SPECIFICATION

FOR

INSTALLATION OF

SAFETY CLASS AND NONSAFETY CLASS HVAC EQUIPMENT AND DUCTWORK

FOR THE

HOUSTON LIGHTING & POWER COMPANY

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

5V279VS1003

JOB NO. 14926

RECEIVED
AUG 12 1988
RECEIVED
FDCC

DIVISION P-10

MECHANICAL CONSTRUCTION SPECIFICATION

9 / REV — HL&P / 14926-001 — 8/3/88 / DATE

No.	DATE	REVISIONS	BY	CH'K	EGS	C.ENG	POE	PE	QA
9	8-11-88	Incorporated HSCN 38 and FCRs HBH-02225, HBH-02230.	VS	MH	RLR	NA	NA	RLR	HKA
		Revision 0 through 8 on file.	(See microfilm for signatures)						

HOUSTON AREA OFFICE — BECHTEL — SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

JOB No. 14926

5V279VS1003

SHEET 1 OF 11

STP 1006 (5/84)

5.8 MINIMUM SEPARATION REQUIREMENTS

The guideline requirements for seismic separation shall be as set forth on drawing 3A01-0-S-10003 "Seismic Separation Control Drawing."

6.0 INSPECTION AND AIR LEAK TEST REQUIREMENTS

6.1 INSPECTION

Upon completion of HVAC systems or partial systems, Constructor shall visually inspect and carefully check that all equipment, ducts, and controls have been properly installed in accordance with the applicable installation details, drawings, specifications, and/or instructions of the Construction Manager.

6.2 AIR LEAK TEST

6.2.1 The Constructor shall organize and conduct the air leak test and demonstrate acceptable performance of the installation. Unless otherwise specified, the Construction Manager maintains the right to witness the test and request additional testing which is deemed necessary.

6.2.2 Leak testing shall apply to all safety and non-safety class duct work systems except as follows:

A. Intake or exhaust air plenums which are connected to outdoors via louvers may be visually inspected for acceptance.

B. The Reactor Containment Fan Cooler duct system including the ring duct may be visually inspected for acceptance.

C. The turbine generator building main steam isolation valve cubicles and all non-safety balance of plant ductwork.

D. The reactor containment supplementary purge supply and exhaust air duct portion, located inside the RCB.

E. Other duct work which is not feasible to be tested can be waived from the leak test with the Construction Manager's approval.

F. Trim joints associated with grilles, registers and diffusers at suspended ceilings.

6.2.3 Leak test for safety class HVAC systems shall be performed by using either a direct measurement method or pressure decay method conforming to the intent of ANSI N-510-75, Sections 6.3 and 6.4. Leak location methods shall be as follows:

A. Bubble method (ANSI N-510, Section 6.5)

B. DOP spray method (ANSI N-510, Section 6.6)

C. Dye penetrant or magnetic particle methods (for welds only).

D. The Constructor shall have the option to use Superior Signal Co. Inc.'s smoke bomb for preliminary testing to locate excessive leakage in ducts and shall take precautionary measures to ensure the safety of personnel and permanent plant equipment.

6.2.4 The Constructor may use the following equation to determine leakage when the pressure decay method is used:

$$L = \frac{V\,(P_1 - P_2)}{(407.3 + P)t}$$

L	=	Leakage, cfm
V	=	Volume of duct section or housing, ft^3
P	=	Test pressure, inches w.g.
p1	=	Pressure at start of test, inches w.g.
p2	=	Pressure at end of test, inches w.g.
t	=	Time of pressure decay, minutes

6.2.5 Test of individual partial duct systems may be performed separately if found desirable due to construction schedule or access limitations. Partial duct systems tested shall be blanked off on both open ends until adjacent duct is tested and ready to be connected. However, proper testing at the joints, between the ducts partially tested, shall be prepared to assure the overall system leakage requirements. The Constructor shall minimize the number of untested joints, insure that their location is accessible, record their location on a record set of testing drawings and describe in the Constructor's leak test procedure methods to insure that the untested joints will not compromise system integrity.

6.2.6 Leak Test Pressures

6.2.6.1 Safety-related units and components which can be isolated and exposed to full fan shutoff pressure, shall be leak tested to 1.5 times the fan operating pressure or fan shutoff pressure (pressure in inch W.G.), whichever is greater.

6.2.6.2 Safety-related units and components subject only to rated air flow shall be leak-tested at 1.5 times the maximum operating pressure (pressure in inch W.G.) which results from rated air flow or 18 inches W.G., whichever is smaller.

6.2.6.3 Nonsafety-related units and components shall be leak tested at 1.25 times the system's maximum operating pressure which results from the rated air flow.

6.2.6.4 All duct sections/systems which are required to be tested shall be subjected to air leak tests as described in ANSI N-510-1975 Standard.

6.2.7 Duct system maximum allowable leakage shall be as specified in Appendix "C". HVAC concrete chases forming a part of any duct system shall be tested as a unit with the respective system and leakage shall not exceed the maximum allowable leakage specified for that system in Appendix "C". Filter units shall be treated in accordance with ANSI-N509 as directed by the construction manager.

6.2.8 The Constructor shall address a means of recertifying duct sections that are altered after leak testing. Access doors and removable duct pieces located in the approved leak tested duct systems may be removed and re-installed with no retest requirements.

6.2.9 The Constructor shall apply rust preventative touchup to field welds except for those welded areas which are inaccessible prior to leak testing. No rust preventative touchup shall be applied to field welds in the RCB unless otherwise directed by the Construction Manager.

6.2.10 The Constructor may use the calibrated orifice system in lieu of the gas totalizing system for the direct measurement method to determine duct leakage.

6.2.11 When liquid penetrant testing is performed and the backside of weld is inaccessible the Constructor shall repair any surface defects in accordance with procedures acceptable to the Construction Manager.

6.2.12 Deleted.

6.2.13 Design pressure for construction of duct systems is shown in the Manual of HVAC Ducts and Duct Supports (No. 5-V-010-M-28500).

6.2.14 The Constructor shall have the option to use Hardcast Inc. two-part sealant system on non safety class ductwork outside the RCB and the IVC in accordance with Manufacturer's recommendations, if the installed gaskets and sealants specified in Section 3.0 have noticeable leakages, Construction Manager's approval is required for the use of this sealant system on safety class ductwork. The two-part sealant system shall consist of Hardcast Adhesive No. FTA-20 and 3 inch tape No. DT-5300, 4 inch tape No. DT-5400 or 6 inch tape No. DT-6100.

6.2.15 The Construction shall have the option to seal any penetrations in HVAC concrete chases that are to be sealed by the penetration sealing contractor, by temporary means, to complete the air leak test. The permanent seals installed by the penetration seal contractor to replace the temporary seals will be visually inspected for acceptance with no retest for air leakage.

APPENDIX C

AIR LEAK TEST PRESSURE

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
MAB								
5V109V00006	8V101VFN020 9V101VFN021 8V101VFN022	1. MAB Supply Filter Coil Housing	11.2	19.0		19.0	2.0%	- All duct and plenum on the suction side of these fans will be visual inspection for air tightness. - All duct on the dicharge side of these fans will be tested at fan shut-off pressure to the first isolation damper, and 8 inch w.g. for the duct within the remainder of the fan system
		2. MAB Supply Duct System	11.2	19.0	8.0	14.0	2.0%	Housing 9V101VXV020 9V101VXV021
	8V101VFH015 8V101VFH016	1. MAB locker Room Prefilter Housing	11.3	21.5		14.2	2.0%	Housing 9V101VXV022
		2. MAB Locker Room Supply Duct System	11.3	21.5	8.0	14.2	2.0%	
5V109V00008	8V101VAH025	1. Counting Room Supplementary Fan Coil Unit	4.6		5.8	5.8	2.0%	

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
MAB (Cont'd)								
5V109V00008	8V101VFN013 8V101VFN014	2. MAB Supplementary Exhaust Duct	13.0	13.9	8.0	16.3	2.0%	8V101VXV001 8V101VXV002
5V109V00009	8V101VFN017 8V101VFN018	1. MAB Main Exhaust Plenum	9.8	16.6		12.3	2.0%	8V101VXV023
	8V101VFN019	2. MAB Main Exhaust** Duct System	9.8	16.6	8.0	12.3	2.0%	
5V109V00008	3V101VAH022 3V101VAH023	Radiation Monitor Room, Suppl Fan Coolers	2.65		4.0	4.0	1.0%	
EAB								
5V119V25000	3V111VFN014 3V111VFN015	1. Main Supply Air Ducting	12.7	20.0	18.0 (**)	18.0	1.0%	3V111VXV007 3V111VXV008
	3V111VFN016	2. Unit Casing & Connecting Duct Pieces	12.7	20.0	18.0 (**)	18.0	1.0%	3V111VXV009 3V111VAH001 3V111VAH002 3V111VAH003

*Refer to Note #1
**For Unit 2 this value is 8.0

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
EAB (Cont'd)								
	3V111VFN001 3V111VFN002 3V111VFN003	1. Main Return Air Duct System	5.8	13.5	8.0	8.7	1.0%	
	3V111VFN010 3V111VFN011 3V111VFN012	1. Battery Room Exhaust System	3.5	6.5	5.2	5.2	1.0%	
5V119V25003	3V111VFN004 3V111VFN005 3V111VFN006	1. Control Room Make-up Air System Ductwork	10.4	11.2	8.0	15.6	0.5%	3V111VXV004 3V111VXV005 3V111VXV006
5V119V25004	3V111VFN007 3V111VFN008 3V111VFN009	1. Control Room Clean-up Duct System	9.0	9.3	8.0	13.5	0.5%	

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
EAB (Cont'd)								
	3V111VFN017 3V111VFN018 3V111VFN019	1. Control Room Supply System Ductwork	12.7		8.0	18.0	0.5%	
	3V111VFN025	1. Control Room	6.9	8.3	8.0	10.4	0.5/0.1%	Allowable leak rate shall be 0.1% for return air concrete chase and 0.5% for remaining return air duct.
	3V111VFN026 3V111VFN027	Return Air System Ductwork						
	9V111VFN039	1. Control Room Toilet/Kitchen Exhaust	2.5		3.0	3.0	0.5%	Testing from downstream of second isolation valve to the Control Room pressure boundary

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
EAB (Cont'd)								
8V119V25006	9V111VFN014	1. TSC Make-up Air Ductwork	12.7		8.0	15.9	0.5%	
	9V111VFN015 9V111VFN016	1. TSC Supply Air Duct System	7.0	7.3	8.0	8.8	0.5%	
8V119V25006	9V111VFN017 9V111VFN018	1. TSC Return Air Duct System/ Smoke Purge	4.9	4.9	6.2	6.2	0.5%	
	9V111VFN019	1. TSC Exhaust Air Duct System	3.5	3.7	4.4	4.4	0.5%	
5V119V00020	9V141VFN015 9V141VFN016	1. EAB Penetration Space Exhaust Air Duct System	3.5	3.6	4.4	4.4	2.0%	
	9V111VFN025 9V111VFN026 9V111VFN027	1. Normal Supply Duct System EAB Penetration Area	6.9		8.0	8.6	2.0%	

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
EAB (Cont'd)								
	3V111VFN030 3V111VFN031 3V111VFN032	1. Penetration Space	6.2		8.0	9.3	1.0%	
RCB								
5V14900016	2V141VFN001 2V141VFN002	1. RCFC Plenums/ Housings		9.4 (Normal)				1) Visual inspection only (leak test not required).
	2V141VFN003 2V141VFN004 2V141VFN005 2V141VFN006	2. RCFC Supply Air Duct	5.0	22.0 (DBA)	22.0	22.0	1.0%	2) Ducts below water level to be tested to have no leakage at all. (Welded ducts only.) Other supply duct systems to be tested for 1% leakage. 3) The discharge cone, transition piece, backdraft damper are to have visual inspection only. (Leak test not required.)

