MAY. 27. 1998 1:29PM SWANKE HAYDEN CONNELL ARCHITECTS INUK GROUP NO. 0971 P. 7/12 # 2/ 3
05/12 '98 15:42 NO.911 03/05

AISI BEAM COLUMN DESIGN WITH LATERAL TORSIONAL BUCKLING

JOB NAME: WORLD TRADE CENTER 5/12/98

LOCATION: TYPICAL STUD W/240 SQFT LATERAL LOAD

MEMBER SIZE: 08SW14 Strength increase due to wind= 1.333

ALL UNITS IN POUNDS AND INCHES

LOADS	AXIAL=	130	LB	Mx=	60840	SHEAR=	1560
	EXT. LOAD=	240	PSF	My=P*e	0	Spacing=	12
MEMBER CAPACITY				Ma=	60001	Va=	1999

For Member Capacity See Super Stud Catalog

SECTION PROPERTIES

Lx=	156	Lunb=	156	Thick=	0.0713	DEPTH=	8
Lt=	48	Kx=	1	Xo=	-1.311		
Ly=	48	Ky=	1	Ro=	3.35		
Area=	0.916	Aef=	0.51	Cw=	6.08		
rx=	3	ry =	0.704	J=	0.00156		
Ix=	8.242	Iy=	0.454	Sy=	0.27		
Fy=	50000	G=	11300000	E=	29500000		
KxLx/rx=	52	KyLy/ry=	68.18182	Pun. Dep	2.5		
S(f)x	2.037	Se(Sxeff)=	2.037	see Super	Stud Catalog		

Allowable Load

λ=	2.22840017		σex=	107565.8	Eq.C3.1.2-12
ρ=	0.40444911		σt=	74897.42	Eq.C3.1.2-14
Fey=	62566.8306	Eq.C4.1-1	σex+σt=	182463.3	
Fn=	39917	Eq.C4-3&C4-4	β=	0.84485	Eq.C4.2-3
Pe=	98506.463	Eq.C5-5	Fe=	61986.77	Eq.C4.2-1
Pa=Fn*Aef	20470.3983	Eq.C4-2			
αx=	0.99746616	Eq.C5-4			
Pa=Pa/1.92	10661.6648	Eq.C4-1 14212			

Lateral Torsional Buckling / **Minor Axis Bending Capacity**

σey=	62566.8306	Eq.C3.1.2-13	Sy=	0.27
Cb=	1		Pcr=	57315.2
Me=	210061.168	Eq.C3.1.2-10	1/αy=	1.004374
My=	101850	Eq.C3.1.2-5	My=	8083.832
Mc=	89504.2835	Eq.C3.1.2-8		
Max=	89504.2835	Eq.C3.1.2-1		
Ma=	53595.1794	Eq.C3.1-1		

Interaction Equation

P/Pa+1/αx(Mx/Max)+1/αy(My/May)	=	0.863	<=	1	O.K.	Eq.C5-1

Combined Bending & Shear

(M/Ma)^2+(V/Va)^2	=	0.65	<	1	O.K.
DEFLECTION L/ 240	=	0.65			
I(req)	=	8.04	< Act.	8.24	O.K.

AISI BEAM COLUMN DESIGN WITH LATERAL TORSIONAL BUCKLING

JOB NAME:	WORLD TRADE CENTER	5/12/98
LOCATION:	TYPICAL STUD W/420 SQFT LATERAL LOAD	
MEMBER SIZE:	10SSW14	Strength increase due to wind= 1.333

ALL UNITS IN POUNDS AND INCHES

LOADS	AXIAL=	130	LB	Mx=	106470	SHEAR=	2730
	EXT. LOAD=	420	PSF	My=P*e	0	Spacing=	12
MEMBER CAPACITY				Ma=	84011	Va=	3331
				For Member Capacity See Super Stud Catalog			

