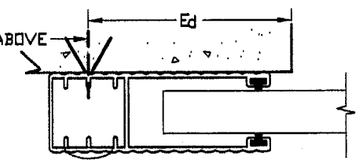
TRACK B
OPTION 1

ANCHOR TYPE	CHART TO USE		
	CONC.	BLOCK	WOOD
A	6	2	–
E	–	–	5



TRACK B
OPTION 2

SEE CHART ABOVE



TRACK A

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ROLLUP\94-52ABH

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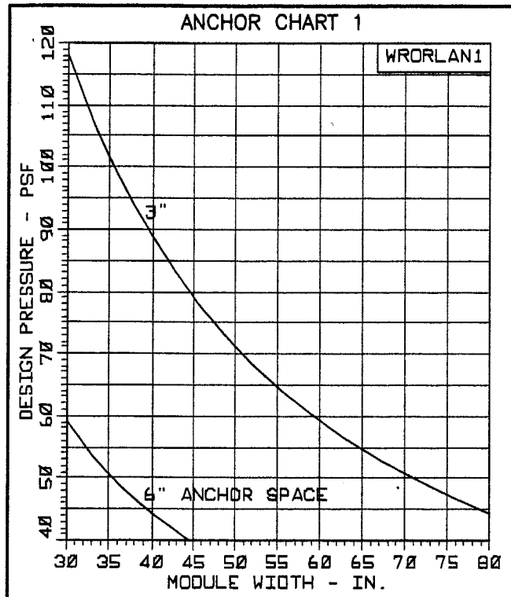
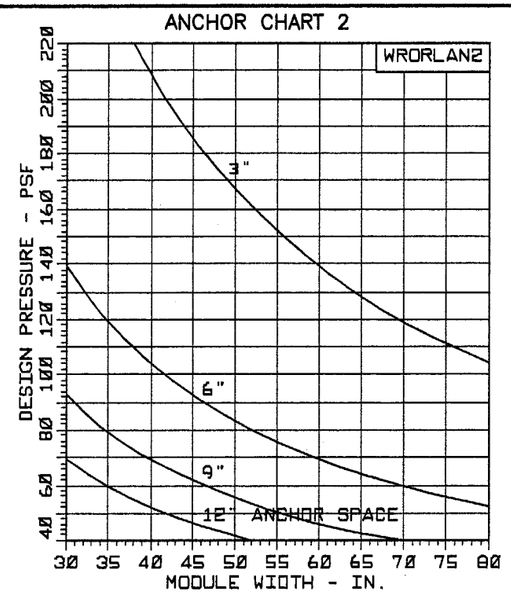
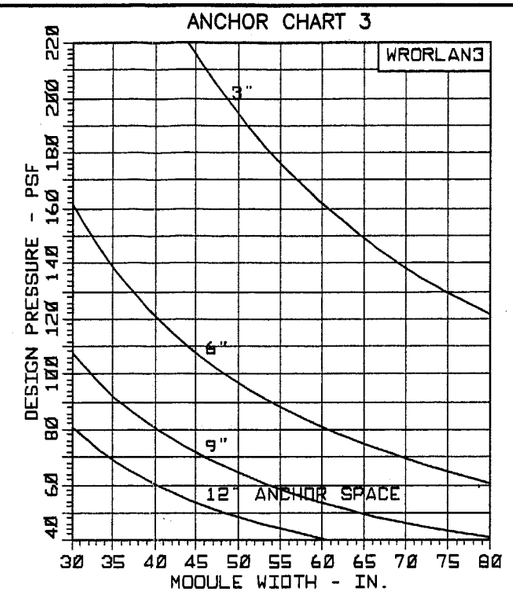
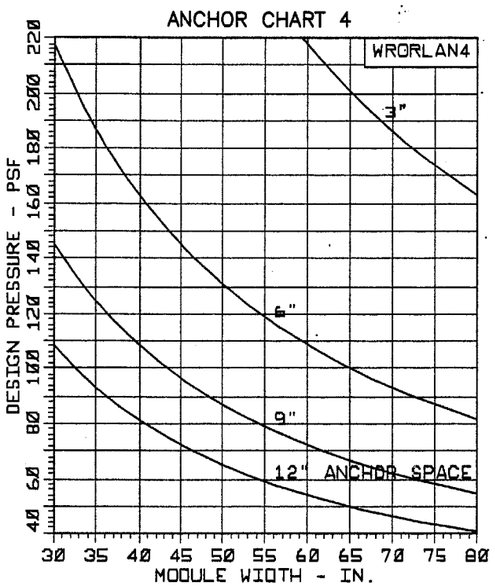
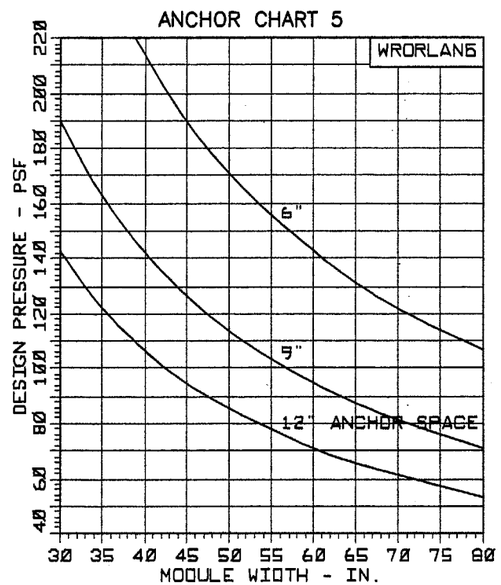
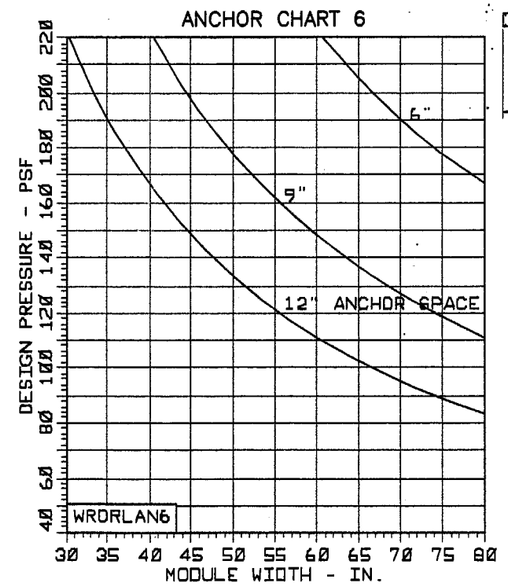