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
RCB (Cont'd)								4) The constructor shall have the option to leak test all RCFC welded supply air ducts below the *flood level (EL. -4'-9") for no water leakage/seepage by filling the ducts with clean water to the flood level El.(-)4'-9". When filled to El.(-)4'-9", the water level in the duct shall be marked initially and checked after 24 hours for any drop in elevation. In case drop in level is observed, the leakage/seepage paths shall be repaired/sealed with approved materials and procedures. *Flood Level: EL.(-)4'9"
3V141VFN027 3V141VFN028 3V141VFN029 3V141VFN030	1.	Containment Cubicles Exhaust System Ductwork	2.9		4.5	4.5	1.0%	

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
RCB (Cont'd)								
5V149V00018	8V141VFN007 8V141VFN008	1. RCB Normal Purge Supply Filter and Coil Housing.	13.8	24.0		24.0	2.0%	9V141VXV020
		2. Normal Purge Ducting System (Supply Air)	13.8	24.0	17.3	17.3	2.0%	
	8V141VFN009 8V141VFN010	1. Normal Purge Exhaust Air Ducting System	5.8	11.5	7.3	7.3	2.0%	
5V149V00019	8V141VFN011 8V141VFN012	1. RCB Supplementary Purge Supply Unit Housing.	10.4	11.3		13.0	2.0%	9V141VHX021 Leak Testing is Not Required Inside the RCB
		2. Supplementary Purge Supply Duct System.	10.4	11.3	13.0	13.0	2.0%	

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.		SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
RCB (Cont'd)									
	8V141VFN013 8V141VFN014	1.	RCB Supplementary Purge Exhaust Air Duct System	9.3	10.2	11.6	11.6	2.0%	Leak Testing is Not Required Inside the RCB
5V149V00022	8V141VFN021 8V141VFN022	1.	Tendon Gallery Vent Air System Ductwork	1.2	2.25	1.5	1.5	2.0%	
	8V141VFN023 8V141VFN024	1.	Reactor Cavity & Support Vent Air System Ductwork	5.8	8.75	7.3	7.3	2.0%	Leak Testing of Air Intake Plenum is Not Required
5V149V00022	8V141VFN029 8V141VFN030 8V141VFN031 8V141VFN032	1.	Containment Cooling Unit Ductwork	8.0	9.10	8.0	12.0	2.0%	

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
RCB (Cont'd)								
	9V141VFN036 9V141VFN037	1. Reactor Support Exhaust Ductwork System	4.1	13.5	5.2	5.2	2.0%	
FHB								
5V129V00012	8V121VFN001 8V121VFN002 8V121VFN003	1. FHB Supply Air System, Filter & Coil Housings	8.1	9.5		10.2	2.0%	8V121VXV007 8V121VXV008 8V121VXV009
		2. Supply Air Duct System.	8.1	9.5	8.0	10.2	2.0%	
		3. Intake Riser Supply Filter Housing.	8.1	9.5		10.2	2.0%	
		4. Supply Air Plenum Discharge Side.	8.1	9.5	8.0	10.2	2.0%	
3V129V00013	3V121VFN004 3V121VFN005 3V121VFN006	1. Exch. Air Plenum Discharge Side of Exhaust Fans.	6.9	7.20	8.0	10.4	0.5%	

*Refer to Note #1

APPENDIX C

AIR LEAK TEST PRESSURES

P & ID	FAN TAG NO.	SERVICE/ SYSTEM	System Design Press. In. W.G.	Fan Shut-Off Press. In. W.G.	*Leak Test Press. In. W.G. Ducts	*Leak Test Press. In. W.G. Units & Components	Allowable System Leakage Rate	Remarks (See Notes No. 1 Through 5)
FHB (Cont'd)								
	3¥121¥FN007 3¥121¥FN008 3¥121¥FN009	2. Exch. Air Plenum at Inlet side of booster Fans.	10.4	16.6	8.0	16.6	0.5%	
		3. Exch. Air Duct System.	6.9	7.20	8.0	10.4	0.5%	
		4. Booster Fans Duct System	10.4	16.6	8.0	15.5	0.5%	
DGB								
5¥139¥0015	9¥131¥FN007 9¥131¥FN008 9¥131¥FN009	1. Normal Vent Ductwork Supply	2.3	3.85	2.9	2.9	2.0%	9¥131¥X¥020 9¥131¥X¥021 9¥131¥X¥022
	3¥131¥FN001 3¥131¥FN002 3¥131¥FN003	1. Emergency Vent System Duct-work.	1.7	4.7	2.6	2.6	2.0%	

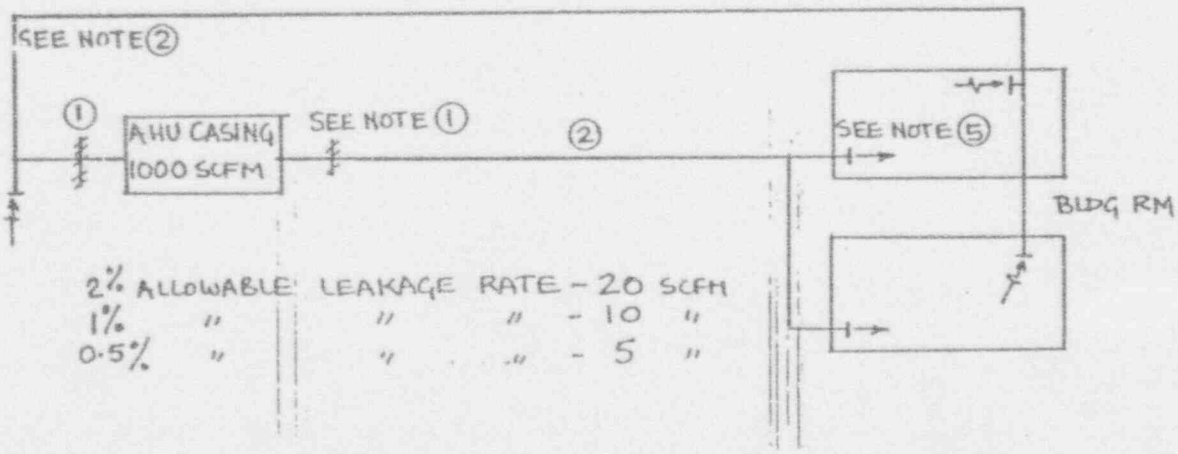
APPENDIX C

AIR LEAK TEST PRESSURES

NOTES:

1. For the purpose of testing, duct sections between AHU casings or fans with isolation dampers, the section of the duct between the isolation dampers shall be considered as a part of the AHU casings or fans and shall be tested at fan shut-off pressure.
2. The ducts/plenums/casings on the fan discharge side shall be tested under positive pressure and those on the suction side of the fans shall be tested under negative pressure if possible. If testing under negative pressure of ducts/plenums/casings on the suction side of the fans is not possible, then it shall be tested under positive pressure.
3. When a system is broken into convenient segments, to simplify testing, allowable leakage must be apportioned to each section so that the total system leakage stays within the allowable leakage limits.
4. All audible leaks must be repaired no matter how small the leakage is.
5. Leak tests are not required for final branches into rooms, EXCEPT EAB.

TYPICAL LEAK TEST SKETCH



ATTACHMENT 6

PM DATE	PM FREQ	TAG #	DAMPER DESCRIPTION	PM WORK INSTR
03/28/93	OUTAGE	3V142VDA298	UNIT 2 TENDON GALLERY EXHAUST	93000515
03/31/93	OUTAGE	3V112VDA076	UNIT 2 EAB HVAC EXHAUST	93000496
04/07/93	OUTAGE	3V142VDA001	UNIT 2 RCB PURGE SUPPLY	93000517
04/21/93	OUTAGE	3V102VDA113	UNIT 2 PLANT EXHAUST STACK	93000492
05/13/93	2 YR	3V111VDA277	UNIT 1 TSC HVAC EXHAUST	93000504
05/13/93	2 YR	3V111VDA275	UNIT 1 TSC SMOKE PURGE EXHAUST	93000504
05/20/93	2 YR	3V111VDA276	UNIT 1 TSC HVAC SUPPLY	93000509
06/04/93	2 YR	3V112VDA075	UNIT 2 CONTROL ROOM OUTSIDE AIR INTAKE	93000485
06/09/93	2 YR	3V112VDA077	UNIT 2 EAB ELEVATOR MACHINE ROOM EXHAUST	93000499
06/16/93	2 YR	3V111VDA075	UNIT 1 CONTROL ROOM OUTSIDE AIR INTAKE	93000484
06/30/93	2 YR	3V112VDA078	UNIT 2 EAB ELEVATOR MACHINE ROOM SUPPLY	93000501
07/06/93	2 YR	3V112VDA276	UNIT 2 TSC HVAC SUPPLY	93000510
07/07/93	2 YR	3V112VDA302	UNIT 2 TSC OUTSIDE AIR INTAKE	93000503
07/20/93	2 YR	3V112VDA277	UNIT 2 TSC HVAC EXHAUST	93000505
07/20/93	2 YR	3V112VDA275	UNIT 2 TSC SMOKE PURGE EXHAUST	93000505
08/08/93	OUTAGE	3V141VDA001	UNIT 1 RCB PURGE SUPPLY	93000516
08/10/93	2 YR	3V111VDA077	UNIT 1 EAB ELEVATOR MACHINE ROOM EXHAUST	93000498
08/10/93	2 YR	3V111VDA078	UNIT 1 EAB ELEVATOR MACHINE ROOM SUPPLY	93000500
08/11/93	2 YR	3V111VDA302	UNIT 1 TSC OUTSIDE AIR INTAKE	93000502
08/20/93	OUTAGE	3V141VDA298	UNIT 1 TENDON GALLERY EXHAUST	93000514
08/25/93	OUTAGE	3V101VDA118	UNIT 1 MAB MAIN HVAC SUPPLY	93000518
08/25/93	OUTAGE	3V101VDA119	UNIT 1 MAB MAIN HVAC SUPPLY	93000518
08/25/93	OUTAGE	3V101VDA120	UNIT 1 MAB MAIN HVAC SUPPLY	93000518

PM DATE	PM FREQ	TAG #	DAMPER DESCRIPTION	PM WORK INSTR
10/18/93	OUTAGE	3V101VDA113	UNIT 1 PLANT EXHAUST STACK	93000491
10/19/93	OUTAGE	3V111VDA076	UNIT 1 EAB HVAC EXHAUST	93000495
10/20/93	OUTAGE	3V101VDA052	UNIT 1 FHB SUPPLY	93000493
03/23/94	OUTAGE	3V102VDA118	UNIT 2 MAB MAIN HVAC SUPPLY	93000519
03/23/94	OUTAGE	3V102VDA119	UNIT 2 MAB MAIN HVAC SUPPLY	93000519
03/23/94	OUTAGE	3V102VDA120	UNIT 2 MAB MAIN HVAC SUPPLY	93000519
12/10/94	OUTAGE	3V102VDA052	UNIT 2 FHB SUPPLY	93000494

ATTACHMENT 7

-TORNADO DAMPERS-

0000738 (08/89) SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

VENDOR MANUAL COVER SHEET

NOTICE

Check the supplier document register for the latest installation drawing(s). Use the installation drawing(s) contained in the controlled vendor drawing file in FDCC in lieu of the same drawing(s) in the vendor manual. If the installation drawing(s) in the manual is not listed in the Supplier Document Register or if it is a later revision than listed in the Supplier Document Register, contact Engineering for resolution.

SUPPLIER DOCUMENT NO.: 80278-722 REV. HCL PACKAGE NO.: 0422C

MANUAL TITLE: INSTALL, MAINT, OPER MNL - NUC SAFETY RELATED DAMPERS

SUPPLIER NAME: AMER. WARMING & VENT. CO.

EQUIPMENT TAG NO'S

See Master Equipment List.

RECEIVED JAN 17 1990

HL&P LOG NO.(S)

8168-00262-IVA

8168-00243-IVA

VETIP REVIEW COMPLETE

J. Hughes 1/16/90

NAME DATE

IMPORTANT

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

DATE RECEIVED

HL&P SIGNED

DOCUMENT STATUS

1 ☐ APPROVED FOR USE/WORK MAY PROCEED.