SECTION PROPERTIES

Lt=	156	Lunb=	156	Thick=	0.0713	DEPTH=	10
Lx=	48	Kx=	1	Xo=	-1.807		
Ly=	48	Ky=	1	Ro=	4.231		
Area=	1.165	Aef=	0.62	Cw=	19.827		
rx=	3.768	ry =	0.904	J=	0.00197		
Ix=	16.549	Iy=	0.952	Sy=	0.448		
Fy=	50000	G=	11300000	E=	29500000		
KxLx/rx=	41.4012739	KyLy/ry=	53.09735	Pun Dep	2.5		
Sx=Sx	3.29	Se(Stud)=	3.29	see Super Stud Catalog			

Allowable Load

λ=	3.1547307		σex=	169689.1	Eq.C3.1.2-12
ρ=	0.29487883		σt=	121087.3	Eq.C3.1.2-14
Fey=	103165.788	Eq.C4.1-1	σex+σt=	290776.4	
Fn=	43679	Eq.C4-3&C4-4	β=	0.839129	Eq.C4.2-3
Pcr=	197789.791	Eq.C5-5	Fe=	98876.82	Eq.C4.2-1
Pn=Fn*Aef	27265.921	Eq.C4-2			
αx=	0.99873805	Eq.C5-4			
Pa=Pn/1.92	14201.0005	Eq.C4-1	18929.93		

Lateral Torsional Buckling

σey=	103165.788	Eq.C3.1.2-13	Minor Axis Bending Capacity		
Cb=	1		Sy=	0.448	
Me=	550916.946	Eq.C3.1.2-10	Pey=	120181	
My=	164500	Eq.C3.1.2-5	1/αy=	1.002081	
Mc=	152220.359	Eq.C3.1.2-4	My=	13413.17	
Mnx=	152220.359	Eq.C3.1.2-1			
Max=	91149.9154	Eq.C3.1-1			

Interaction Equation

P/Pa+1/αx(Mx/Max)+1/αy(My/May)	=	0.894	<=	1	O.K.	Eq.C5-1

Combined Bending & Shear

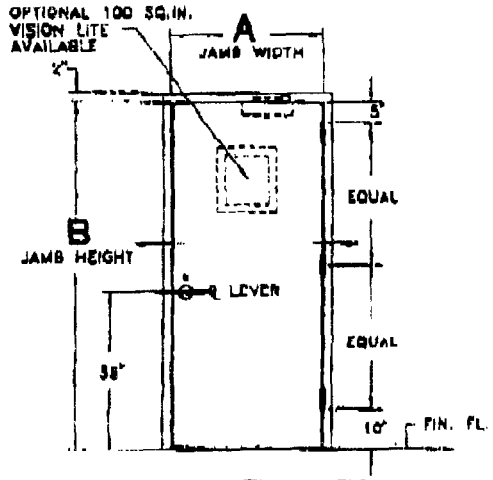
(M/Ma)^2+(V/Va)^2	=	1.12	<	1	NO GOOD
DEFLECTION L/ 240	=	0.65			
I(req)	=	14.08	< Act.	16.55	O.K.

use 12 Gage, OK
10SSW12 @ 12" on cen.

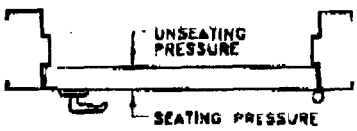
SERIES LRB

OVERLY MANUFACTURING COMPANY
314 WEST OTTERMAN STREET
POST OFFICE BOX 70
GREENSBURG, PA. 15601-0070
TELEPHONE: (412) 834-7300
FAX: (412) 838-2871

