

WINDOW SIMULATION REPORT

NFRC 100: Procedure for Determining Fenestration Product U-Factors

NFRC 200: Solar Heat Gain Coefficient and Visible Transmittance

**NFRC 500: Procedure for Determining Fenestration Product Condensation
Resistance Values**

REPORT PREPARED FOR:

**Chip Vaughn
Great Land Windows
261 College Road
Fairbanks
Alaska
99701
(907) 479-8437**

REPORT NUMBER:

ILF10003w-a

PRODUCT LINE:

300 Tilt and Turn

August 23 , 2010

**Enermodal Engineering Ltd.
582 Lancaster St. W.
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N2K 1M3
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Manufacturer: Great Land Windows

Report Number: ILF10003w-a

Product Line: 300 Tilt and Turn

Frame: Fiberglass with Styrofoam

Sash: Fiberglass with Styrofoam

Thermal Break: N

Edge of Glass: The glazing is held by a neoprene glazing wedge on the interior edge and foam weatherstripping on the exterior edge.

Glazing: Glazing options are triple, quint, argon and krypton fill.

Spacer: Super Spacer E-class: OF-D; Steel: CS-D

Weatherstripping: Flexible PVC bulbs on the frame and sash.

Simulations: Performed using WINDOW 5, and THERM 5.

General: This product line includes the 300 Tilt and Turn manufactured by Great Land Windows.

This is a reissued report of ILF701w-n.

Michael Barclay, P.Eng.

Simulator

Michael Barclay, P.Eng.

Simulator in Responsible Charge

WINDOW SIMULATION REPORT

The windows documented in this report were simulated in accordance with the NFRC 100: Procedure for Determining Fenestration Product U-Factors (2010), NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence (2010) and NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values (2010).

The windows were simulated using WINDOW 5 and THERM 5 computer programs as specified in NFRC 100 and NFRC 200. The most currently approved spectral data files from NFRC were also used. The WINDOW program models the one-dimensional heat flow through the center-of-glass portion of the window. The THERM program models the two-dimensional heat flow through the frame, edge-of-glass, divider, and divider-edge portions of the window. The input data for both programs is based on manufacturer's specifications. Defaults for material thermal and optical properties are given in the computer programs. When values other than defaults were used, they are documented.

Ratings values included in this report are for submittal to an NFRC-licensed IA and are not meant to be used directly for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes.

DISCLAIMER:

This window simulation report was generated by Enermodal Engineering Ltd. of Kitchener, ON. The report relates only to the items specified.

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Enermodal Engineering Ltd. and its employees neither endorse nor warrant the suitability of the product simulated. Every effort was taken to accurately model the performance of the windows documented in this report. Because of the large amount of input data and analyses, it is possible that errors or omissions could occur.

Neither Enermodal Engineering Ltd. nor any of its employees shall be responsible for any loss or damage resulting directly or indirectly from any default, error, or omission.

SIMULATION NOTES

- 1 Unless otherwise stated. All continuous hardware that does not create a thermal bridge such as hinges, balances, locks etc. are not modeled.
- 2 This is an "NFRC 100: Procedure for Determining Fenestration Product U-Factors" Certification Report.
- 3 This is an "NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence" Certification Report.
- 4 This is an "NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values" Certification Report.
- 5 Unit conversions are performed according to NFRC601.
- 6 All glazing surface emissivities are assumed to be 0.84 unless otherwise stated.
- 7 The gas fill method is single probe with 90% argon and 90% krypton fill.

NFRC - U-Value Baseline Product

Manufacturer: Great Land Windows

Mfr contact: Chip Vaughn

Product line: 300 Tilt and Turn

Simulator in Michael Barclay,
Responsible P.Eng.
Charge:

Product Type: DATT

IA Name:

Frame: Fiberglass with Styrofoam

Report number: ILF10003w-a

Date: 8/23/2010

Revised date:

CPD:

Product Description	272-kry-TC88-kry-TC88-kry-272, bsl	
Glass Thick 1 (in)	0.117	
Glass Thick 2 (in)	0.003	
Glass Thick 3 (in)	0.003	
Glass Thick 4 (in)	0.117	
Glass Thick 5 (in)		
# of Glazing Layers	4	
Surface #2 Emissivity	0.04	
Surface #3 Emissivity	0.13	
Surface #4 Emissivity	0.11	
Surface #5 Emissivity	0.13	
Surface #6 Emissivity	0.11	
Surface #7 Emissivity	0.04	
Surface #8 Emissivity		
Gap 1	0.375	
Gap 2	0.375	
Gap 3	0.375	
Gap 4		
Validation Size	1200 x 1500 mm	
	47.244 x 59.055 in	
Spacer Type	CS-D	
Grid	N	
Gap Fill	Air (10%) / Krypton (90%) Mix	
U-Value	0.16	

ID	Name	No. of Layers	Mode	Tilt	Environmental Conditions	K_{eff} (Btu/h* ft^2 *F)	Overall Thickness (in)	U_{val} (Btu/h* ft^2 *F)	SHGC	Visible Transmittance
1	cl-arg-TC88-arg-Cl	3	#	90	NFRC 100-2001	0.016	1.364	0.145	0.510	0.650
2	SB60-arg-SB60-arg-Cl	3	#	90	NFRC 100-2001	0.013	1.354	0.124	0.308	0.582
3	cl-kry-TC88-kry-cl-kry-TC88-kry-cl	5	#	90	NFRC 100-2001	0.009	1.360	0.083	0.384	0.472
14	272-kry-TC88-kry-TC88-kry-272	4	#	90	NFRC 100-2002	0.007	1.367	0.070	0.294	0.402

NFRC Simulation Data – Summary

Manufacturer: Great Land Windows
 Series/Model #: 300 Tilt and Turn

Spacer: Super Spacer E-class: OF-D; Steel: CS-D

Operator Type: DATT Sim Lab Code: SEEL
 Model Size: 1200 x 1500 Report number: ILF10003w-a
 Thermal Break: N Date: 8/23/2010
 Revised Date:
 Rating Procedure: 2010