2 APPROVED FOR USE AS NOTED/REVISE AND RESUBMIT, WORK MAY PROCEED SUBJECT TO INCORPORATION OF CORRECTION INDICATED.

3 NOT APPROVED/REVISE AND RESUBMIT, WORK MAY NOT PROCEED.

4 REVIEW NOT REQUIRED

10-1-89

DATE

SOUTH TEXAS PROJECT

ST-RM-0147 (02/86)

ORIGINAL PO NUMBER REFERENCE

UNIT 1

THIS DRAWING MUST BE WORKED WITH THE FOLLOWING DOCUMENTS

DCN's	FCN	FCR's
SDD2	32	33

UNIT 2

THIS DRAWING MUST BE WORKED WITH THE FOLLOWING DOCUMENTS

DCN's	CN's	FCR's
SDD2	32	33
	SE2093	

REV	DATE	REVISION NOTE	BY	CKD	DV	SE
HC 1	12/1/88	FOR THE INCORPORATION OF CHANGE DOCUMENTS SEE THE INDEX OF REVISIONS SHEETS.				
	1/20/89	For Incorporation of Change Documents See the Index of Revisions Sht.				

HOUSTON LIGHTING & POWER CO. SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

PAGE 1 OF ~~588~~ 562 CC 1-15-90

1.0 INTRODUCTION

1.1 This document addresses maintainability of dampers and actuators supplied by AWV for nuclear safety applications on the South Texas Project. Included are spare parts recommendations and descriptions.

1.2 Equipment provided is based upon AWV NVC (volume control) and NBD (backdraft) construction standards developed for nuclear power plant use in accordance with ANSI N509.

MODEL	MAXIMUM PRESSURE	MAXIMUM VEL. (fpm)	MODE
NVC-41	5 in. w.g.	3900	Volume Control
NVC-42	10 in. w.g.	5150	Volume Control
NVC-38	13.5 in. w.g.	6400	Low Leakage
NVC-56	10 in. w.g.	5150	Round
NBD-53	15 in. w.g.	6400	Backdraft
NBD-70	3 psi.	—	Tornado Exhaust
NBD-71	3 psi.	—	Tornado Intake

1.2.1 NVC-41 is a low pressure damper having a single thickness blade and rated for AMCA Class I fan systems. Damper complies with ANSI N509, Table 5-3, Class II leakage criteria with seals.

1.2.2 NVC-42 is a medium pressure damper having an airfoil blade with blade hem welded to increase rigidity. Damper complies with ANSI N509, Table 5-3, Class II leakage criteria with seals. It is rated for AMCA Class II fan systems.

1.2.3 NVC-38 is a low leakage parallel bladed damper having a leakage criteria of 2.0 cfm/sq. ft. at 1.0 in. w.g. Each blade operates in its own compartment. O-ring stuffing boxes are standard at shaft penetrations.

1.2.4 NVC-56 is a single blade round damper pivoted on sleeve bearings.

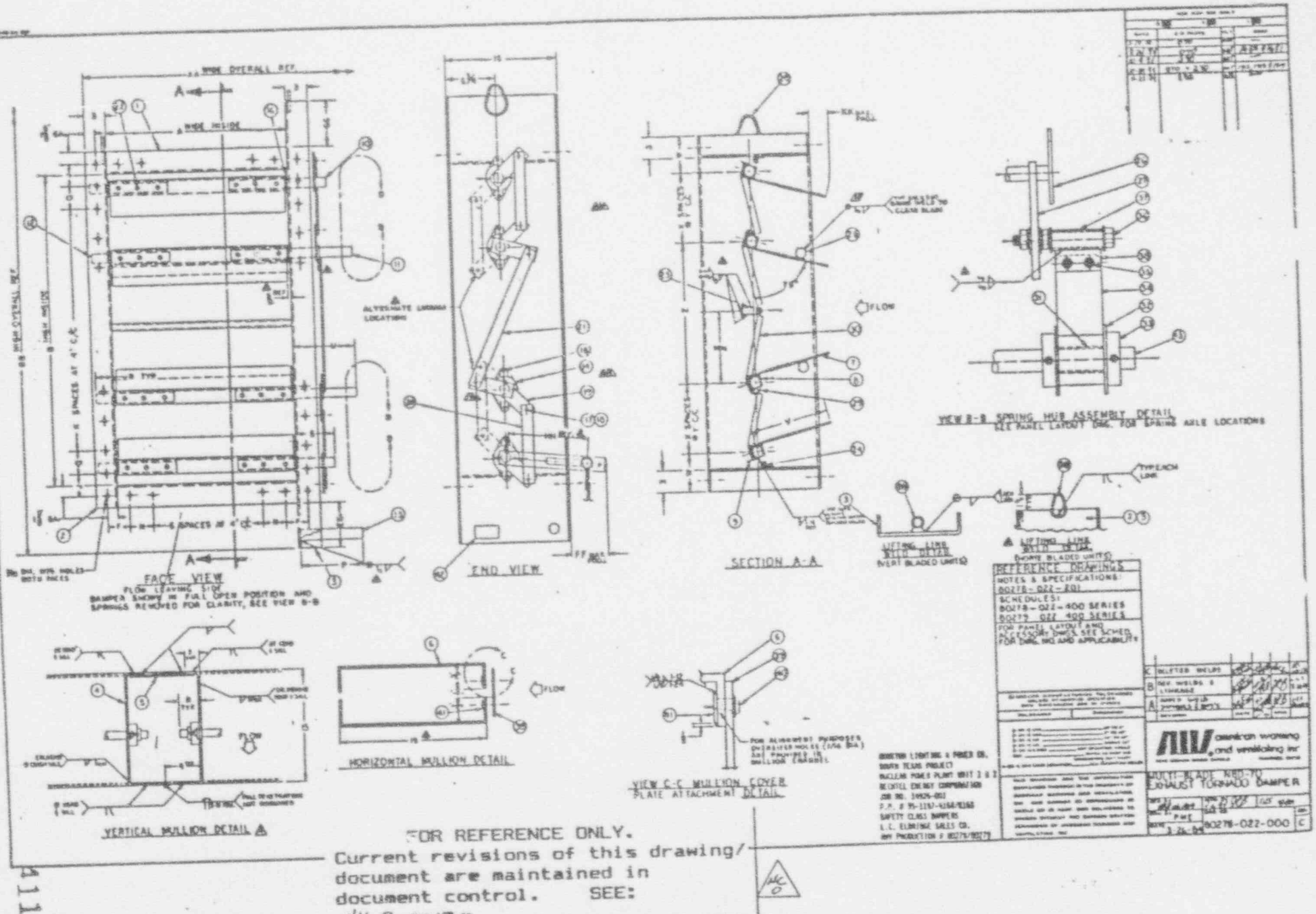
1.2.5 NBD-53 is a backdraft damper having an edge pivoted airfoil blade rotating on relubricable ball bearings. Linkage and adjustable counterweights are located outside the airstream. Leakage criteria complies with ANSI N509 Table 5-3, Class II for dampers equipped with elastomer seals. Reactor Containment Backdraft Dampers with mechanically fastened elastomeric blade edge seals and stainless steel jamb seals have leakage criteria 150% of Class II. C

1.2.6 NBD-70 is a tornado damper designed for exhaust and/or return air applications. Edge pivoted blades are pointed into the airstream and close upon increased air flow due to negative pressure (tornado) downstream of damper. Constant force springs hold blades in the open position until a start closed differential pressure of four (4) in. w.g. is reached. Typical closing time is .25 seconds.

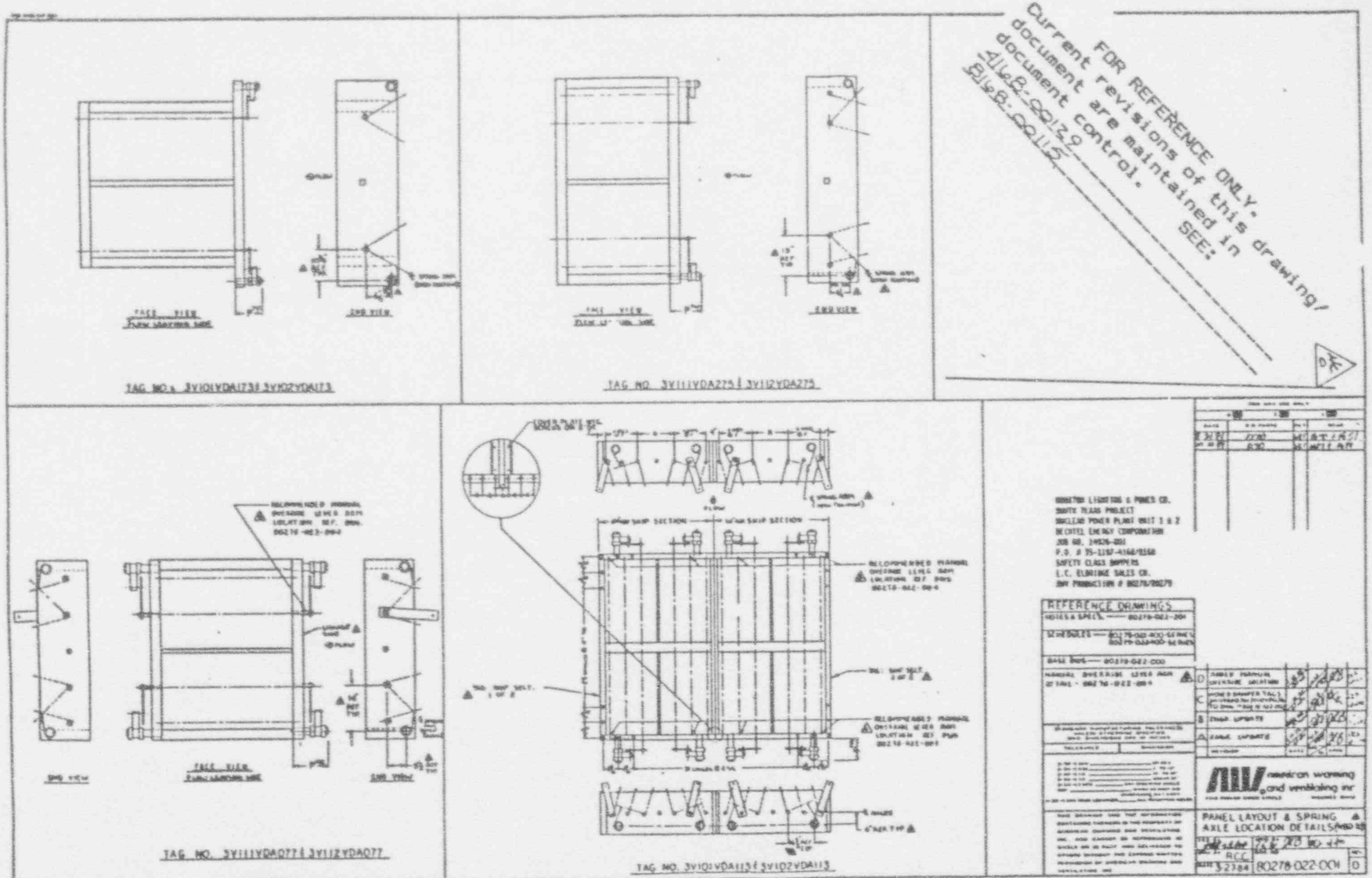
1.2.7 NBD-71 is a tornado damper intended for intake or supply air applications. The edge pivoted blades open in the same direction as airflow and close with flow reversal. Blades are held open by their own weight or by light constant force springs so as to minimize pressure drop through damper. Typical closing time is .25 seconds under tornado conditions.

1.3 Damper models NVC-41, NVC-42, NVC-38 and NBD-53 were qualified by seismic test under operating conditions. Models NBD-70 and NBD-71 were qualified by a combination of seismic test and analysis as sizes, flows and pressures prevented testing of total assemblies. The Model NVC-56 was qualified by analysis only due to its small size and function.

1.4 Actuators, limit switches, solenoid valves and filter regulators were environmentally qualified by test reports. Damper components such as bearings, elastomers and lubricants are being qualified by an AWV environmental test. Recommended lubrication and replacement intervals may be revised upon completion of test program.