LOW RANGE BLAST / SINGLE SWING
UL FIRE LABELED / DOOR AND FRAME ASSEMBLY



OUTSIDE ELEVATION
RR SWING SHOWN LR OPPOSITE

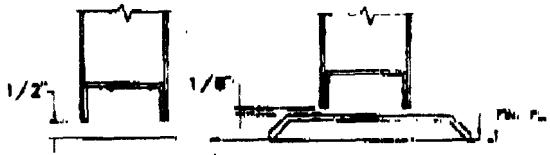


HORIZONTAL SECTION - RR

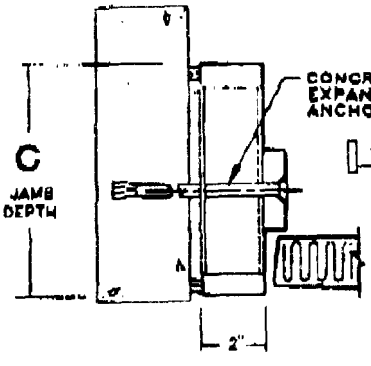
NOTES:

1. The door and frame are designed to withstand an equivalent total static load as listed below.
2. All exposed surfaces of door and frame to receive one coat of rust inhibitive prime paint.
3. U.L. labeled units require U.L. listed closers.
4. Door can be equipped with conventional mortise lock/ latch or mortised panic device. Customer to specify.

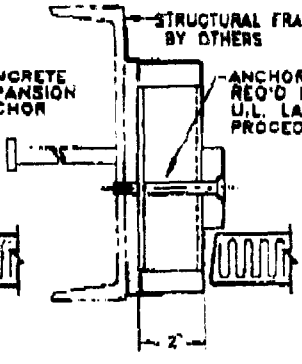
VISION LITE SECTION



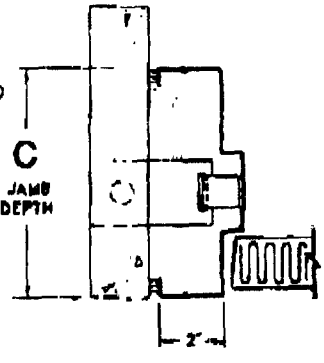
SILL SECTIONS



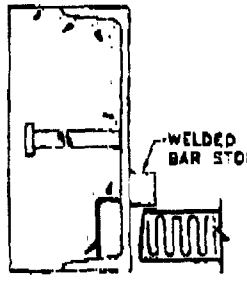
BOLT-IN DETAIL



WELD-IN DETAIL



BOLT-IN DETAIL



STRUCTURAL

MODEL NUMBER	JAMB OPENING SIZE	MAXIMUM SEATING PRESSURE	MAXIMUM UNSEATING PRESSURE	UL LABEL	DOOR THICK	LOCK TYPE	QTY. HINGES	DOOR WEIGHT
LRB	36 X 84	575 PSF	312 PSF	3 HR. "A" MAX.	1-3/4"	OVERLY DOUBLE AUGHT LOCK	3	210
	36 X 96	504 PSF	273 PSF				4	247
	40 X 92	473 PSF	256 PSF				4	302
	48 X 84	432 PSF	234 PSF				3	315
	48 X 96	378 PSF	204 PSF				4	320

NOTE: WALL ANCHORAGE SIZE AND LOCATION TO BE DETERMINED BY OVERLY'S DESIGN ENGINEERS.

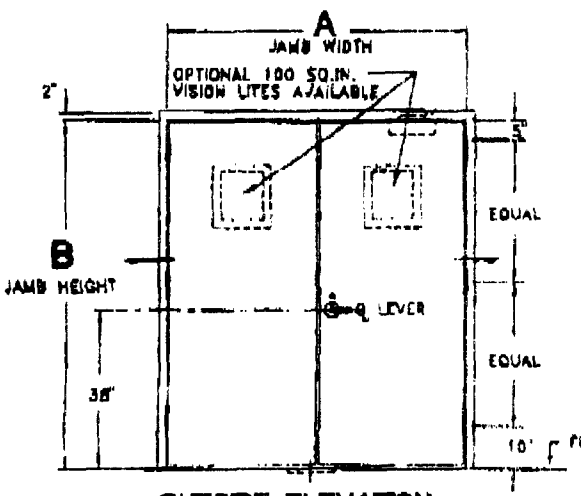
REV. 9/18/97

SERIES

LRB

OVERLY MANUFACTURING COMPANY
574 WEST OTTERMAN STREET
POST OFFICE BOX 70
GREENSBURG, PA. 15601-0070
TELEPHONE (412) 834-7300
FAX: (412) 830-2871