Mfr-Product Code	Product Number	Gap 1 (in)	Gap 2 (in)	Gap Fill 1	Gap Fill 2	Emissivity Surface 2	Emissivity Surface 3	Emissivity Surface 4	Emissivity Surface 5	Tint	Spacer	Grid Type	Grid Size	U-Factor (Btu/h*F ²)	SHGC	VT	*CR
SB60-arg-SB60-arg-Cl, se	0001	0.50	0.50	ARG	ARG	0.03		0.03		CL	OF-D	N		0.18	0.21	0.39	72
cl-arg-TC88-arg-Cl, sl	0002	0.56	0.56	ARG	ARG		0.13	0.11		CL	CS-D	N		0.21	0.35	0.44	66
cl-kry-TC88-kry-cl-kry-TC88-kry-cl, sl	0003	0.25	0.25	KRY	KRY		0.13	0.11		CL	CS-D	N		0.17	0.27	0.32	68

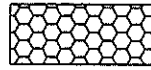
*Note: The Condensation Resistance results obtained from this procedure are for controlled laboratory conditions and do not include the effects of air movement through the specimen, solar radiation, and the thermal bridging that may occur due to the specific design and construction of the fenestration system opening.

APPENDIX A

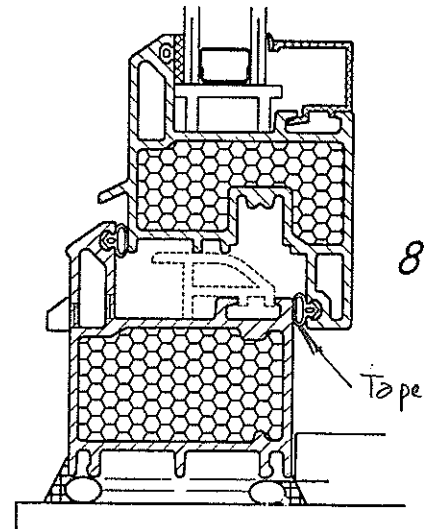
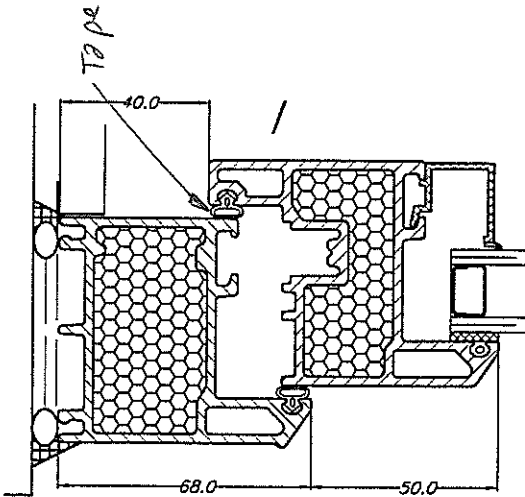
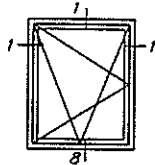
Product Drawings



SERIES 300 TILT'N TURN WINDOW



~~OPTIONAL STYROFOAM~~



Report Number:
ILF70(W-n)
AUG 01 2007
Enermodal Engineering Ltd.



22mm(DOUBLE GLASS)
GLASS STOP(PVC)



5.08mm F.C. 4.06mm F.C. 3.04mm F.C.
GLAZING WEDGE(NEOPRENE)



35mm(TRIPLE GLASS)
GLAZING STOP(ALUMINUM)



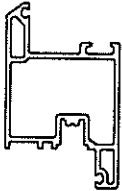
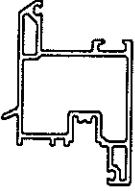
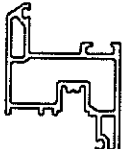
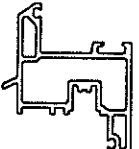
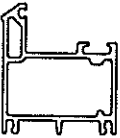
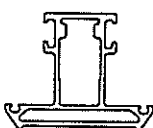
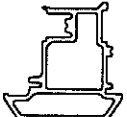
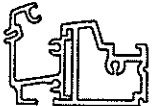


30 Constellation Court
Toronto, Ontario M9W 1K1

PARTS LIST

SERIES 300 & SERIES 301
TILT'N TURN/CASEMENT/AWNING

DR. BY.	
DATE	Feb.2007
SHEET	1 / 6

300-100

Parts #	Description	Colour	Price	Comments
301*		Door sash	Not painted	Fiberglass, S/L=
			White	
			Other	
301D*		Door sash with drip deflector	Not painted	Fiberglass, S/L=
			White	
			Other	
302		Window sash	Not painted	Fiberglass, S/L=
			White	
			Other	
302D		Window sash with drip deflector	Not painted	Fiberglass, S/L=
			White	
			Other	
303*		Perimeter frame	Not painted	Fiberglass, S/L=
			White	
			Other	
304		Mullion / Transom	Not painted	Fiberglass, S/L=
			White	
			Other	
305		Astragal (2 leaf opening)	Not painted	Fiberglass, S/L=
			White	
			Other	
308/309		Patio door sill (Alum. / PVC)	Not painted	Alum. / PVC, S/L=
			White	
			Other	
310		Connecting bar (for frame)		PVC, S/L=
311		Glass stop 22mm(7/8")	Not painted	PVC, S/L=
			White	
			Other	

Report Number: Fiberglass,
S/L=
ILF 701W-n
AUG 01 2007
Enermodal Engineering Ltd.




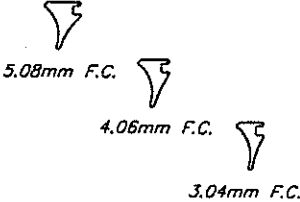







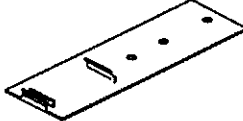
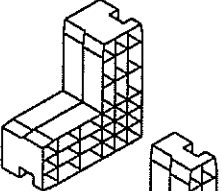
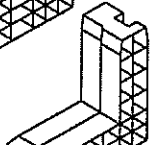
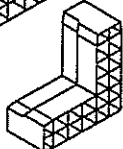
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Toronto, Ontario M9W 1K1

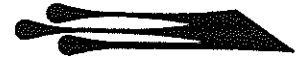
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SERIES 300 & SERIES 301
TILT'N TURN/CASEMENT/AWNING