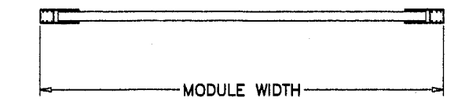




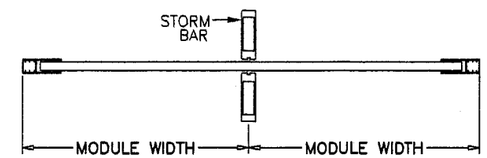




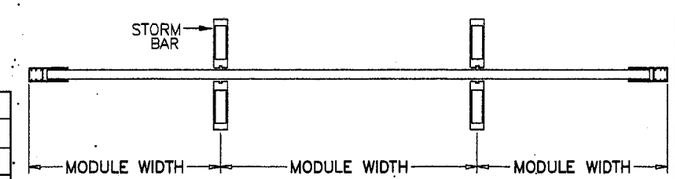




SINGLE SPANS



TWO SPANS



THREE SPANS

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

USE CHARTS 1 THRU 6 TO VERIFY ANCHOR REQUIREMENTS AND STRESS LIMITATIONS OF LOAD/SPAN COMBINATIONS.

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 Ⓐ = 1/4" TAPCON 1-3/4" EMBEDMENT TO CONCRETE
1-1/4" EMBEDMENT TO BLOCK

ANCHOR Ⓑ = #14 S.M.S. W/ RAWL SCRU-LEAD INTO CONCRETE
1-1/2" EMBEDMENT.