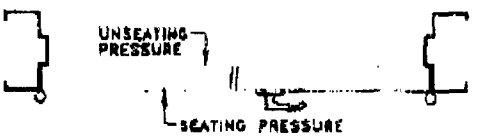
LOW RANGE BLAST / UL FIRE LABELED / PAIR OF DOORS AND FRAME ASSEMBLY



OUTSIDE ELEVATION
RR SWING SHOWN LR OPPOSITE

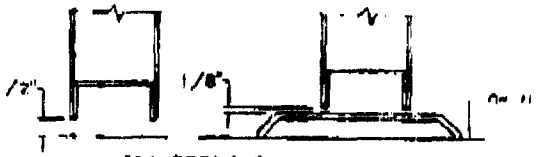
NOTES:

1. The door and frame are designed to withstand an equivalent total static load as listed below.
2. All exposed surfaces of door and frame to receive one coat of rust inhibitive prime paint.
3. U.L. labeled units require U.L. listed closers.
4. Door can be equipped with conventional mortise lock/ latch or mortised panic device. Customer to specify.

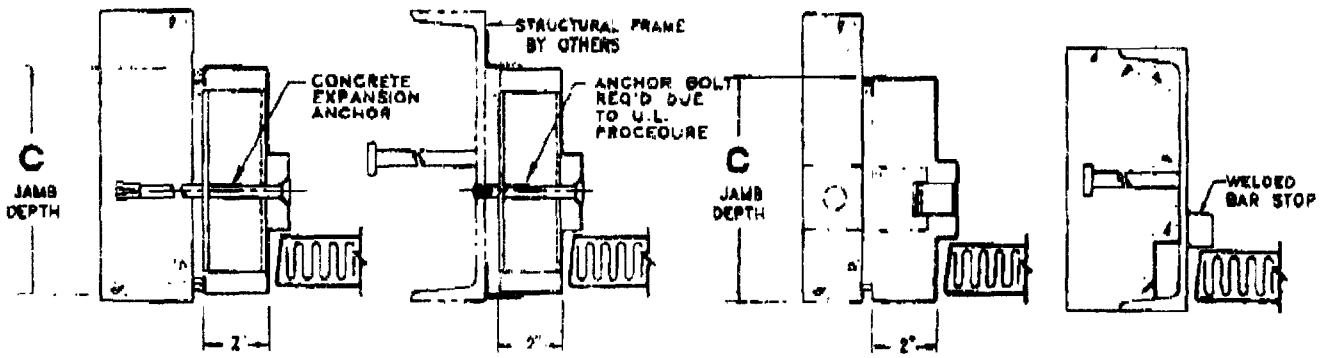


HORIZONTAL SECTION - RR ACTIVE

VISION LITE SECTION



SILL SECTIONS



BOLT-IN DETAIL | WELD-IN DETAIL | BOLT-IN DETAIL | STRUCTURAL

MODEL NUMBER	JAMB OPENING SIZE	MAXIMUM SEATING PRESSURE	MAXIMUM UNSEATING PRESSURE	UL LABEL	DOOR THICK	LOCK TYPE	QTY. HINGES	DOOR WEIGHT
LRB	72 X 84	XXX PSF	XXX PSF	3 HR. "A" MAX.	1-3/4"	OVERLY DOUBLE OUGHT	5	185
	84 X 84	XXX PSF	XXX PSF				6	222
	96 X 96	XXX PSF	XXX PSF				8	273

NOTE: WALL ANCHORAGE SIZE AND LOCATION TO BE DETERMINED BY OVERLY'S DESIGN ENGINEERS.