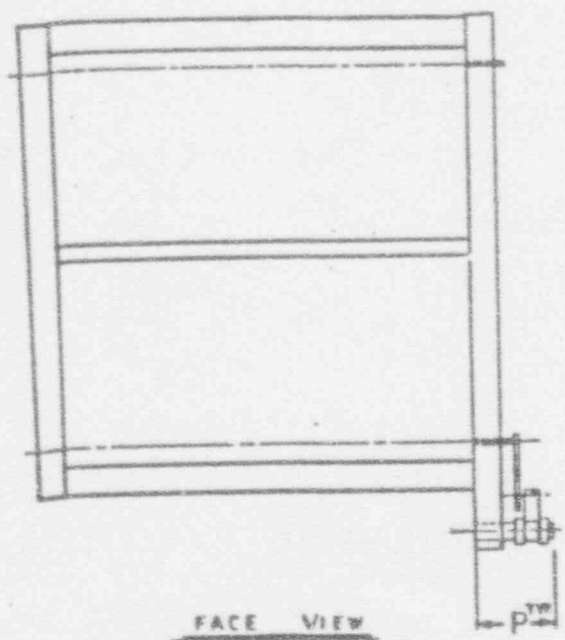


FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00139

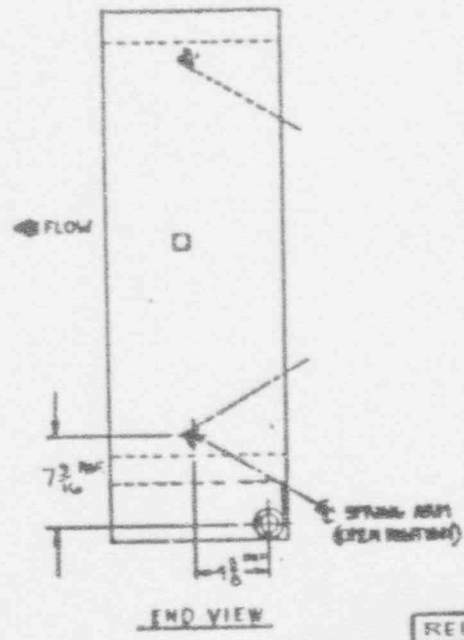

FOR REFERENCE ONLY.
Current revisions of this drawing/
document are maintained in
document control.
SEE:
4168-00129
8168-00115
FACE VIEW
END VIEW
TAG NO. 3V101VDA173 & 3V102VDA173
TAG NO. 3V111VDA275 & 3V112VDA275
TAG NO. 3V111VDA077 & 3V112VDA077
TAG NO. 3V101VDA113 & 3V102VDA113
HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-001
P.O. # 35-1197-4168/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
REFERENCE DRAWINGS
NOTES & SPECS. — 80278-022-204
SCHEDULES — 80278-022-400-SERIES
BASE DWG — 80278-022-000
MANUAL OVERRIDE LEVER ARM
american warming and ventilating inc
PANEL LAYOUT & SPRING AXLE LOCATION DETAILS
RCC
3-27-84
80278-022-001
0

412

FOR REFERENCE ONLY.
Current revisions of this drawing/
document are maintained in
document control. SEE:
41658-00217
B16B-00204



FACE VIEW
FLOW LEAVING SIDE



END VIEW

TAG NO.s 3V141VDA298 & 3V142VDA298

REFERENCE DRAWINGS
80278-022-000 BASE DWG.
80278-022-201 - NOTES & SPECS
80278-022-405 - SCHEDULE
80279-022-405 - SCHEDULE

04-94	250		—
04-94	270		—
DATE	S.O. PARTS	PLT	SCMS
Q [redacted]	T [redacted]	I [redacted]	
FOR AMV USE ONLY			

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT
UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB # 14926-081
P.O.# 33-1197-4168/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AMV PROD. # 80278/80279

REVISION	DATE	APPD.

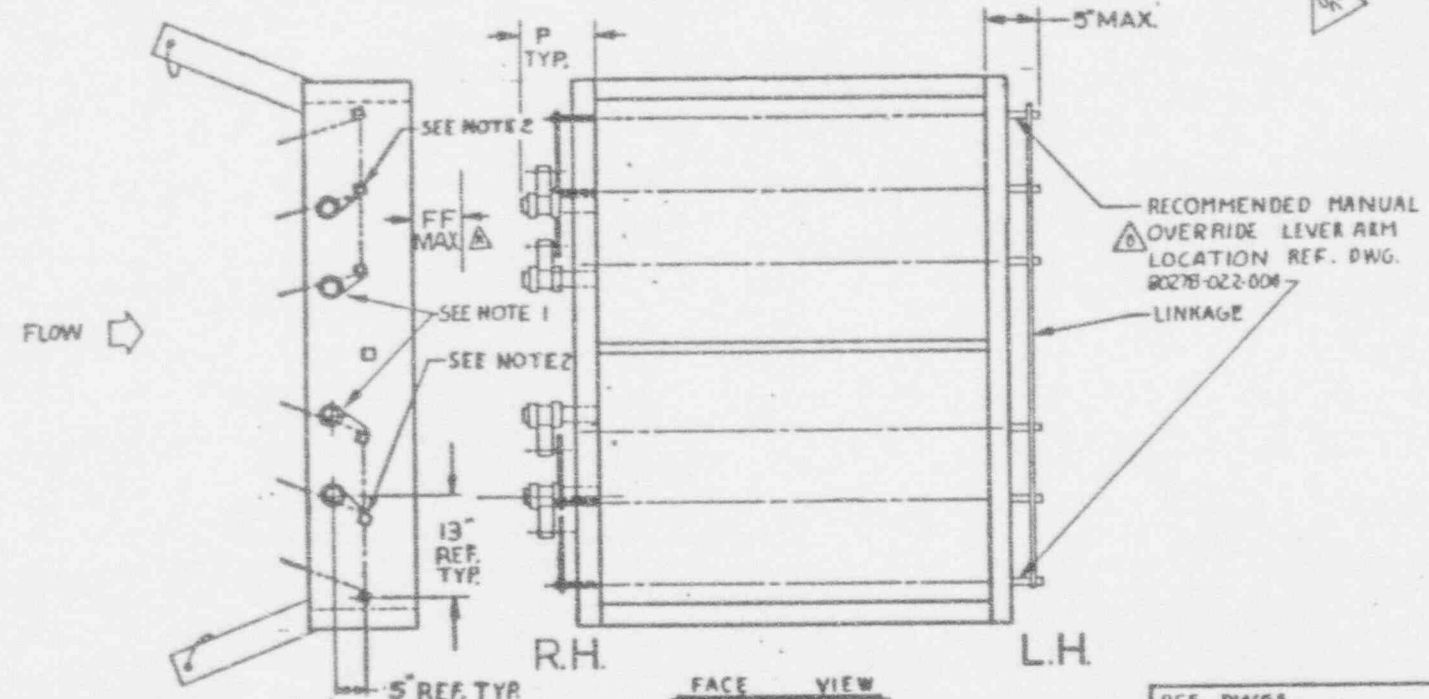
american warming and ventilating inc
1915 INDIAN WOOD CIRCLE MAUMEE, OHIO

PANEL LAYOUT AND
SPRING LOCATION DETAIL

CKD. BY	APP'D BY	APP'D
DRN. BY R.E.E.	DWG. NO. 80278-022-002	REV
DATE 7-17-96		

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
A16B-00252
B16B-00234

NOTE: 1) SPRINGS ARE TO BE DOUBLE LAMINATED.
2) ACT. AXLE EXTENSION IS 5" FOR AXLES #2 & #5 ONLY, ON R.H. SIDE OF DAMPER AS VIEWED FROM FLOW ENTERING. AXLES ARE NUMBERED FROM HEAD TO SILL.
⚠3 3) 'FF' DIMENSION IS REFERENCED FROM FLOW LEAVING FACE OF DAMPER.



TAG NO. 3V111VDA076 & 3V112VDA076

REF. DWGS.
80278-022-405, -004 ⚠4
80279-022-405

american warming and ventilating inc
1213 INDIAN WOOD CIRCLE MAUMEE, OHIO

PANEL LAYOUT & SPRING AXLE LOCATION DETAILS (LAD-70)

DRN. BY	WCB	DWG. NO.	80278-022-003
DATE	10-23-84	REV	B

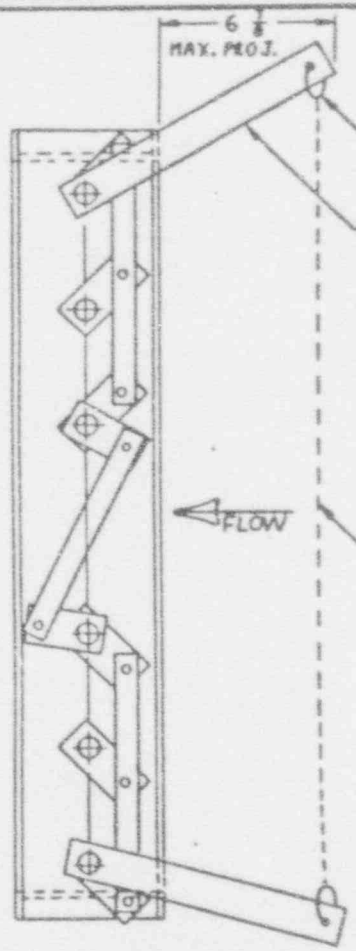
REVISION	DATE	DRN. BY	CK.	APPD.
B ADDED MANUAL OVERRIDE LOCATION	1-14-85	WCB		DES 1/24/85
A ADDED 'FF' DIM., NOTE 3, ARROW	10-31-84	WCB		DES 11/14/85

HOUSTON LIGHTING AND POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT #1&2
BECHTEL ENERGY CORPORATION
JOB NO. 14826-001
P.O. NO. 95-1187-6181/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO., INC.
AWV PRODUCTION NO. 80278/80279

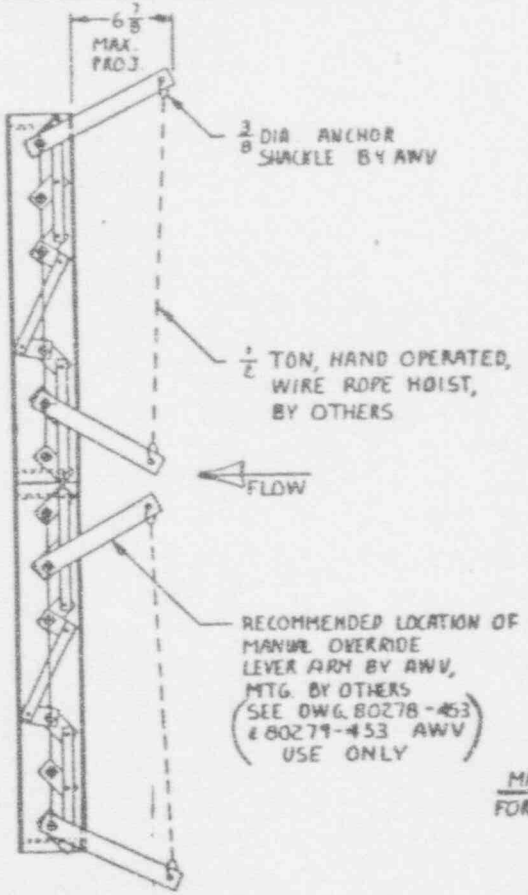
DATE	B.O. PARTS	PLT	SCNS
1-14-85	071	INT	1754-1760
10-31-84	070	INT	1699-1700