ANCHOR Ⓒ = 1/4" x 1-1/4" HILTI METAL HIT ANCHORS
1" EMBEDMENT TO CONCRETE OR BLOCK

ANCHOR Ⓓ = 1/4" RAWL CALK-IN, STAR 'TAMPIN' OR EQUAL.
TOTAL ANCHOR BODY INTO CONC. OR BLOCK

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

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

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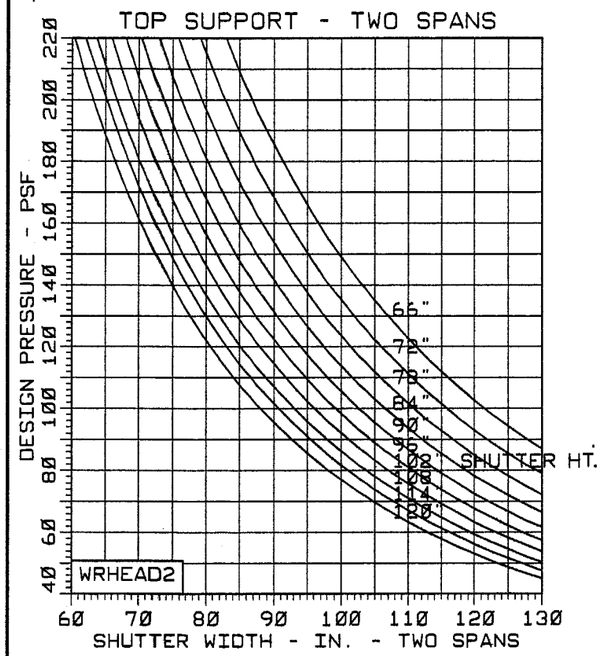
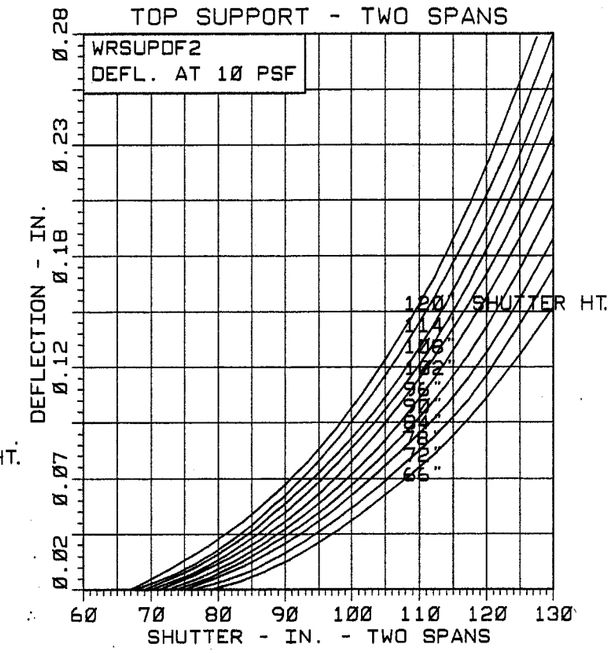
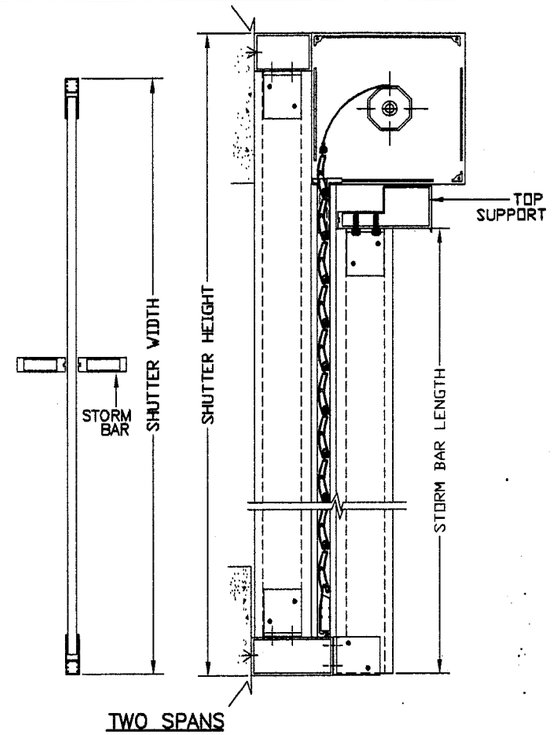
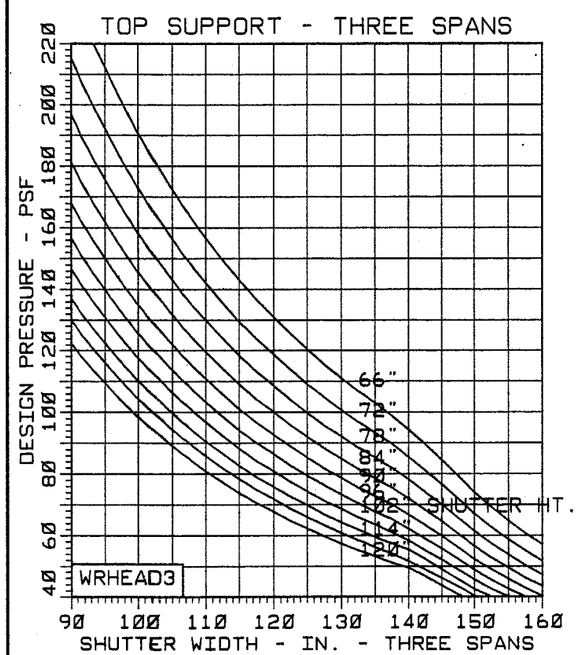
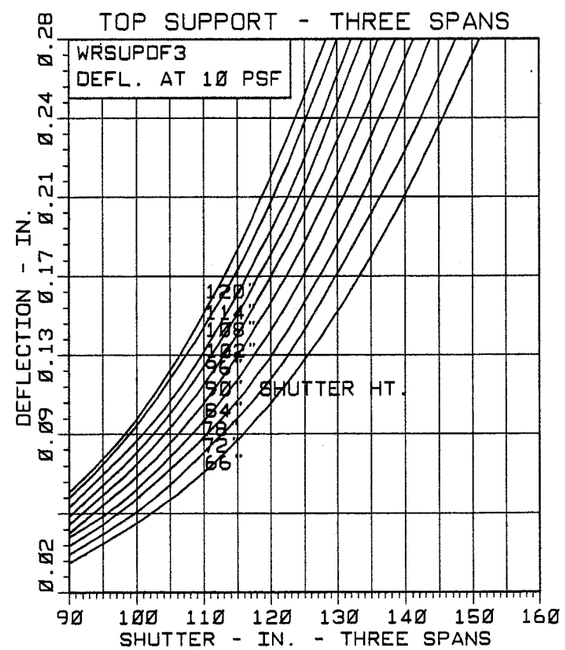