DR. BY.	
DATE	Feb. 2007
SHEET	2 / 6

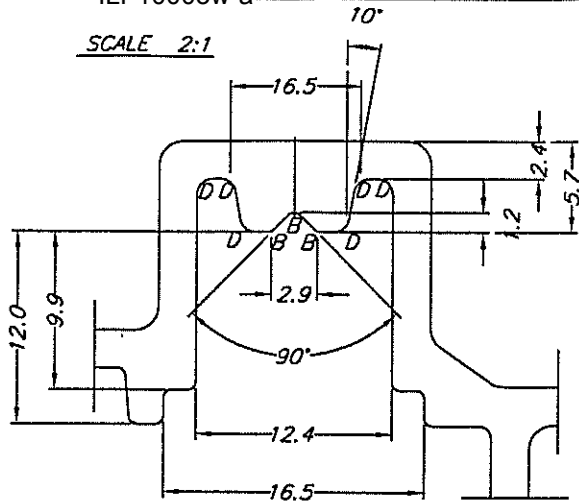
300-100

Parts #	Description	Colour	Price	Comments
312	 <p>Glass stop 35mm(1 3/8")</p>	Not painted		Aluminum, S/L=
		White		
		Other		
	 <p>5.08mm F.C. 4.06mm F.C. 3.04mm F.C.</p> <p>Glazing wedge</p>			Neoprene, /roll
313	 <p>Air seal plug left or right (for astragal)</p>			PVC, / per carton
315	 <p>Door sash riding block</p>			PVC, S/L=
319	 <p>Glass setting block</p>			PVC, S/L=
320	 <p>Glazing pocket filler</p> <p>Adhesive glazing tape 1/8" x 1/2"</p>			2000'/roll
321				Neoprene, /roll
113	 <p>Bulb-type gasket</p>			Rubber /roll
323	 <p>Bulb-type gasket</p>			Rubber /roll
324	 <p>Window sash riding block</p>			PVC, S/L=
737B	 <p>Strap anchor</p>		Report Number: ILF701w-n	Galv. steel, / per carton
325	 <p>Door sash shearblock</p>		AUG 01 2007 Enermodal Engineering Ltd.	Nylon+30% glass filled /per carton
326		 <p>Window sash shearblock</p>		Nylon+30% glass filled /per carton
327		 <p>Perimeter frame shearblock</p>		

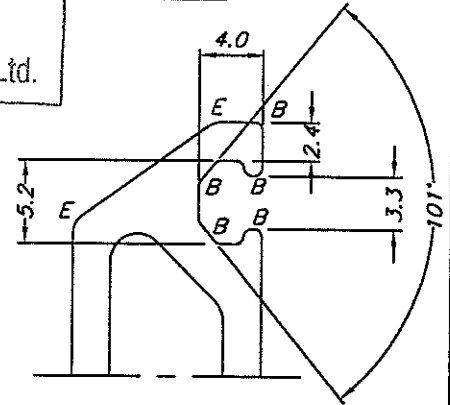


INLINE
FIBERGLASS LTD.

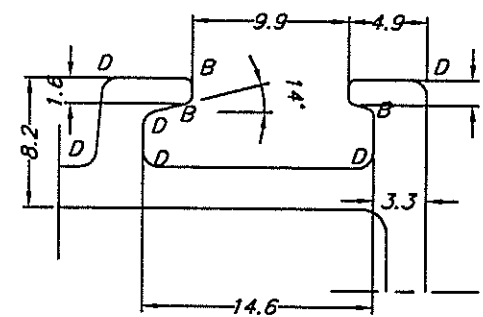
Report Number:
ILF 701w-n
AUG 0 1 2007
Enermodal Engineering Ltd.



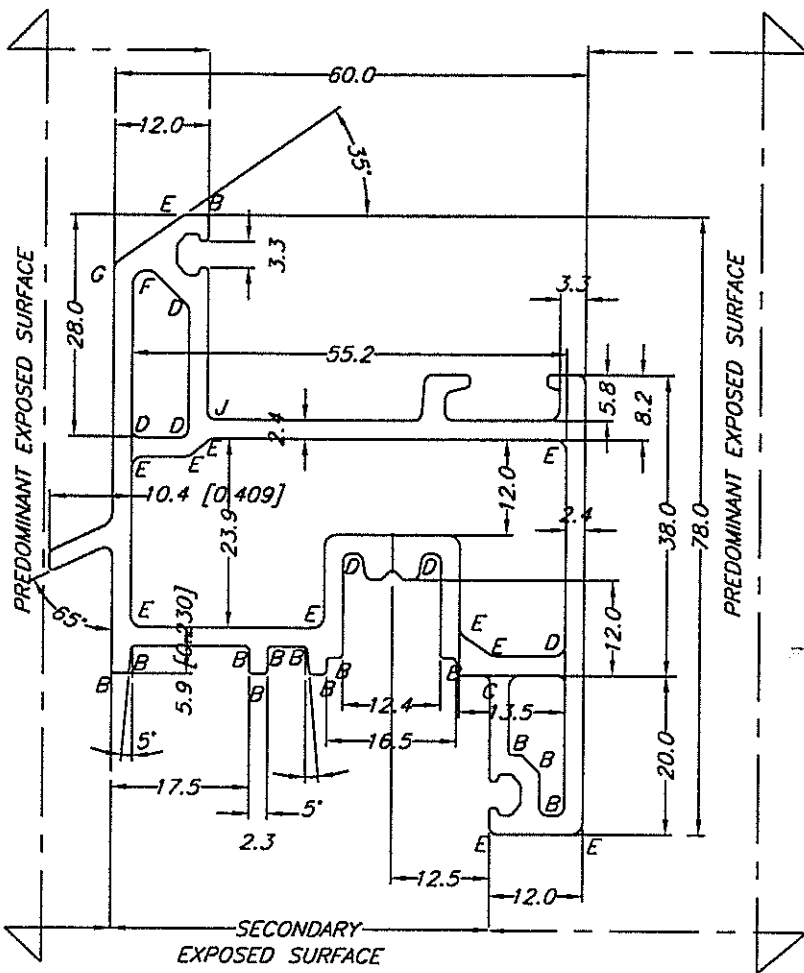
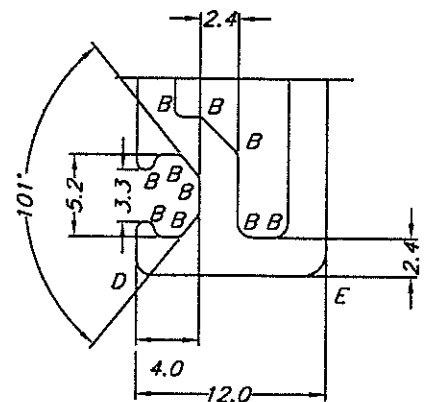
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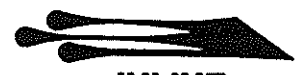
SCALE 2:1