FOR AWV USE ONLY

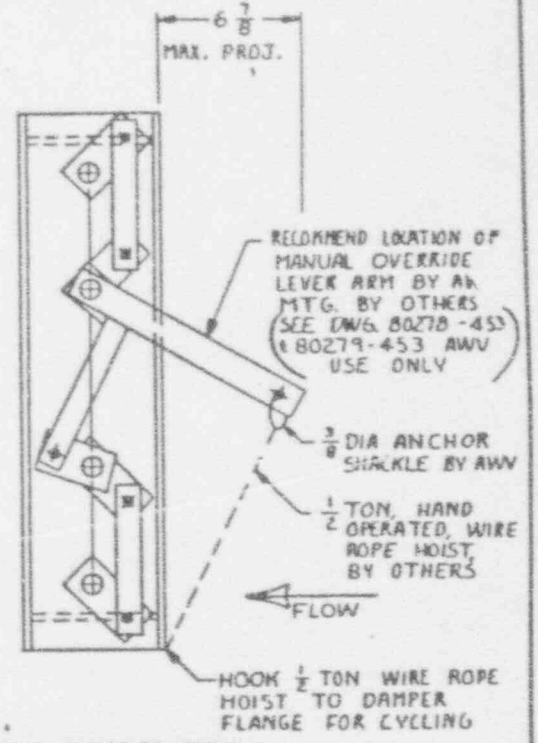
twip



MANUAL OVERRIDE DETAIL
FOR TAGS: 3V111VDA076 & 3V112VDA076



MANUAL OVERRIDE DETAIL
FOR TAGS: 3V101VDA113 & 3V102VDA113



MANUAL OVERRIDE DETAIL
FOR TAGS: 3V111VDA077 & 3V112VDA077

DATE	R.O. PARTS	PLT	ECN#
O	Y	I	

FOR AWV USE ONLY

HOUSTON LIGHTING AND POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT #1 #2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-881
P.O. NO. 35-1187-4188/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO. INC.
AWV PRODUCTION NO. 80278/80279

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00265
B168-00246

REF. DWGS.:
80278-022-001, -403, -404, -405, -003, 80279-022-403, -404, & -405

american warming and ventilating inc
1319 INDIAN WOOD CIRCLE MAUMEE, OHIO

LEVER ARM MTG. DETAIL

CKD. BY	APVD. BY	DCS
DRN. BY WCB	DWG. NO. 80278-022-004	REV.
DATE 4-22-85		

5th

SPECIFICATIONS

FRAME: 15 x 3 x 1/4" THK. ASTM-A36 H.R.S. (1)(2)(3) WITH LIFTING LINKS (28)

VERTICAL MULLION: 15 x 4 x 2 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (4) WITH 1 x 2 x 1/4" THK. PLATED STEEL PRINT BARS (5) ACROSS OPEN SECTION ON 24" MAX. SPACING.

HORIZONTAL MULLION: 15 x 1-3/4 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (6) WITH 3-1/2 x 10 GA. ASTM-A526/A527 GALV. STEEL COVER PLATES (39) W/ #10 SELF THREADING PLT. STL. MTG. SCREWS (40) & GE-106 SILICONE SEALING COMPOUND SHIPPED LOOSE FOR ASSEMBLY IN FIELD BY OTHERS AT SHIP SECTION SPLIT.

BLADES: 10 GA. ASTM-A526/A527 GALVANIZED STEEL EDGE PIVOTED SINGLE THICKNESS BLADE (7)

AXLE: (SEE SCHED. FOR DIA.) AISI-1018 PLATED STEEL STUB (11)(12)(13)(14) WITH ASTM-A513/A500 GRADE B SQUARE TUBE (8) (SEE SCHED. FOR SIZE.)

BEARINGS: SEALMASTER RELUBRICABLE BALL WITH WOOL FELT RADIAL SEAL & SHELL ALAYANIA #2 GREASE (16) & W/ STAIN. STL. THRUST WASHERS (15) AT JAMBS.

LINKAGE: HEAVY DUTY AISI-M1020/ASTM-A36 PLATED H.R.S. (19)(20)(21) WITH STAINLESS STEEL PINS (17) AND O.I.B. BEARINGS (18) SINGLE PER PANEL.

STOPS: 1 x 1 x 10 GA. ASTM-A526/527 GALVANIZED STEEL ANGLE (24) AND 2 x 1 x 11 GA. ASTM-A513/A500 GRADE B "RECT. TUBE (25)

SEALS: EPDM-3 BULB (MCL# 7404) (29) ON BLADES & STOPS W/ EPT-4 WEDGE (MCL# 7408) (30) ON JAMBS & W/GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.

FINISH: HOT DIP GALVANIZING PER ASTM-A123 ON ALL CARBON STEEL COMPONENTS. MILL ON GALVANIZED OR PLATED STEEL SURFACES WITH TOUCH-UP OF WELDED AREAS OF GALV. OR PLATED STEEL WITH GALVANOX TYPE I.

TIE BARS: (2) TWO 3/4" DIA. AISI-1018 PLATED STEEL FULL LENGTH BARS (23) LOCATED AT CENTER BLADES FOR FULL OPEN STOPS.

POSITION INDICATOR: 16 GA. ASTM-A527 GALVANIZED STEEL ARROW (26) WELDED TO AXLE ON EXTERIOR PANELS.

ACTUATOR: CONSTANT FORCE SPRING TO HOLD BLADES OPEN UNTIL INCIDENT (SEE SCHED. FOR MODEL #) DAMPER WILL CLOSE UPON PRESSURE RISE. START CLOSE PRESSURE IS 4.0 IN. W.G.

NOTES

1. SEE SCHEDULE 80278-022-400 SERIES OR 80278-022-400 SERIES FOR ADDITIONAL DESIGN INFO.
2. ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STANDARD WELD DRAWING # 10151 UNLESS OTHERWISE SPECIFIED.
3. EACH DAMPER TO HAVE A STAINLESS STEEL I.D. TAG (42) WITH 1/4" HIGH CHARACTERS AFFIXED TO DAMPER WITH THE FOLLOWING INFORMATION:

   P.O. NO. (PER SCHED.) DAMPER TYPE: NBD-70
   MANUFACTURERS NAME: AMERICAN WARMING & VENTILATING
   NAME OF COMPONENT: TORNADO DAMPER/EXHAUST
   DAMPER TAG NO. (PER SCHED.), & S.O.# (PER SCHED.)

4. INLET DUCTS MUST BE OF SUFFICIENT LENGTH TO CONTAIN THE BLADE IN THE OPEN POSITION AND THE DUCT & JUNCTION OF THE DAMPER MUST BE SMOOTH AND FREE OF PROTRUSIONS THAT MAY DAMAGE THE BLADE.
5. LEAKAGE & DEFLECTION TESTING PER AWV DOC.# 80278-TOE. EACH DAMPER WILL BE CYCLE TESTED 25 TIMES UNDER SHOP FLOOR CONDITIONS.
6. QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLIES AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.
7. CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR FRAME, BLADES & AXLES WHICH ARE CONSIDERED THE HIGH STRESS ITEMS BY AWV. CERTIFICATES OF CONFORMANCE ARE TO BE SUPPLIED ON ALL OTHER MATERIALS.
8. SEISMIC QUALIFICATIONS WILL BE FURNISHED FOR THE DAMPER ASSEMBLY.
9. DUE TO THE SIZE OF THIS EQUIPMENT, REASONABLE CARE MUST BE EXERCISED WHEN LOADING, UNLOADING, HANDLING & INSTALLING THESE DAMPERS TO AVOID OVERSTRESSING & POSSIBLE PERMANENT DAMAGE TO THE FRAME & RELATED COMPONENTS BY EXCESSIVE RACKING, SKEWING, TWISTING, ETC.
10. BLADES ARE ALWAYS PARALLEL TO THE 'A' DIMENSION.
11. PLATING CONFORMS TO ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC.

DATE	G.O. PARTS	PLT	SCHD
11-27-84	250	100	—
10-9-84	270	101	—
5-18-84	070	457	—

FOR AWV USE ONLY

HOUSTON LIGHTING & POWER CO.
SOU
NUC
BEE
JOB
P.O
SAF
L.F
AWV

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00128
8168-00114

American warming and ventilating inc

NOTES & SPECS FOR DWG. # 80278-B22-000 (NBD-70)

DRN. BY RCC | DWG. NO. 80278-B22-201 | REV A

DATE 8/7E/84

GENERAL INFORMATION

BLDG. 1 B QNTY. 1 BASE DWG. 80278-022-000
DATA SHT. 3V289V24009-6 NOTES & SPECS. 80278-022-201
TAG NO. 3V101VDA173 PANEL LAYOUT 80278-022-001
OPENING SIZE 27 W. X 27 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 940
DESIGN VELOCITY (FPM) 186
PRESS. DROP PER AMCA 500, FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 438
START CLOSED PRESS. (IN. W.G.) 4

BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL/UP
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 300
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

H1 (LBS.) 900
H2 (LBS.) 900
V (LBS.) 1300
M (IN. LBS.) 350
TORNADO (LBS.) 1887

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL # SH31U58
QUANTITY/PANEL 2
TOTAL QUANTITY 2
FORCE (LBS.) 40 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE LH
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL) 1 & 2

AWV USE ONLY

CRK. AREA/PANEL 1.7
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE (A) 123 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 1000
ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE: A= 27		1ST/LST.PNCH L= 5 1/8	(A)
H.INSIDE: B= 27		#BLD.SPCS. X= —	
MTG.HLS.: F= 2 7/16		SPC.C.C.: Y= —	
MTG.HOLE: G= 5		CTR. SPC. Z= 22 3/4	(A)
MTG.HOLE: J= 2 7/16		O.A.WIDE: AA= 40	
MTG.HLS.: K= 5		O.A.HIGH: BB= 49	
MTG.HLS.: N= 2 7/16		BTM.JB.EXT EE= 7	
MTG.HLS.: Q= 2 7/16		MAX.PROJ: FF= 6 1/2	(A)
AXLE EXT.R= 2 1/8	(A)	TOP.JB.EXT GG= 7	
AXLE EXT.S= —		SPRING C/C HH= 7 7/16	
AXLE EXT.T= —		MAX.PROJ: KK= 3	
ACT. EXT. U= 6		AXLE DIA. 1	(A)
SPR-SHFT EXT. P= 8 1/2		BLDS/PANEL 2	
BLD. W.: V= 11 1/4	(A)		

TUBE SIZE 1 1/4 x 1 1/4 x 11 GA. (A)

	REVISION	DATE	BY	APPD. BY
A	REVISED AXLE DIA & ENGR. UPDATE	5-23-84 / 5/2/84	RCC	K

AMERICAN WARMING AND VENTILATING INC.
1330 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

CKD. BY KCH 4/6/84 | MFG. APPR. BY 4/27/84 | Q. A. APPR. BY 5/4/84
DRN. BY PME | DWG. NO. 80278-022-401 | REV. A
DATE 3/28/84

SOTXNB.D70

FOR REFERENCE ONLY.
Current revisions of this drawing/document are maintained in document control. SEE:
4168-00121

DATE	S.O. PARTS	PLT	SCHG
5-30-84	070	WQT	1571
5-31-84	070	WQT	—

S [redacted] T [redacted] I [redacted]

FOR A.W.V. USE ONLY

U1 A17

GENERAL INFORMATION

BLDG. & 3 QNTY. 1 BASE DWG. 80278-022-000
DATA SHT. 3V289V24010-12 NOTES & SPECS. 80278-022-201
TAG NO. 3V111VDA275 PANEL LAYOUT 80278-022-001
OPENING SIZE 42 W. X 24 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 10,500
DESIGN VELOCITY (FPM) 1500
PRESS. DROP PER AMCA 500, FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 638
START CLOSED PRESS. (IN. W.G.) 4
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL/UP
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 400
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. N/A

SEISMIC REACTIONS

HI (LBS.) 1200
H2 (LBS.) 1200
V (LBS.) 1750
M (IN. LBS.) 150
TORNADO (LBS.) 2624

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL# SH31U58
QUANTITY/PANEL 2
TOTAL QUANTITY 2
FORCE (LBS.) 40 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE LH
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL) 2+3

AWV USE ONLY

CRK. AREA/PANEL 2.5
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 160 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 4000

FABRICATION INFORMATION

W.INSIDE:	A= 24		1ST/LST.PNCH	W= 5	
H.INSIDE:	B= 42		@BLD.SPCS.	X= 1	
MTG.HLS.:	F= 3 3/8		SPC.C.C.:	Y= 9 5/16	
MTG.HOLE:	G= 5		CTR. SPC.	Z= 19 3/8	
MTG.HOLE:	J= 2 3/16		O.A.WIDE:	AA= 38	
MTG.HLS.:	K= 9		O.A.HIGH:	BB= 50	
MTG.HLS.:	N= —		BTM.JB.EXT	EE= —	
MTG.HLS.:	Q= 2 3/16		MAX.PROJ:	FF= 3 1/2	
AXLE EXT.R=	2		TOP.JB.EXT	GG= —	
AXLE EXT.S=	3 1/2		SPRING C/C	HH= 9 1/4	
AXLE EXT.T=	—		MAX.PROJ:	KK= 15/16	
ACT. EXT. U=	8		AXLE DIA.	3/4	
SPR SHFT EXT: P=	10		BLDS/PANEL	4	
BLD. W.: V=	9 5/16				

TUBE SIZE 1X1 X 11GA.