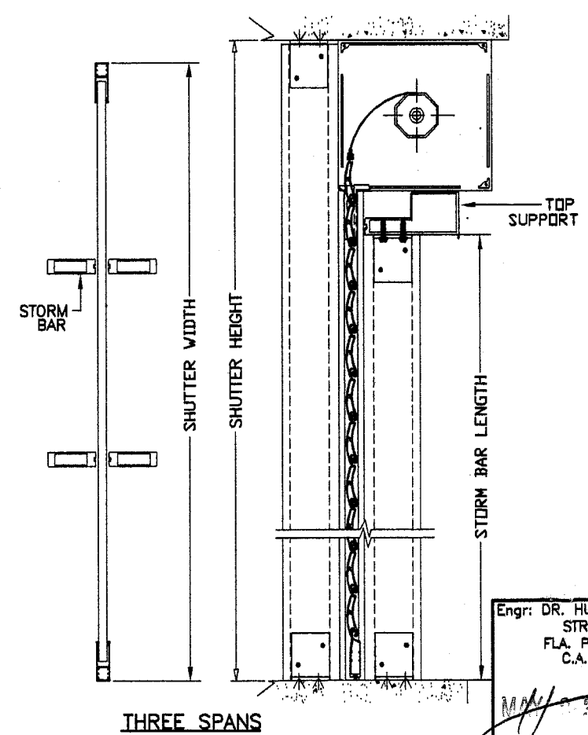




THE CURVES ON THESE GRAPHS SHOW SHUTTER HEIGHT
SEE SKETCH FOR REFERENCE







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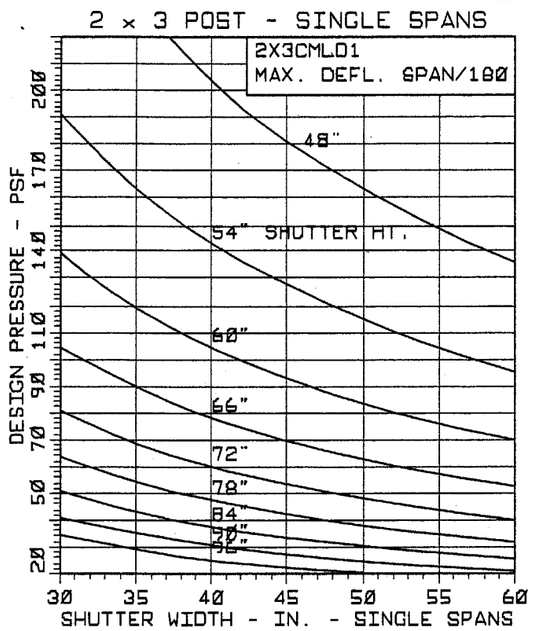
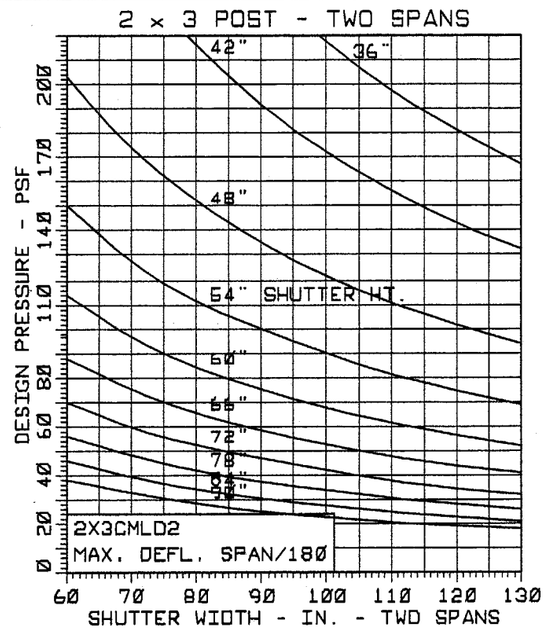
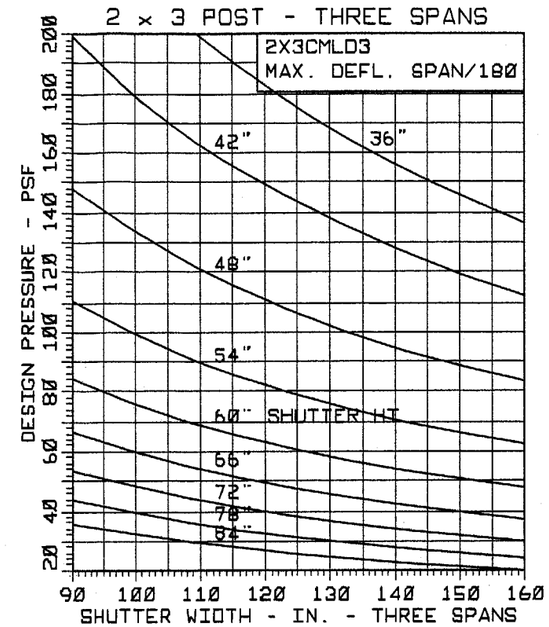
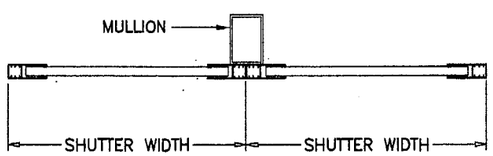
sheet 7 of 12









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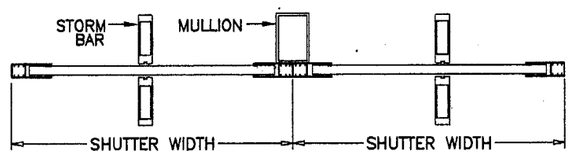

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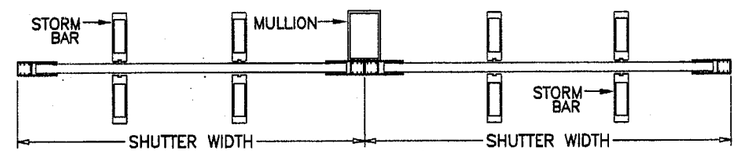

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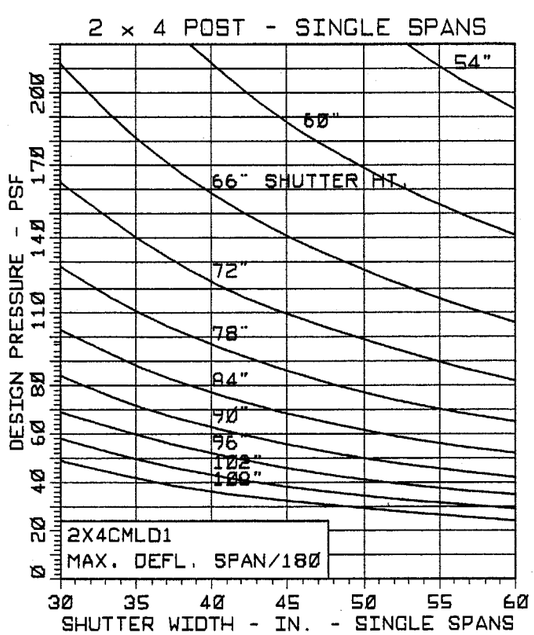