SCALE 2:1



A	0.25	Inline Fiberglass Ltd.				CUSTOMER	INLINE FIBERGLASS O.K. TEAM		DESCRIPTION		WINDOW SASH			
B	0.50	DWG #		302D	CUSTOMER DWG #		DATE		TOL.	SCALE		1 : 1		
C	0.75	WEIGHT		kg/m	AREA	mm ²	PERIM.	mm	WALL THK.	mm	DRWN BY	R.N.	MATL	Fiberglass
D	1.00	WEIGHT		lb/ft	AREA	in ²	PERIM.	in	WALL THK.	in	CHK'D BY	M.P.	DIRECT#	/300N
E	1.50	REV.	DATE	NOTES				REV.	DATE	NOTES				
F	1.75	1.	Oct. 14 '99											
G	2.00													
H	2.50													
I	3.00													

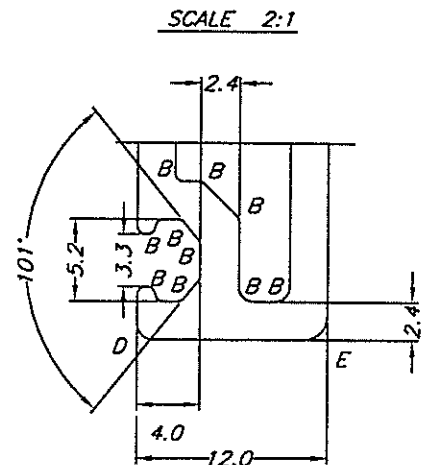
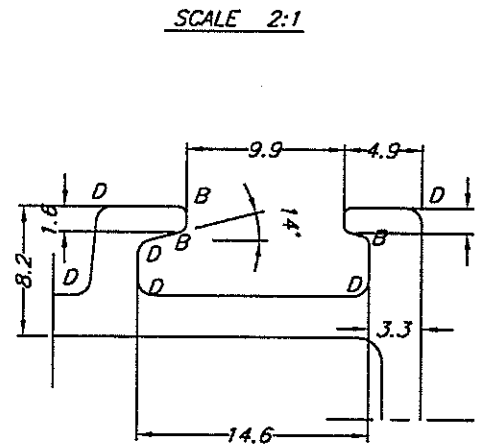
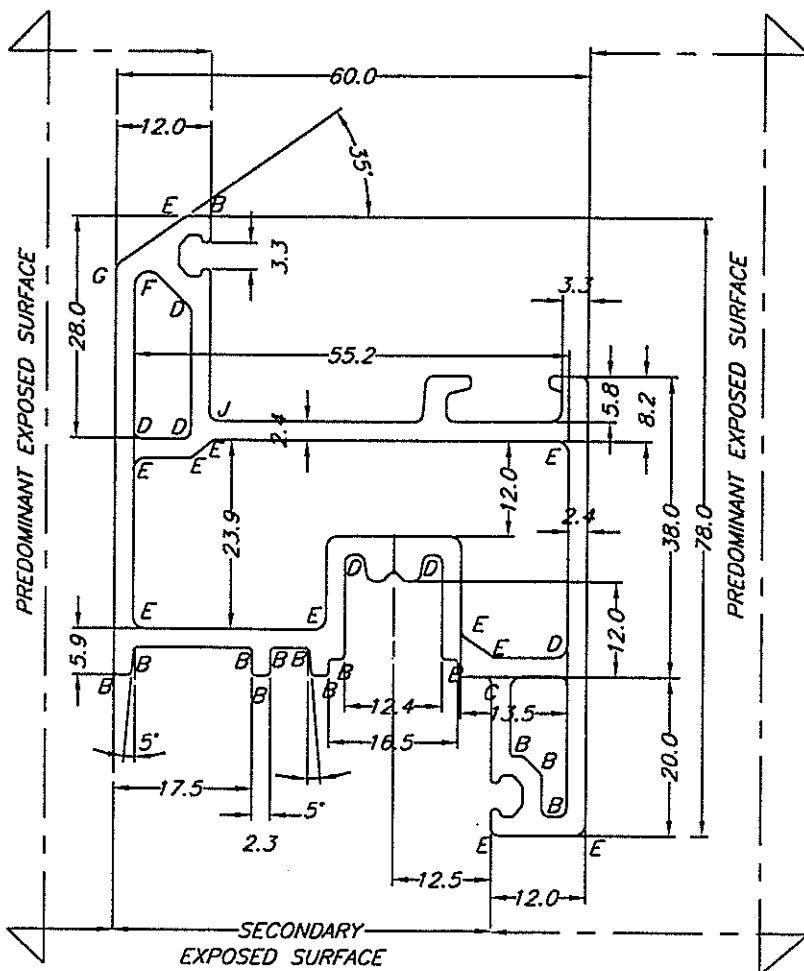
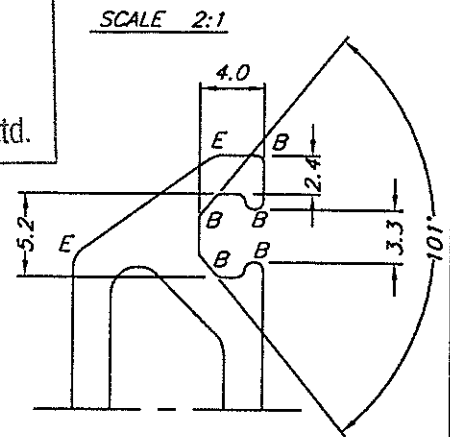
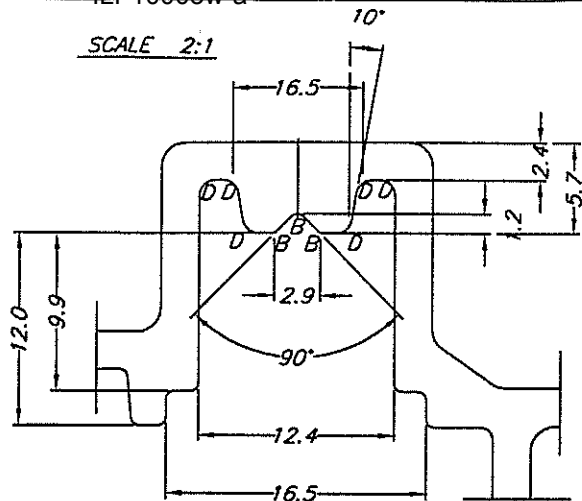


INLINE
FIBERGLASS LTD.