REV. 7/13/9

RUSKIN®

PO BOX 129 Grandview, Mo. 64030

STANDARD CONSTRUCTION

FRAME
CD80AF3 — 8" x 2" x 12 gage steel channel.
CD80AF4 — 8" x 2" x 10 gage steel channel.

BLADES
CD80AF3 — 5¾" to 7¾" wide, double skin airfoil type of 16 gage steel for blade lengths to 48" and 14 gage steel for 48" to 60" blade lengths.
CD80AF4 — 5¾" to 7¾" wide, double skin airfoil type of 12 gage steel for blade lengths to 48" and 10 gage steel for 48" to 60" blade lengths.

LINKAGE
Side linkage out of airstream. 3/16" x ¾" plated steel tie bars. ¾" diameter stainless steel pivot pins with lock type retainers. 10 gage galvanized steel clevis arms.

AXLES
CD80AF3 — ¾" diameter plated steel.
CD80AF4 — ¾" diameter plated steel for blade lengths up to 48". 1" diameter plated steel for 48" to 60" blade lengths.

BEARINGS
Stainless steel sleeve bolted to frame.

FINISH
Mill galvanized.

MAXIMUM TEMPERATURE
250°F is standard. Damper can be supplied for temperatures between 250°F and 400°F by increasing clearance between blade ends and frame. Advise Ruskin of maximum operating temperature.

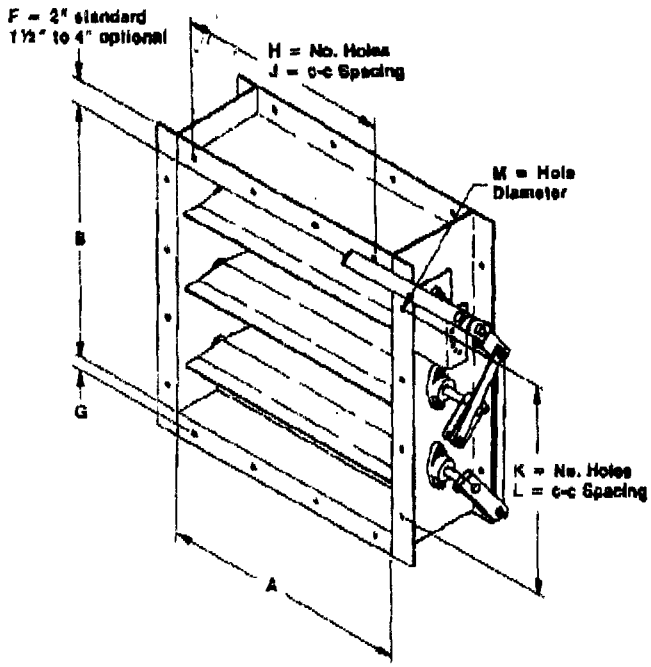
MINIMUM SIZE
Single blade, parallel action — 6"w x 6"h.
Two blade, parallel or opposed action — 6"w x 12"h.

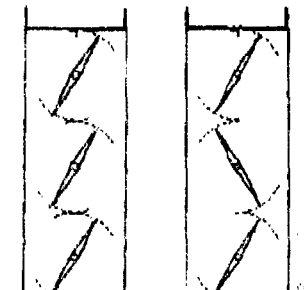
MAXIMUM SIZE
60"w x 96"h.

FEATURES AND VARIATIONS

The CD80AF Series dampers are ideally suited for flanged installation in industrial systems with up to 21 in. w.g. static pressure for the CD80AF3 and up to 45 in. w.g. static pressure for the CD80AF4. The sturdy construction and airfoil shaped blades provide outstanding performance, low pressure drop, and quiet operation.

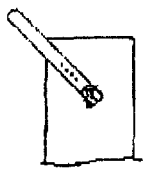
Variations available at additional cost and include:
- EPDM blade seals suitable for 250°F maximum temperature and silicone blade seals suitable for 400°F maximum temperature.
- Flexible stainless steel jamb seals.
- Bearings with integral shaft seals and bearings mounted outboard of frame.
- Axle shaft seals.
- Special materials, including stainless steel, for all parts in airstream.
- Nonstandard flanges and bolt holes in flange.
- Special finishes.
- Electric and pneumatic damper motor operators.