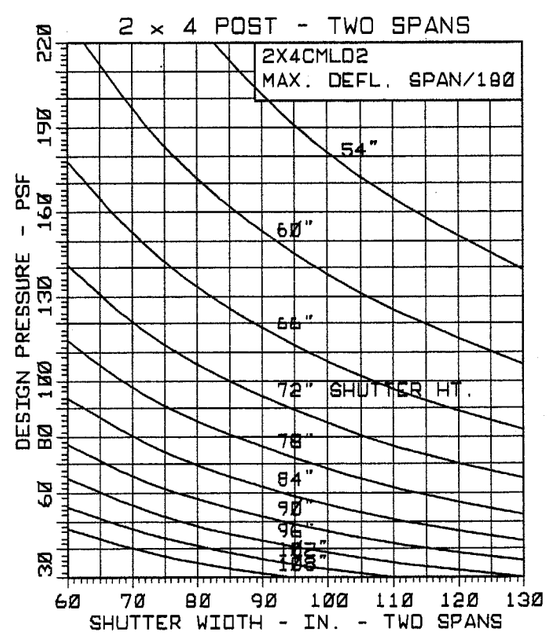

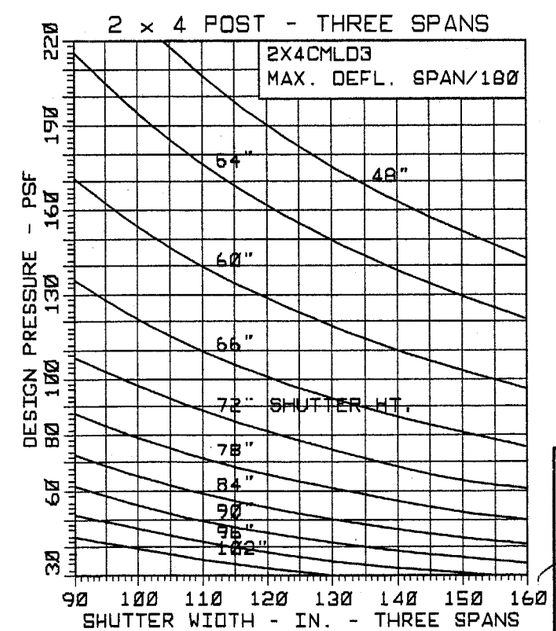

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ROLLUP\94-52ABH

ROLLING SHUTTER DETAILS

SOUTHERN METAL PRODUCTS, LLC - D.B.A.
ALL BROWARD HURRICANE PANEL INC.
450 WEST McNAB ROAD
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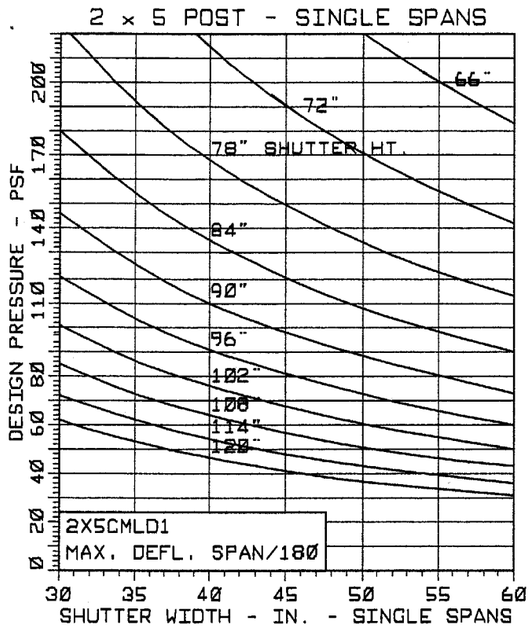

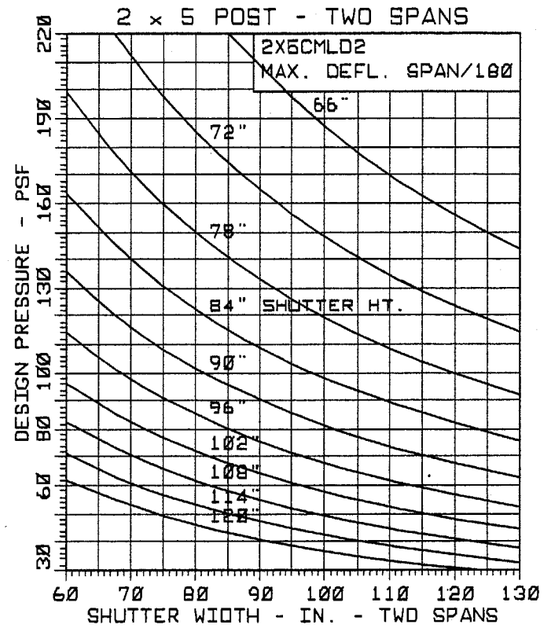

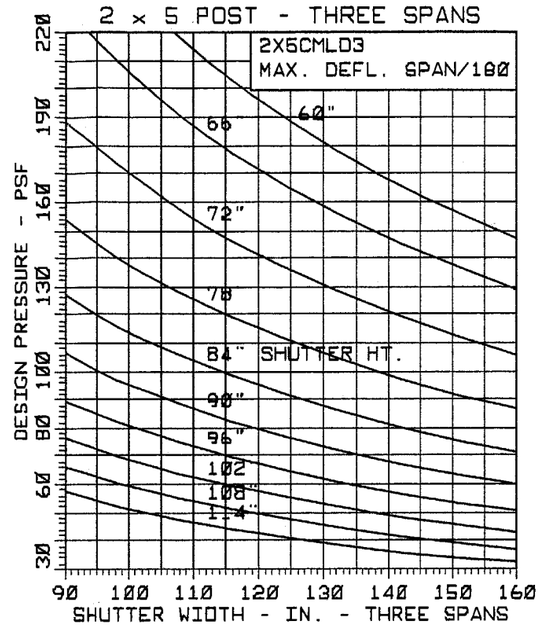

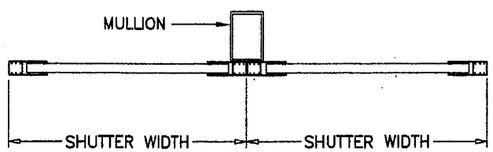

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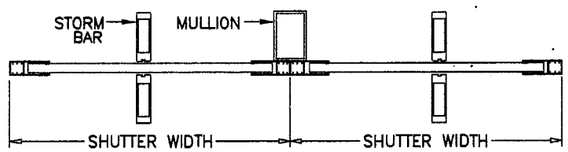

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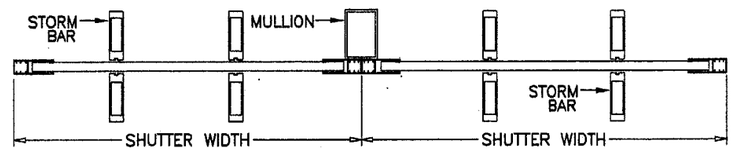