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ILF701W-n

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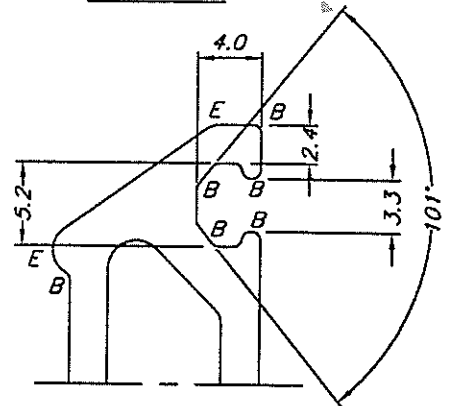
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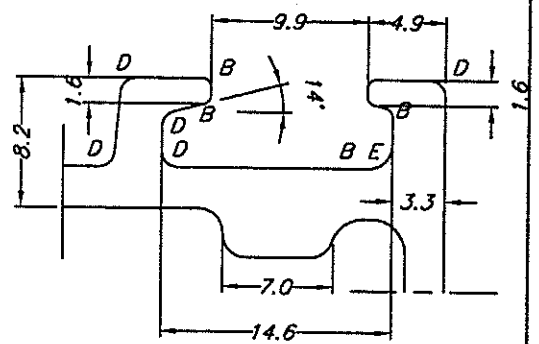
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B	0.50	Inline Fiberglass Ltd.			WINDOW SASH	
C	0.75	CUSTOMER			DESCRIPTION	
D	1.00	DWG #	302	CUSTOMER DWG #	DATE	TOL.
E	1.50	WEIGHT	kg/m	AREA	mm ²	SCALE
F	1.75	PERIM.	mm	794.5	601.8	1 : 1
G	2.00	WALL THK.	mm	2.4	DRWN BY	MAT'L
H	2.50	WEIGHT	lb/ft	AREA	in ²	Fiberglass
I	3.00	PERIM.	in	13.5	16.5	DIRECT#
		WALL THK.	in	(.095)	CHK'D BY	/300N
		REV.	DATE	NOTES	REV.	DATE
		1.	Oct. 14, '99			



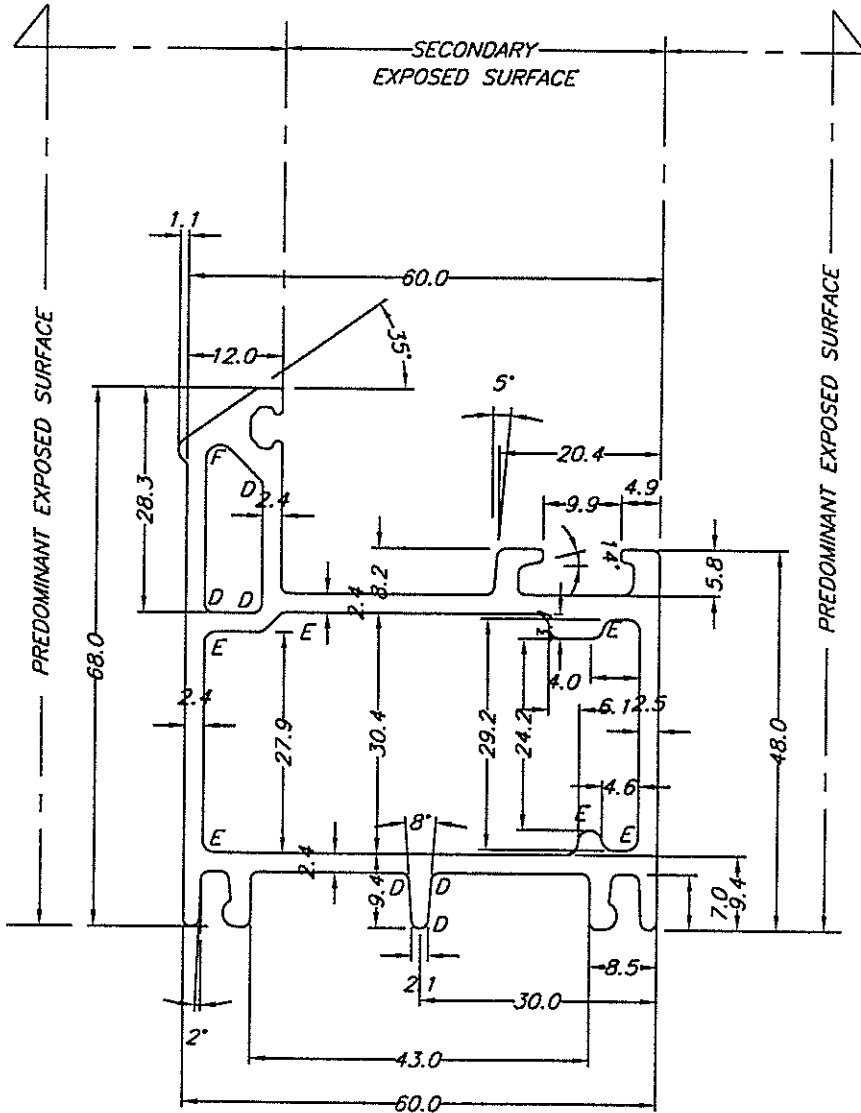
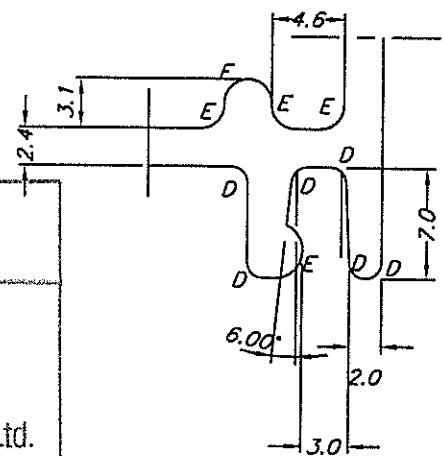
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SCALE 2:1