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00120

REVISION	DATE	BY	APPD. BY

AMERICAN WARMING AND VENTILATING INC.
2340 DRUID WOOD CIRCLE MACON, GA.

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

CKD. BY RBH 4/6/84	APPD. BY [illegible]	A. A. APPL. BY DE 4/6/84	REV.
DRN. BY PME	DWG. NO. 80278-022-402		
DATE 3/28/84			

SOTXNB.070

DATE	E.O. PARTS	PLT	ECNS
5-21-84	070	W.T	—

FOR A.W.V. USE ONLY

GENERAL INFORMATION

BLDG. E.B QNTY. 1 BASE DWG. 80278-022-000
DATA SHT. 3V289V24010-2 NOTES & SPECS. 80278-022-201
TAG NO. 3V111VDA077 PANEL LAYOUT 80278-022-001
OPENING SIZE 48 W. X 48 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 6570
DESIGN VELOCITY (FPM) 411
PRESS. DROP PER AMCA 500, FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 1166
START CLOSED PRESS. (IN. W.G.) 4
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL UP
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 780
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. YES

SEISMIC REACTIONS

H1 (LBS.) 2340
H2 (LBS.) 2340
V (LBS.) 3460
M (IN. LBS.) 300
TORNADO (LBS.) 6132

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL# SH31U58
QUANTITY/PANEL 4
TOTAL QUANTITY 4
FORCE (LBS.) 40 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE RH+LH
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:) 2+3

AWV USE ONLY

CRK. AREA/PANEL 4.6
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 406 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE: A= 48	IST/LST.PNCH W 5 1/2
H.INSIDE: B= 48	#BLD.SPCS. X= 1
MTG.HLS.: F= 3 3/8	SPC.C.C.: Y= 10 13/16
MTG.HOLE: G= 11	CTR. SPC. Z= 21 5/8
MTG.HOLE: J= 3 3/8	O.A.WIDE: AA= 73
MTG.HLS.: K= 11	O.A.HIGH: BB= 56
MTG.HLS.: N= —	BTM.JB.EXT EE= —
MTG.HLS.: Q= —	MAX.PROJ: FF= 6 1/2
AXLE EXT.R= —	TOP.JB.EXT GG= —
AXLE EXT.S= 5	SPRING C/C HH= 11 7/8
AXLE EXT.T= —	MAX.PROJ: KK= 25/16
ACT. EXT. U= 10	AXLE DIA. 1 1/2
SPR SHFT EXT: P= 12	BLDS/PANEL 4
BLD. W.: V= 10 9/16	

TUBE SIZE 2 X 2 X 1/4

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:
4168-00119 Unit 1
Unit 2

	REVISION	DATE	BY	APP. BY

AMERICAN WARMING AND VENTILATING INC.
1310 INDIAN WOOD CIRCLE MAUMEE, OHIO

DATE	S.O. PARTS	PLT	ECNS
5-21-84	010	WT	—

● [redacted] T [redacted] I [redacted]
FOR A.W.V. USE ONLY

HOUSTON LIGHTING AND POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT #1
BECHTEL ENERGY CORPORATION
JOB NO. 14926-001
P.O. NO. 35-1197-4168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO. INC.
AWV PRODUCTION NO. 80278

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

CKD. BY RCH 4/6/84 APPD. BY Q.A. APPD. BY DCS 4/6/84
DRN. BY PME DWG. NO. 80278-022-403 REV.
DATE 3/28/84

SOTXNB.D70

GENERAL INFORMATION

BLDG. 1 B QNTY. 1 BASE DWG. 80278-022-000
DATA SHT. 3V289V24009-2 NOTES & SPECS. 80278-022-201
TAG NO. 3V101VDA113 PANEL LAYOUT 80278-022-001
OPENING SIZE 132 W. X 106 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 290,470
DESIGN VELOCITY (FPM) 2989
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .69
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 6479
START CLOSED PRESS. (IN. W.G.) 4
BLADE ORIENTATION VERTICAL
MOUNTING VERTICAL
FLOW DIRECTION HORIZONTAL
FABRICATION SECTIONS 2 x 2
NO. OF SHIP SECTIONS 2
WEIGHT/SHIP SECTION(LBS.) 2030
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. N/A

SEISMIC REACTIONS

HI (LBS.) 14,200
H2 (LBS.) 12,180
V (LBS.) 16,240
M (IN. LBS.) 0
TORNADO (LBS.) 41,976

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL# SH311058 **
QUANTITY/PANEL 4
TOTAL QUANTITY 16
FORCE (LBS.) 80 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE RH + LH
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL) 3 + 4 Arr Panel

AWV USE ONLY

CRK. AREA/PANEL 6.4
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 502 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 1000
ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE:	A= 106		1ST/LST.PNCH W		5 1/2
H.INSIDE:	B= 132		#BLD.SPCS.	X=	2
MTG.HLS.:	F= *		SPC.C.C.:	Y=	9 7/8
MTG.HOLE:	G= *		CTR. SPC.	Z=	19 1/2
MTG.HOLE:	J= *		O.A.WIDE:	AA=	127
MTG.HLS.:	K= *		O.A.HIGH:	BB=	140
MTG.HLS.:	N= *		BTM.JB.EXT	EE=	—
MTG.HLS.:	Q= *		MAX.PROJ:	FF=	10 1/2 (A)
AXLE EXT.R=	2 3/4		TOP.JB.EXT	GG=	—
AXLE EXT.S=	5		SPRING C/C	HH=	15 1/2 (A)
AXLE EXT.T=	—		MAX.PROJ:	KK=	1 3/8
ACT. EXT. U=	8		AXLE DIA.		1 1/2
SPR SHFT EXT: P=	10		BLDS/PANEL		6
BLD. W.: V=	9 5/8				

TUBE SIZE 2 X 2 X 1/4

* - SEE DWG. # 80278-022-001

** - SPRINGS ARE DOUBLE LAMINATED

(A) REF. DWG. # 80278-022-1318B FOR SPRING ARM DETAIL (AWV USE ONLY)

	REVISION	DATE	BY	APPD. BY
A	ADDED SPRING ARM DETAIL & REVISED EE DIM. & HH DIM.	5-21-84 5/21/84	RCU	DLS

AMERICAN WARMING AND VENTILATING INC.
1320 DIXIE HWY. FT. WRIGHT, KY. 41011

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

CKD. BY RCU 4/6/84 — APPD. BY DLS 4/6/84
DRN. BY PME — DWG. NO. 80278-022-404 — REV. A
DATE 3/28/84

SOTXNB.D70

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-0010 UNIT 1

DATE	S.O. PARTS	PLT	ECNS
5-21-84	070	NOT	—

FOR A.W.V. USE ONLY

420

GENERAL INFORMATION

BLDG. 8 QNTY. 1 BASE DWG. 80278-022-000
DATA SHT. 3V289V24010-29 NOTES & SPECS. 80278-022-201
TAG NO. 3VIIIVDA076 PANEL LAYOUT 80278-022-003
OPENING SIZE 54 W. X 72 H. ⚠A

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 107,000
DESIGN VELOCITY (FPM) 3963
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) *** ⚠B
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 1968
START CLOSED PRESS. (IN. W.G.) 4
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL/UP
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 1200
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. YES

SEISMIC REACTIONS

HI (LBS.) 3600
H2 (LBS.) 3600
V (LBS.) 5360
M (IN. LBS.) 0
TORNADO (LBS.) 10,464

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL: SH31U58*** ⚠A
QUANTITY/PANEL 6
TOTAL QUANTITY 6** ⚠A
FORCE (LBS.) 40 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE RH ⚠B
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL): 1,2,5+6

AWV USE ONLY

CRK. AREA/PANEL 7.8
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 700 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 3 x 10⁶

FABRICATION INFORMATION

W.INSIDE:	A= 54		1ST/LST.PNCH	h= 5 9/16	
H.INSIDE:	B= 72		*BLD.SPCS.	X= 2	
MTG.HLS.:	F= 2 3/8		SPC.C.C.:	Y= 11 9/16	
MTG.HOLE:	G= 13		CTR. SPC.	Z= 22 1/8	
MTG.HOLE:	J= 3 9/8		O.A.WIDE:	AA= 70	⚠A
MTG.HLS.:	K= 17		O.A.HIGH:	BB= 80	
MTG.HLS.:	N= —		BTM.JB.EXT	EE= —	
MTG.HLS.:	Q= —		MAX.PROJ:	FF= * 8	⚠A
AXLE EXT.R=	2 3/4		TOP.JB.EXT	GG= —	
AXLE EXT.S=	5		SPRING C/C	HH= 13 3/4	
AXLE EXT.T=	—		MAX.PROJ:	KK= 2 11/16	
ACT. EXT. U=	8* ⚠A		AXLE DIA.	1 1/2	
SPR SHFT EXT: P=	10		BLDS/PANEL	6	
BLD. W.: V=	10 15/16				

TJBF SIZE 2 x 2 x 1/4

⚠A * REF. PANEL LAYOUT DWG. 80278-022-003.

** FOUR (4) OF SIX (6) SPRINGS ARE DOUBLE LAMINATED. ⚠A

*** 3.6 AT 107,000 SCFM DURING SMOKE PURGE .25 AT 9,600 SCFM DURING NORMAL OPERATION. ⚠A

	REVISION	DATE	BY	APPD. BY
C	ENGR. UPDATE	1-8-85 1-10-85	WKB	RK
B	ENGR. UPDATE	10-23-84 11-28-84	WKB	RK
A	ENGR. UPDATE	8-17-84 8-20-84	WKB	RK

AMERICAN WARMING AND VENTILATING INC.
1320 MIAMI WOOD CIRCLE MAUMEE, OHIO

DATE	B.O. PARTS	PLT	ECMS
1-14-85	071	WKT	1769
8-24-84	070	WKT	1650
5-21-84	070	WKT	—

B [redacted] T [redacted] I [redacted]
FOR A.W.V. USE ONLY

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00117 UNIT 1

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

CKD. BY RCH 4/6/84 APPD. BY RKB 4/6/84
DRN. BY PME
DATE 3/28/84
DWG. NO. 80278-022-405
REV. C

SOTXNB.D70

A61

GENERAL INFORMATION

BLDG. RC QNTY. 1 BASE DWG. 80278-022-000

DATA SHT. 3V289V24035-5 NOTES & SPECS. 80278-022-201

TAG NO. 3V141VDA-298 PANEL LAYOUT 80278-022-002

OPENING SIZE 16 W. X 12 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI)	3.0
DESIGN FLOW (SCFM)	1000
DESIGN VELOCITY (FPM)	750
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.)	.25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM)	182
START CLOSED PRESS. (IN. W.G.)	4
BLADE ORIENTATION	HORIZ
MOUNTING	HORIZ
FLOW DIRECTION	VERT. UP
FABRICATION SECTIONS	1X1
NO. OF SHIP SECTIONS	1 (ONE)
WEIGHT/SHIP SECTION(LBS.)	165
CLOSE TIME(SEC.)	.25

TESTING

CYCLE 25 TIMES	YES
LEAKAGE/DEFL.	No

SEISMIC REACTIONS

H1 (LBS.)	495
H2 (LBS.)	495
V (LBS.)	690
M (IN. LBS.)	180
TORNADO (LBS.)	576

ACTUATOR (SPRING)

MNFR.	AMETEK (HUNTER)
MODEL#	SH16P38
QUANTITY/PANEL	1
TOTAL QUANTITY	1
FORCE (LBS.)	10 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE	L.H.
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL)	1

AWV USE ONLY

CRK. AREA/PANEL	.72
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE	20 (IN. LBS.)
TIE RODS:	YES

RADIATION

NORMAL (RADS)	100
ABNORMAL (RADS)	100

FABRICATION INFORMATION

W.INSIDE: A=	12		IST/LST.PNCH W.=	5
H.INSIDE: B=	16		#BLD.SPCS. X=	—
MTG.HLS.: F=	2 11/16		SPC.C.C.: Y=	—
MTG.HOLE: G=	1		CTR. SPC. Z=	12
MTG.HOLE: J=	3 3/8		O.A.WIDE: AA=	23
MTG.HLS.: K=	3		O.A.HIGH: BB=	29
MTG.HLS.: N=	2 11/16		BTM.JB.EXT EE=	5
MTG.HLS.: Q=	—		MAX.PROJ: FF=	3 3/8
AXLE EXT.R=	2		TOP.JB.EXT GG=	—
AXLE EXT.S=	—		SPRING C/C HH=	7 1/16
AXLE EXT.T=	—		MAX.PROJ: KK=	—
ACT. EXT. U=	4 1/2		AXLE DIA.	3/4
SPR SHFT EXT: P=	7		BLDS/PANEL	2
BLD. W.: V=	5 7/8			

TUBE SIZE: 1X1X11GA.