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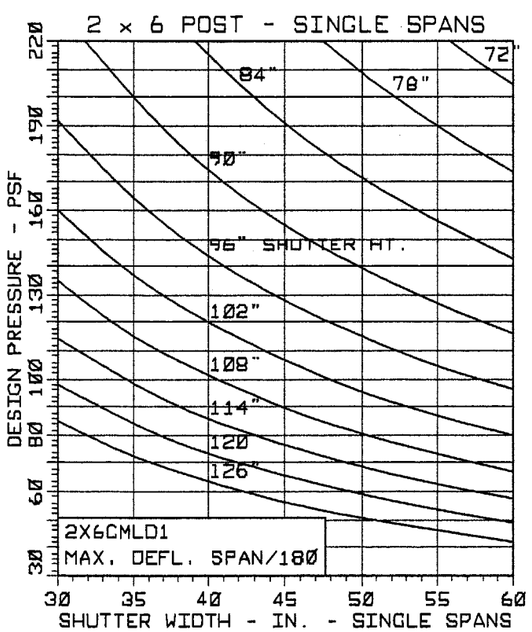

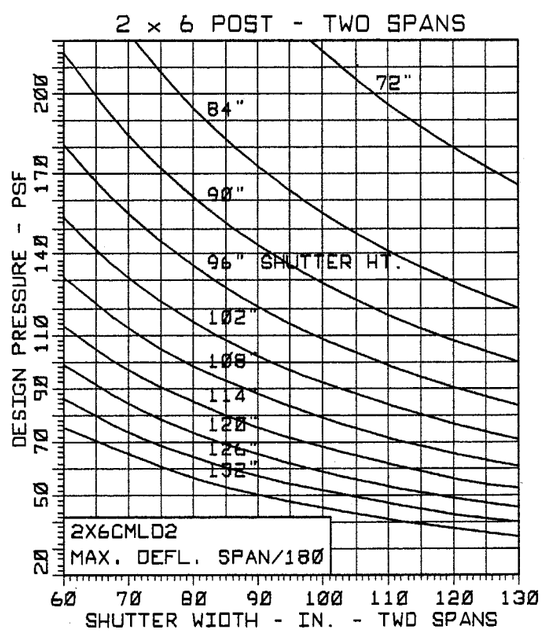

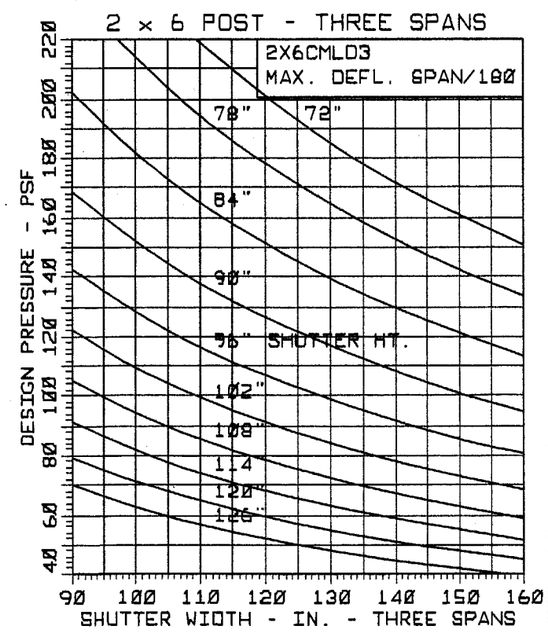

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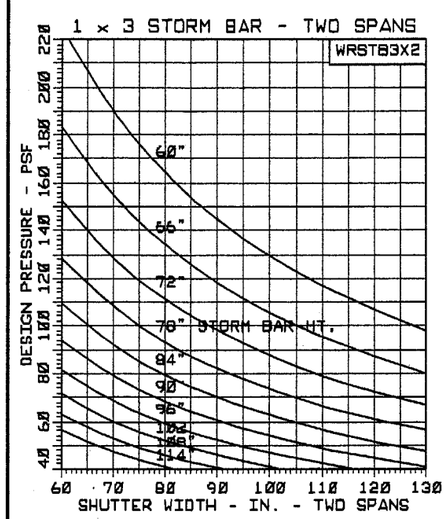
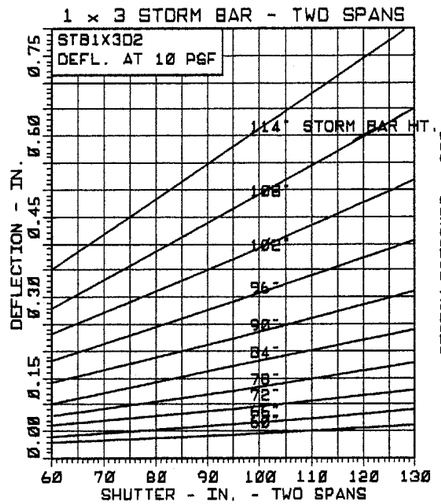
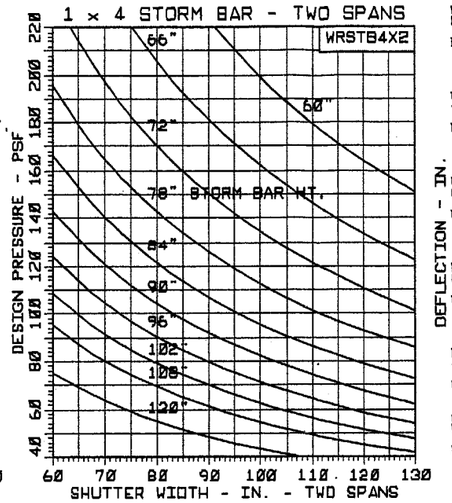
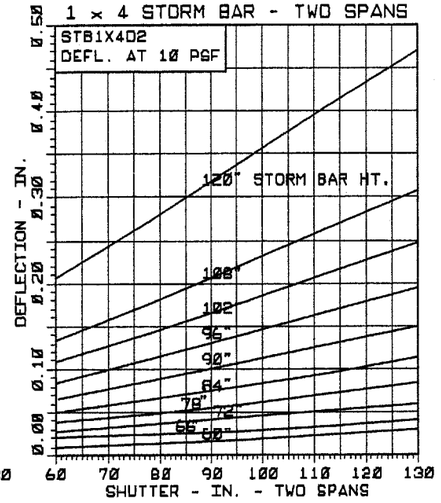
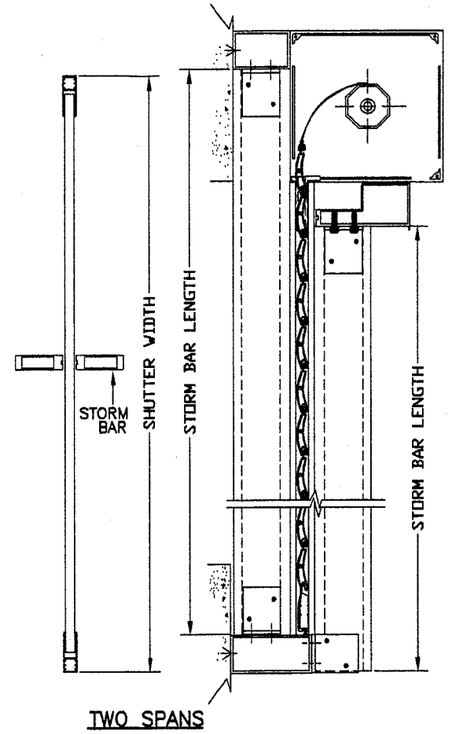