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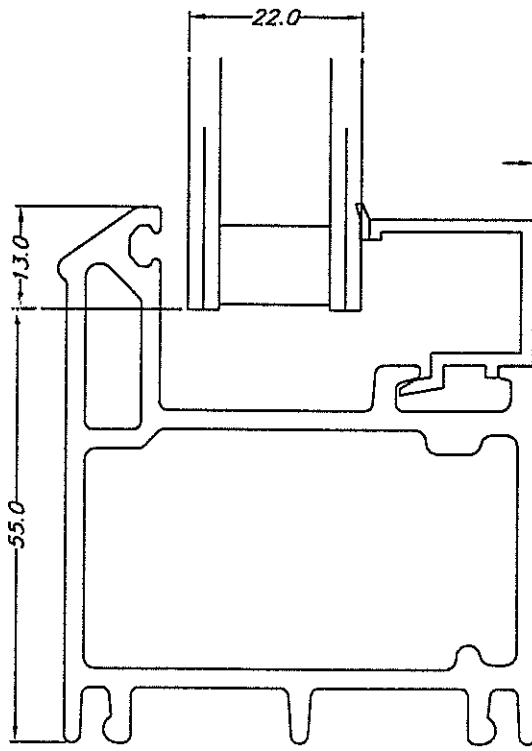
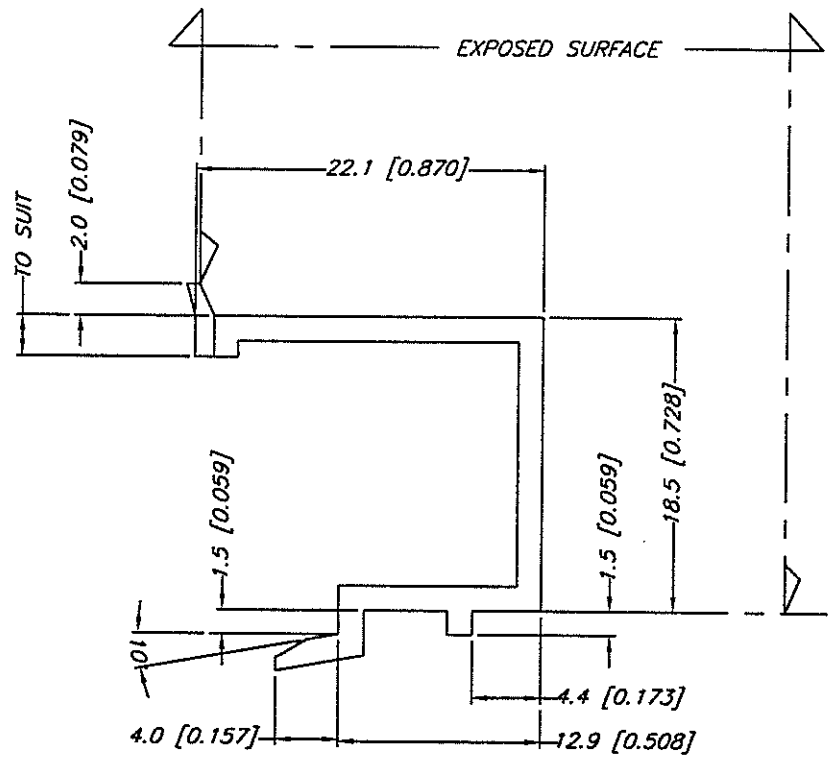


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B	0.50				O.K. TEAM		FRAME			
C	0.75	DWG # 303			CUSTOMER		DATE		TOL.	
D	1.00				O.K. TEAM		01.Oct..'99		SCALE	
E	1.50	WEIGHT	AREA	PERIM.	WALL	DRWN	MAT'L			
F	1.75	kg/m	mm ²	mm	THK. mm	BY	Fiberglass			
G	2.00	lb/ft	in ²	in	THK. in	CHK'D	DIRECT#			
H	2.50	REV.	DATE	NOTES	REV.	DATE	NOTES			
I	3.00	1.	Oct. 13. '99							