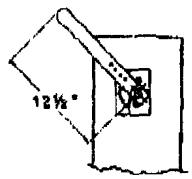


8" STANDARD (PB) PARALLEL BLADE

8" STANDARD (OB) OPPOSED BLADE



CRANK LEVER



HAND QUADRANT

QTY.	MODEL	DIMENSIONS												LEVER TYPE		VARIATIONS
		PB	OB	A	B	C	F	G	H	J	K	L	M	HQ	CL	

JOB LOCATION

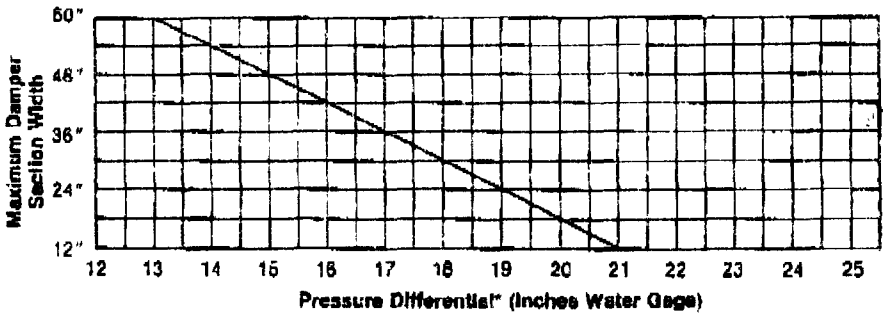
CONTRACTOR

Spec CD80AF3-787/Replaces CD82AF-984

CD80AF3 and CD80AF4 PERFORMANCE DATA

PRESSURE LIMITATIONS

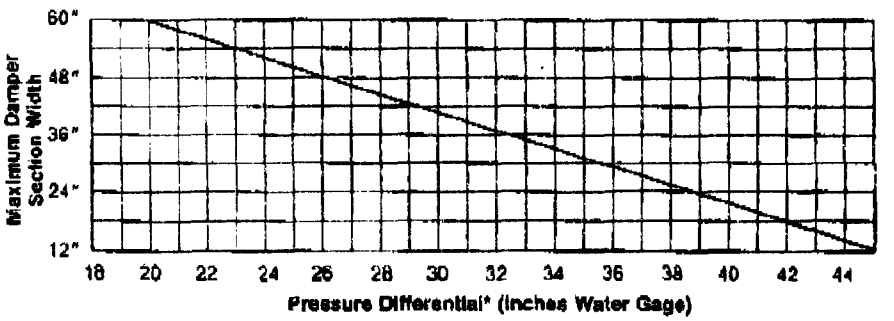
CD80AF3



Pressure limitations shown on charts at left allow maximum blade deflection of 1/180 of span on 60" damper widths. Deflections in other damper widths (less than 48") at higher pressures shown will result in blade deflection substantially less than 1/180 of span.

The CD80AF3 may be used in systems with total pressure exceeding 13" w.g. by reducing the damper section width as indicated in the chart. A maximum design total pressure of 17" w.g. would require a CD80AF3 damper with maximum section width of 36".

CD80AF4



*NOTE: Damper should be specified for fan shut off pressure. Pressure differential is not system pressure, but is the maximum pressure the damper will encounter with blades closed.

The CD80AF3 may be used in systems with total pressure exceeding 20" w.g. by reducing the damper section width as indicated in the chart. A maximum design total pressure of 26" w.g., for example, would require a CD80AF3 damper with maximum section width of 48".

The CD80AF dampers may tolerate higher pressure limitations than those shown here. Conservative ratings are presented intentionally in an effort to avoid misapplication. Consult Ruskin or your Ruskin representative when a damper is to be applied in conditions exceeding recommended maximums.