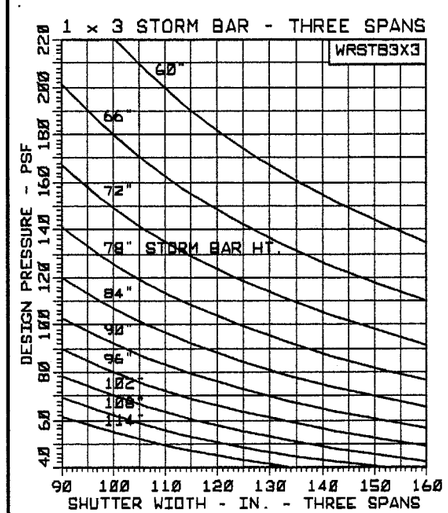


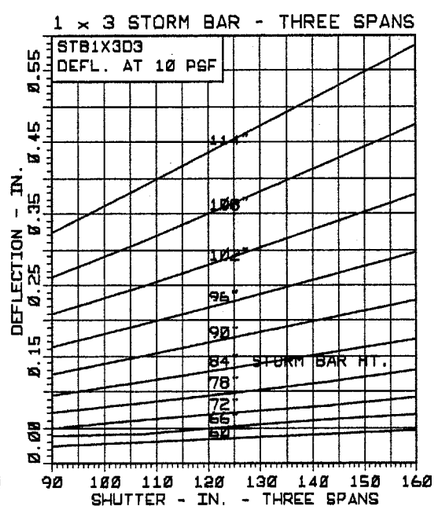


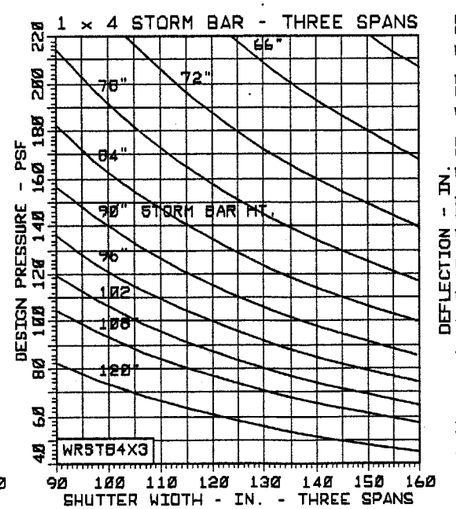


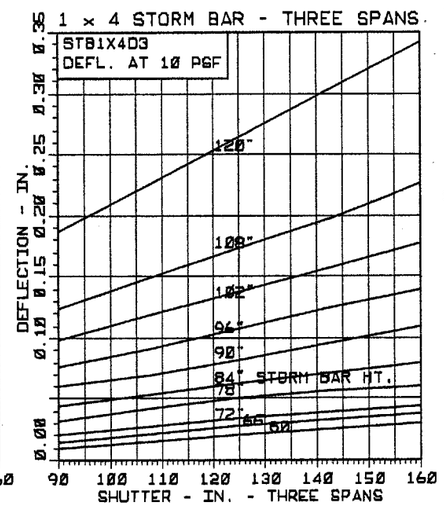
TWO SPANS

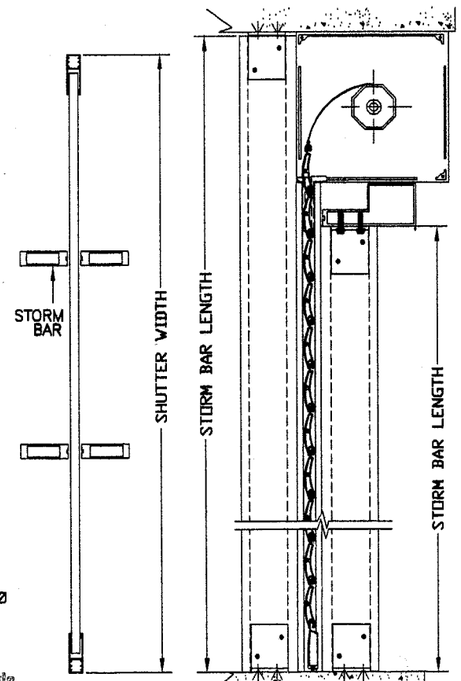
THE CURVES ON THESE GRAPHS SHOW STORM BAR LENGTHS
SEE SKETCH FOR REFERENCE











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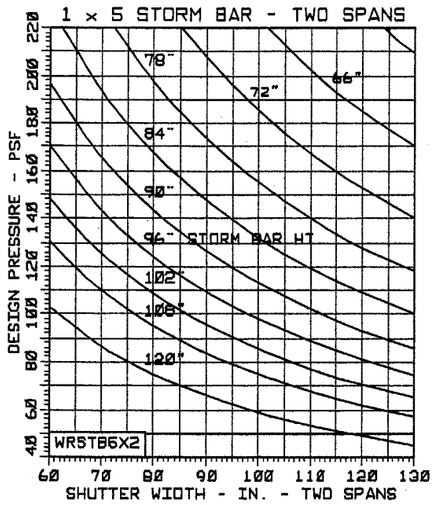

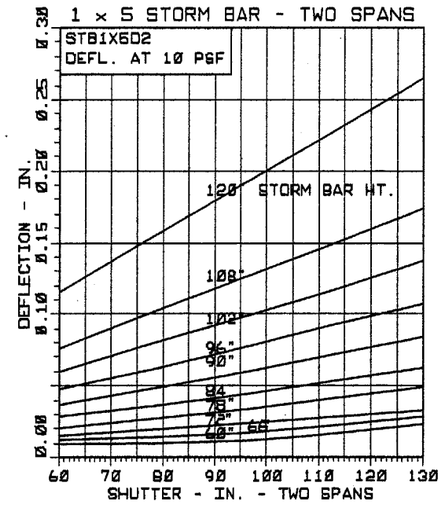

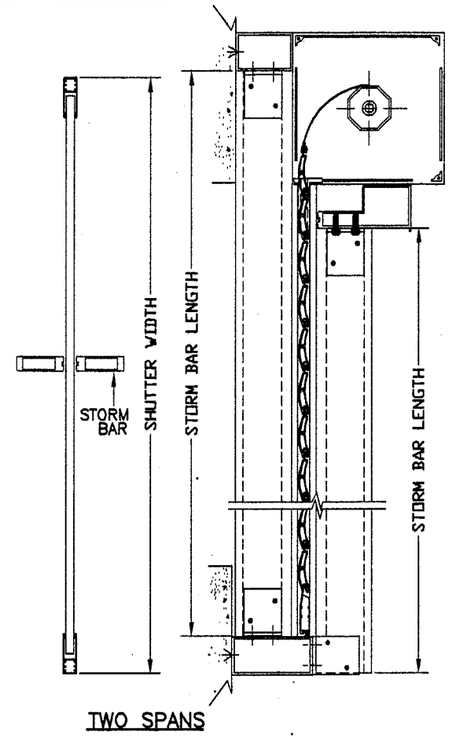