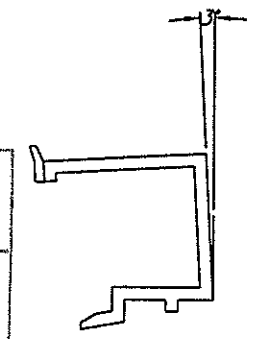


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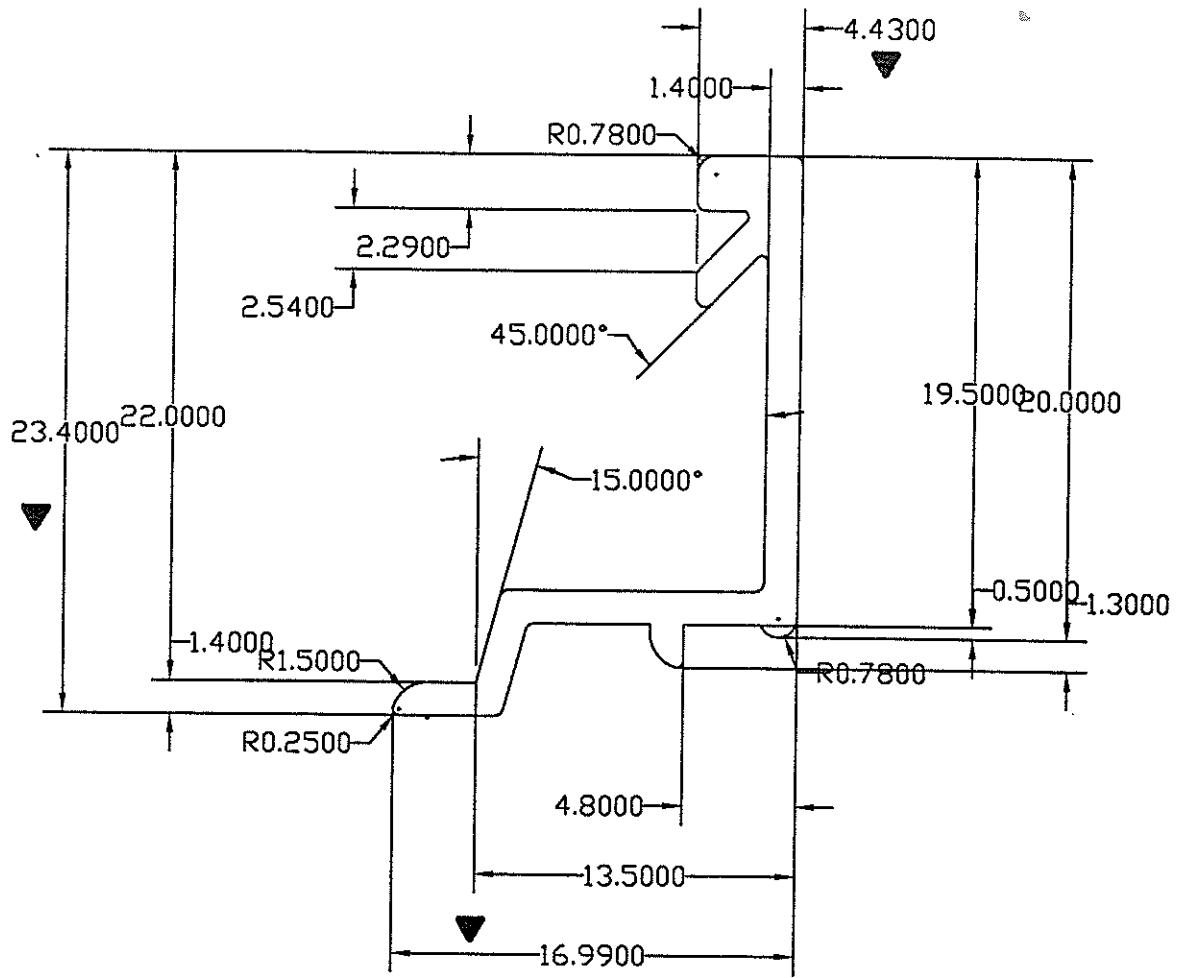
FULL SIZE
STOP FOR 22 mm GLASS

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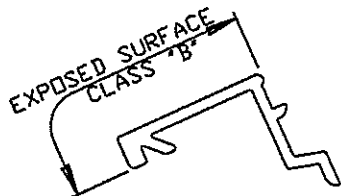


SLOP WHEN EXTRUDING

A	0.25	Inline Fiberglass Ltd.				CUSTOMER	DESCRIPTION						
B	0.50						PVC						
C	0.75												
D	1.00	DWG #	311	CUSTOMER DWG #		DATE	16.Mar.'00	TOL	SCALE	1 : 1			
E	1.50	WEIGHT	kg/m	AREA	mm ² 91.6	PERIM.	mm 120.1	WALL THK.	mm 1.57	DRWN BY	R.N.	MAT'L	
F	1.75	WEIGHT	lb/ft	AREA	in ²	PERIM.	in	WALL THK.	in (.062)	CHK'D BY	M.P.	DIRECT #	/300N
G	2.00	REV.	DATE	NOTES		REV.	DATE	NOTES					
H	2.50												
I	3.00												




ACTUAL SIZE



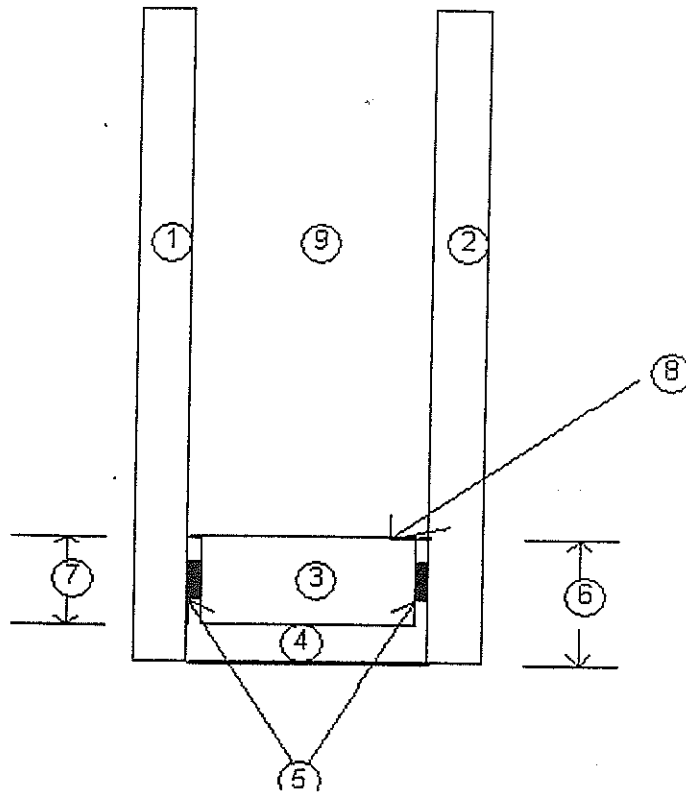
RUNOUT PLANE

Aluminum Alloy - Painted

Report Number:
ILF701W-n
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Enermodal Engineering Ltd.

ITEM.	QTY.	DWG.NO./CAT.NO.	DESCRIPTION	MATERIAL		
 INLINE FIBERGLASS 30 Constellation Court Toronto, Ontario M9W 1K1	SHEET 1/1		GLASS STOP (FOR 1 3/8" GALSS)	DR. BY.	K.C.	
	NO.	REVISION		DATE	DATE	MAY 07
					SCALE	
					312	