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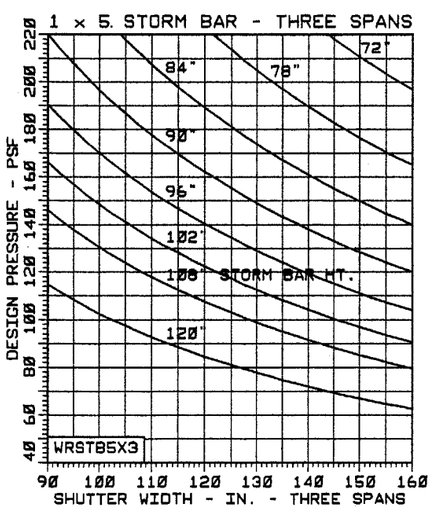

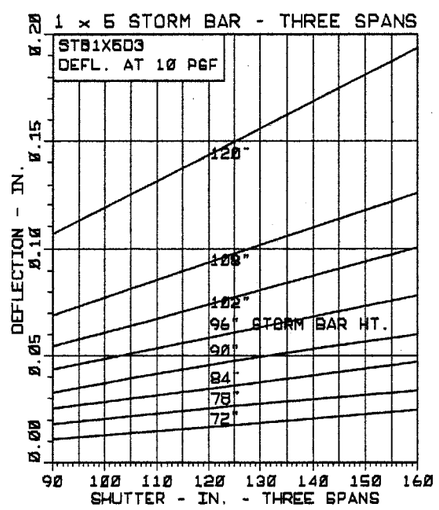

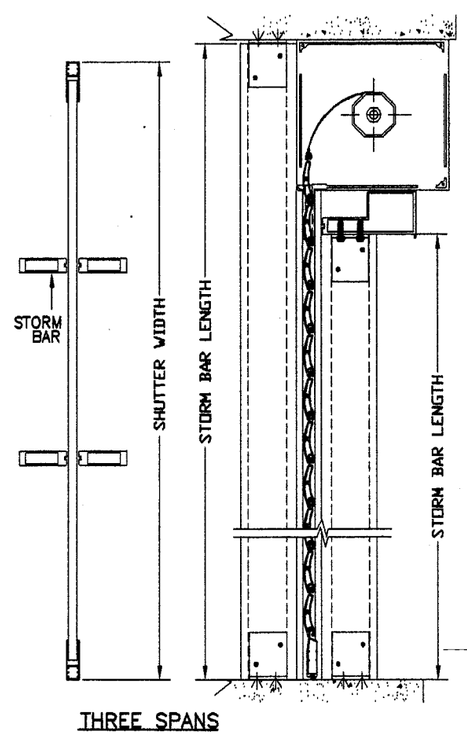

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ROLL SHUTTER OVERALL DEFLECTION CALCULATION SHEET

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
OVERALL DEFLECTION + 1"	3-1/4"
NOTE: NO PART OF SHUTTER SHALL BE UNDER 30' ABOVE GRADE TO WAIVE LARGE MISSILE IMPACT REQUIREMENT.	

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