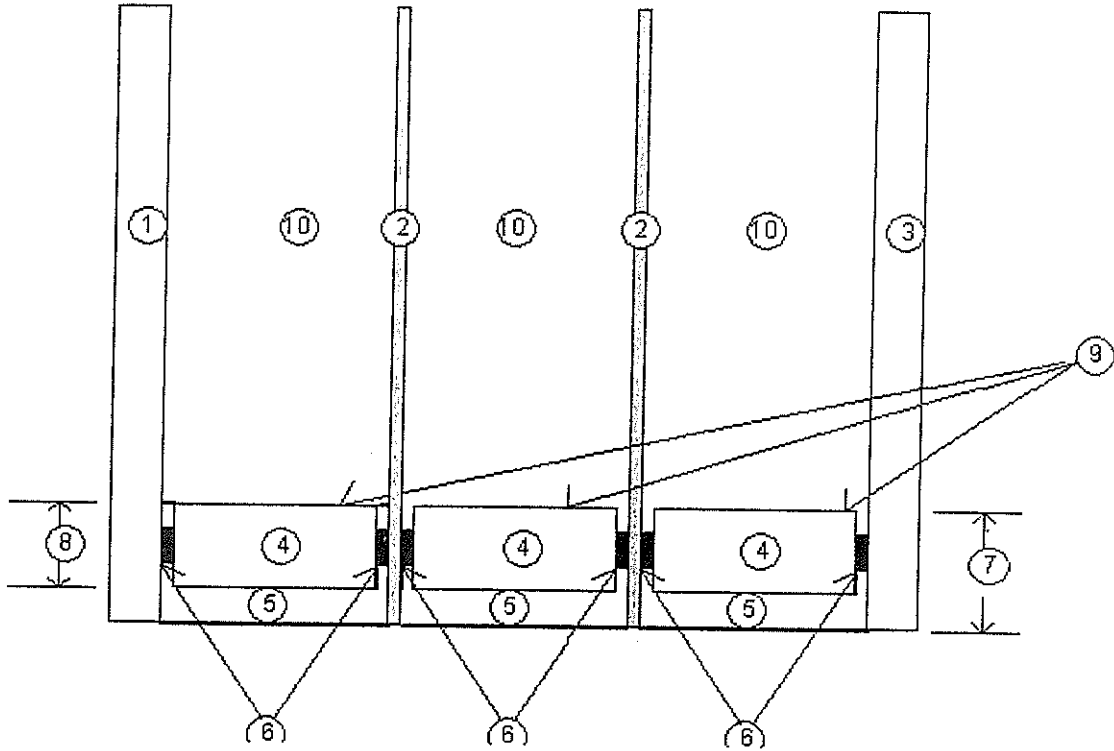
Edge of Glass Detail [Super Spacer] (double glazing)



Location	Detail	Description	Size
1	Glass Type	as per option	3 mil
2	Glass Type	as per option	3mil
3	Dessicant	Molecular Sieve Type 3A	
4	2nd Seal	Polysulfide or Polyurethane	N/A
5	Primary Seal	Structural acrylic side adhesive	N/A
6	Bite		9.5 mil
7	Spacer Height	EdgeTech "E" class Superspacer	4.75 mil
8	Spacer Type	EdgeTech "E" class Superspacer	7.1 mil
9	Gas Fill	95% Argon, 5% Air	or 100 % Air as per option

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Edge of Glass Detail (Double Heat Mirror)

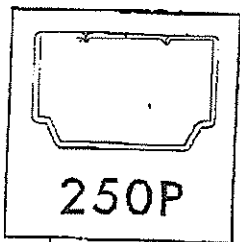


Location	Detail	Description	Size
1	Glass Type	clear	3 mil
2	Heat Mirror Type	HMTC88	.076 mil
3	Glass Type	clear	3 mil
4	Dessicant	Molecular Sieve Type 3A	
5	2nd Seal	Polyurethane (PRC)	
6	Primary Seal	P.I.B. (Polyisobutylene)	0.5 mil
7	Bite		12.7 mil
8	Spacer Height	allmetal steel	7.9 mil
9	Spacer Type	allmetal steel	
10	Gas Fill	Krypton 95% , 5% air	

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Steel - for heat mirror

Att: Khet

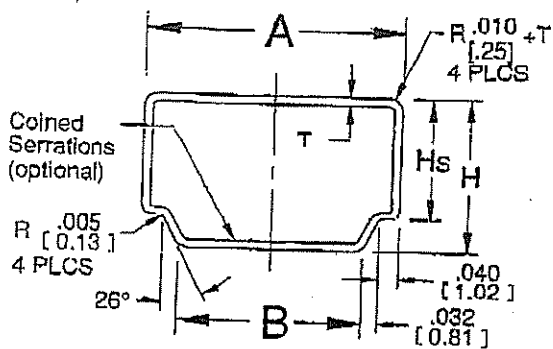


250P

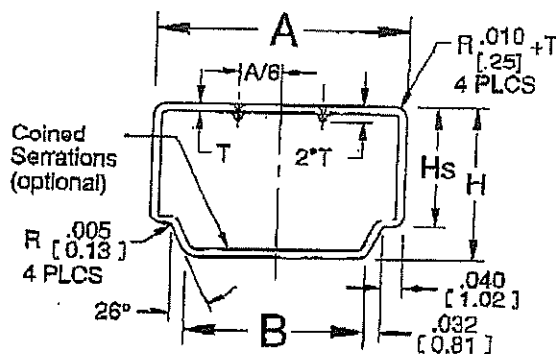
ALLMETAL®

250P Air Spacer

This is in EG Steel



Zippered
(all sizes)



Perforated
(1/4" [6.5mm] and wider)

Tolerance: All dimensions $\pm .005$ [.13mm] unless otherwise specified

Material	H		Hs		T	
	IN	MM	IN	MM	IN	MM
.008" [20mm] Hi-Q Steel	.302	7.67	.240	6.10	.008	.20
.010" [25mm] Anodized Aluminum	.305	7.75	.244	6.20	.010	.25
.012" [30mm] Hi-Q Steel	.307	7.80	.246	6.25	.012	.30
.014" [36mm] EG Steel	.311	7.90	.248	6.30	.014	.36
.014" [36mm] Anodized Aluminum	.311	7.90	.248	6.30	.014	.36
.015" [38mm] Black Steel	.313	7.95	.249	6.32	.015	.38
.016" [41mm] Anodized Aluminum	.315	8.00	.250	6.35	.016	.41
.016" [41mm] Mill Finish Aluminum	.315	8.00	.250	6.35	.016	.41
.0185" [47mm] Mill Finish Aluminum	.320	8.13	.252	6.40	.019	.47

Notes:

1. Dimensions are in decimal inches; dimensions in [] brackets are in mm.
2. Available with serrations at no extra charge on inside of Aluminum spacer at location indicated above; not recommended for spacer to be used for bending.
3. Material tolerances can be found on Material Specifications Data page (ii).
4. Thermal properties can be found on Thermal Performance Data page (iii).

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