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00345 UNIT 1

REVISION	DATE	BY	APPD. BY

AMERICAN WARMING AND VENTILATING INC.

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

CKD. BY RCH 7/27/84	APPD. BY [illegible]	E. A. APPD. 07-27-84
DRN. BY R.C.C.	DWG. NO. 80278-022-406	REV.
DATE 7-17-84		

SOTXNB.070

DATE	S.O. PARTS	PLT	ECNO
10-9-84	270	WAT	—

S [redacted] T [redacted] I [redacted]

FOR A.W.V. USE ONLY

GENERAL INFORMATION

BLDG. EAB QNTY. 1 BASE DWG. 80278-022-000
DATA SHT. 3V289V2401Q-33 NOTES & SPECS. 80278-022-201
TAG NO. 3V111VDA302 PANEL LAYOUT 80278-022- —
OPENING SIZE 30 W. X 30 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3.0
DESIGN FLOW (SCFM) 11600
DESIGN VELOCITY (FPM) 1856
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .30
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 512
START CLOSED PRESS. (IN. W.G.) 4.0
BLADE ORIENTATION VERTICAL
MOUNTING VERTICAL
FLOW DIRECTION HORIZONTAL
FABRICATION SECTIONS 1 x 1
NO. OF SHIP SECTIONS ONE
WEIGHT/SHIP SECTION(LBS.) 400
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

HI (LBS.) 1330
H2 (LBS.) 1200
V (LBS.) 1600
M (IN. LBS.) 2700
TORNADO (LBS.) 2700

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL# SH31058
QUANTITY/PANEL 1
TOTAL QUANTITY 1
FORCE (LBS.) 40 EA.
LOCATION AS REF. FROM (A)
FLOW ENTER. SIDE R.H. (BOTTOM)
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:) 3RD

AWV USE ONLY

CRK. AREA/PANEL 2.02
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 90 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 4000

FABRICATION INFORMATION

W.INSIDE:	A= 30		1ST/LST.PNCH	W= 5/8	
H.INSIDE:	B= 30		@BLD.SPCS.	X= 1	
MTG.HLS.:	F= 2 3/8		SPC.C.C.:	Y= 6 1/16	
MTG.HOLE:	G= 7		CTR. SPC.	Z= 13 1/8	
MTG.HOLE:	J= 2 3/8		O.A.WIDE:	AA= 42	
MTG.HLS.:	K= 7		O.A.HIGH:	BB= 45	
MTG.HLS.:	N= —		BTM.JB.EXT	EE= 7	
MTG.HLS.:	Q= —		MAX.PROJ:	FF= 6 1/2	
AXLE EXT.R=	2 1/8		TOP.JB.EXT	GG= —	
AXLE EXT.S=	3 7/8		SPRING C/C	HH= 11 3/8	
AXLE EXT.T=	—		MAX.PROJ:	KK= —	
ACT. EXT. U=	5 5/8		AXLE DIA.	1.0	
SPR SHFT EXT: P=	8 1/8		BLDS/PANEL	4	
BLD. W.: V=	6 1/16				

TUBE SIZE: 1-1/4 x 1-1/4 x 11 GA.

A	REV. SPRING LOC	8-7-85	WCB	
	REVISION	DATE	BY	APPD. BY

AMERICAN WARMING AND VENTILATING INC.
1320 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

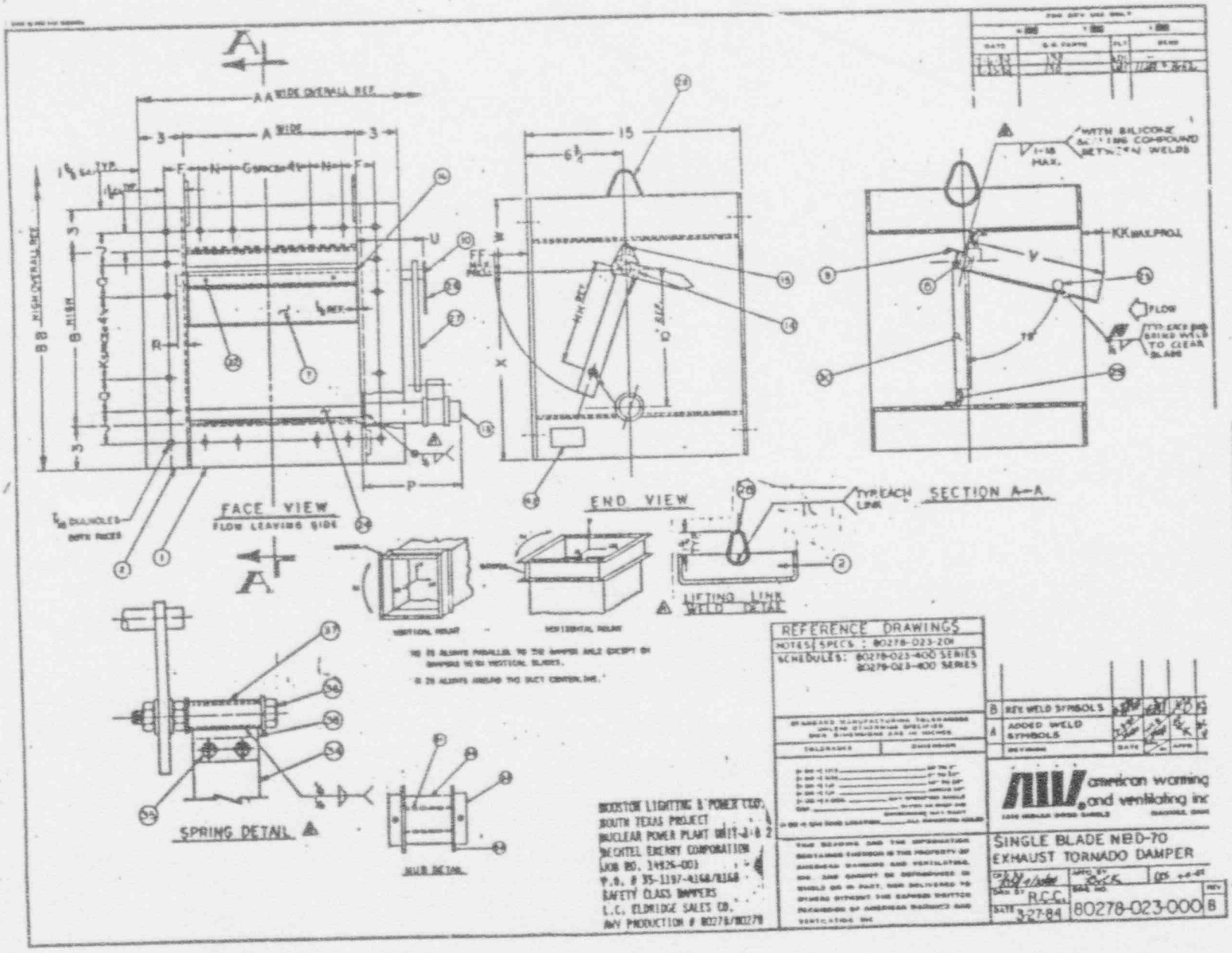
CKD. BY RCH 7/26/85	APPD. BY	S. A. APPR. BY	DATE
DRN. BY WCB	DWG. NO. 80278-022-407		REV. A
DATE 7-24-85			

SOTXNB.D70

8-8-85	350	1000	—
DATE	S.B. PARTS	PLT	ECNS

S [redacted] T [redacted] I [redacted]
FOR A.W.V. USE ONLY

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
81168-00269
81168-00250



FOR REFERENCE ONLY.
Current revisions of this drawing/
document are maintained in
document control. SEE:
4168-00142
8168-00135

SPECIFICATIONS

FRAME: 15 x 3 x 1/4" TUK. ASTM-A36 H.R.S. (1)(7) WITH LIFTING LINKS (28)

BLADES: 10 GA. ASTM-A526/A527 GALVANIZED STEEL EDGE PIVOTED SINGLE THICKNESS BLADE (7)

AXLE: (SEE SCHED. FOR DIA.) AISI-1018 PLATED STEEL FULL LENGTH (10) WITH ASTM-A513/A500 GRADE B SQUARE TUBE (8) (SEE SCHED. FOR SIZE)

A BEARINGS: SEALMASTER RELUBRICABLE BALL WITH WOOL FELT RADIAL SEAL & SHELL ALVANIA #2 GREASE (14) & W/STAINLESS STEEL THRUST WASHERS (16) AT JAMBS.

STOPS: 1 x 1 x 10 GA. ASTM-A526/A527 GALVANIZED STEEL ANGLE (24)

FINISH: HOT DIP GALVANIZING PER ASTM-A123 ON ALL CARBON STEEL COMPONENTS. MILL OR GALVANIZED OR PLATED STEEL SURFACES WITH TOUCH-UP OF WELDED AREAS OF GALV. STEEL WITH GALVANOX TYPE 1.

POSITION INDICATOR: 16 GA. ASTM-A527 GALVANIZED STEEL ARROW (26) WELDED TO AXLE

ACTUATOR: CONSTANT FORCE SPRING TO HOLD BLADES OPEN UNTIL INCIDENT (SEE SCHED. FOR MODEL #) DAMPER WILL CLOSE UPON PRESSURE RISE. START CLOSE PRESSURE IS 4.0 IN. W.G.

TIE BARS: (1) ONE 3/4" DIA. AISI-1018 PLATED STEEL FULL LENGTH BAR (25) LOCATED FOR FULL OPEN STOP.

A SEALS: EPDM-3 (MCL# 7404) (29) ON BLADES & STOPS WITH EPT-4 WEDGE (MCL# 7408) (30) ON JAMBS AND WITH GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.

NOTES

1) SEE SCHEDULE B0278-023-400 OR B0278-023-400 SERIES FOR ADDITIONAL DESIGN INFORMATION

2) ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STANDARD WELD DRAWING #10151 UNLESS OTHERWISE SPECIFIED.

3) EACH DAMPER TO HAVE A STAINLESS STEEL I.D. TAG (42) WITH 1/8" HIGH CHARACTERS AFFIXED TO DAMPER WITH THE FOLLOWING INFORMATION:

P.O. # (PER SCHED.), DAMPER TYPE: NBD-70
MANUFACTURERS NAME: AMERICAN WARMING & VENTILATING, INC.
NAME OF COMPONENT: TORNADO DAMPER/EXHAUST
DAMPER TAG # (PER SCHED.), & S.O. # (PER SCHEDULE)

4) INLET DUCTS MUST BE OF SUFFICIENT LENGTH TO CONTAIN THE BLADE IN THE OPEN POSITION AND THE DUCT & JUNCTION OF THE DAMPER MUST BE SMOOTH & FREE OF PROTRUSIONS THAT MAY DAMAGE THE BLADE.

A 5) LEAKAGE & DEFLECTION TESTING PER AWV DOC.# B0278-702. EACH DAMPER WILL BE CYCLE TESTED 25 TIMES UNDER SHOP FLOOR CONDITIONS.

6) QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLIES AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.

7) CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR FRAME, BLADES & AXLES WHICH ARE CONSIDERED THE HIGH STRESS ITEMS BY AWV. CERTIFICATES OF CONFORMANCE ARE TO BE SUPPLIED ON ALL OTHER MATERIALS.

8) SEISMIC QUALIFICATIONS WILL BE FURNISHED FOR THE DAMPER ASSEMBLY.

9) BLADES ARE ALWAYS PARALLEL TO THE "A" DIMENSION.

10) PLATING CONFORMS TO ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC.

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
A16B-00146
B16B-00132

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-001
P.O. # 35-1197-4168/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AWV PRODUCTION # B0278/B0279

DATE	S.O. PART?	PLT	DCN#
7-6-84	130		—
O [redacted]	T [redacted]	I [redacted]	
FOR AWV USE ONLY			

REVISION	DATE	DRN.	CH.	APPD.
A REVISED BEARING & SEAL SPEC.	7-6-84			

american warming and ventilating inc

NOTES & SPECS. FOR BWG.# B0278-023-000 (NBD-70)

DRN. BY PRE	APPD. BY	DWG. NO.	REV.
DATE 3/26/84		B0278-023-201	A

GENERAL INFORMATION

BLOC. B ONTY. 1 BASE DWG. B0278-023-00
DATA SHT. 3V289V24010-19 NOTES & SPECS. B0278-023-201
TAG NO. 3VIIIVDA277 PANEL LAYOUT N/A
OPENING SIZE 12 W. X 12 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 660
DESIGN VELOCITY (FPM) 660
PRESS. DROP PER AMCA 500.
FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 137
START CLOSED PRESS. (IN. W.G.) 4
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERT / UP
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 140
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. YES

SEISMIC REACTIONS

HI (LBS.) 420
H2 (LBS.) 420
V (LBS.) 580
M (IN. LBS.) 100
TORNADO (LBS.) 292

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL # SH16P38
QUANTITY/PANEL 1
TOTAL QUANTITY 1
FORCE (LBS.) 10 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE LH
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL) 1

AWV USE ONLY

CRK. AREA/PANEL .54
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 20 (IN. LBS.)
TIE ROD : YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 4000

FABRICATION INFORMATION

W.INSIDE:	A= 12		LAST PNCH		5
H.INSIDE:	B= 12		1st PUNCH	X=	13
MTG.HLS.:	F= 2 11/16		SPC.C.C.:	Y=	—
MTG.HOLE:	G= 1		CTR. SPC.	Z=	—
MTG.HOLE:	J= 2 11/16		O.A.WIDE:	AA=	23
MTG.HLS.:	K= 1		O.A.HIGH:	BB=	20
MTG.HLS.:	N= 2 11/16		BTM.JB.EXT	EE=	—
MTG.HLS.:	Q= 2 11/16		MAX.PROJ:	FF=	5
AXLE EXT.R=	2		TOP.JB.EXT	GG=	—
AXLE EXT.S=	—		SPRING C/C	HH=	9 1/2
AXLE EXT.T=	—		MAX.PROJ:	KK=	1 7/16
ACT. EXT. U=	4 1/2		AXLE DIA.	3/4	
SPR SHFT EXT: P=	7		BLDS/PANEL	1	
BLD. W.: V=	9 11/16				

TUBE SIZE 1 X 1 X 11GA.

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
4168-00141 UNIT 1

REVISION	DATE	BY	APPD. BY
7-6-84	130	JWT	—
DATE	S.O. PARTS	PLT	ECMS

FOR A.W.V. USE ONLY

AMERICAN WARMING AND VENTILATING INC.
1320 SUGAR WOOD CIRCLE FLORENCE, OHIO

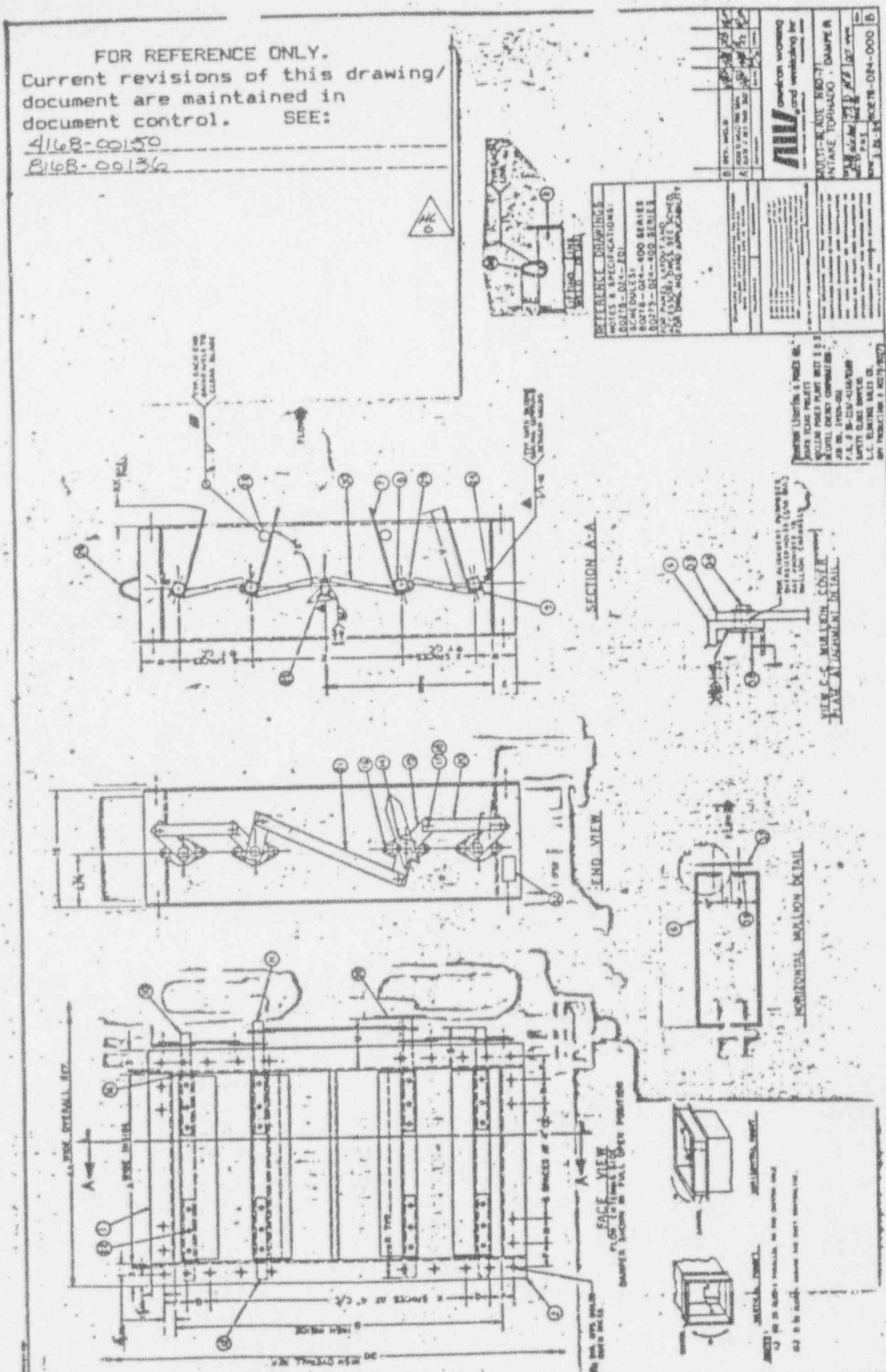
NBD-70 TORNADO EXHAUST DAMPER SCHEDULE

DES. BY KEH 4/10/84	APPD. BY [illegible]	O. A. APPL. BY 05-4-11-84	
DRN. BY PME	DWG. NO. B0278-023-401		REV.
DATE 3/28/84			

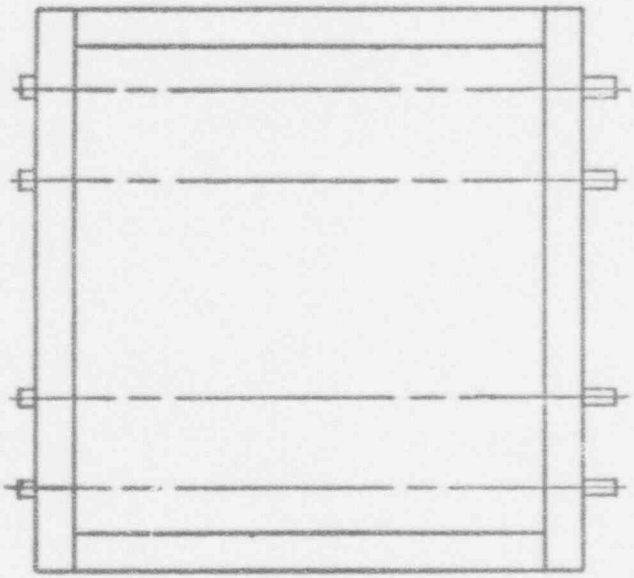
SOTXNB.D70

C-4

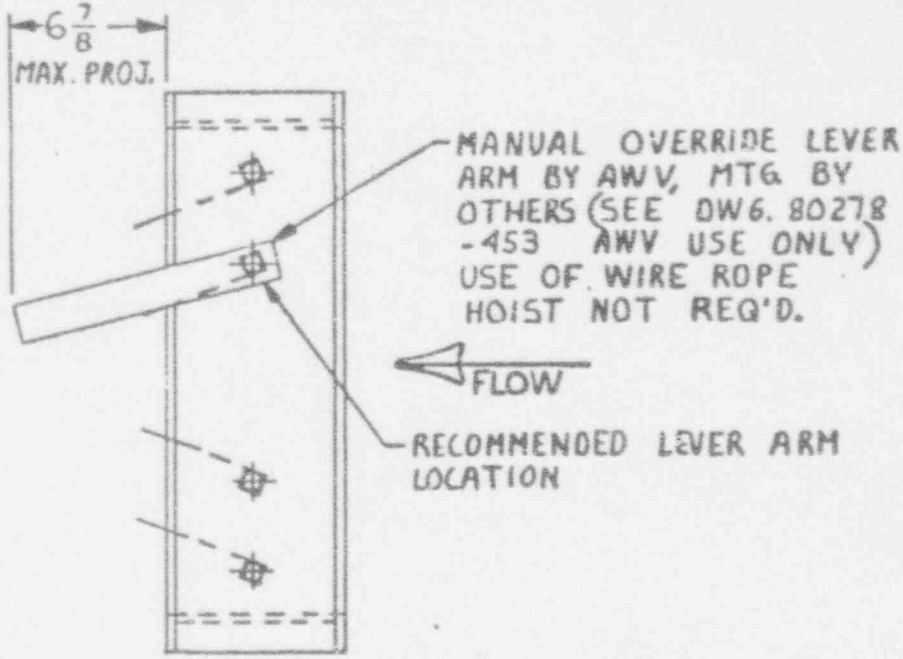
FOR REFERENCE ONLY.
Current revisions of this drawing/
document are maintained in
document control. SEE:
4168-00150
8168-00136



126



FACE VIEW
FLOW LEAVING SIDE



END VIEW

HOUSTON LIGHTING AND POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT #1&2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-881
P.O. NO. 35-1197-4168/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO. INC.
AWV PRODUCTION NO. 80278/80279

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
416B-002666
B16B-00247

PANEL LAYOUT FOR TAGS:
3V111VDA078, 3V112VDA078,
3V111VDA276, & 3V112VDA276

REF. DWGS.:
80278-024-401&-402
80279-024-401&-402

american warming and ventilating inc
1310 INDIAN WOOD CIRCLE MAUMEE, OHIO

PANEL LAYOUT

CKD. BY	APPD. BY	DCS 4/30/85
DRN. BY NCB	DWG. NO. 80278-024-002	REV.
DATE 4-22-85		

DATE	S.O. PARTS	PLT	ECNS
Q ☐	T ☐	I ☐	

FOR AWV USE ONLY

REVISION	DATE	DRN/CK	APPD.

487

SPECIFICATIONS

FRAME: 15 x 3 x 1/4" THK. ASTM-A36 H.R.S. (1) (2) WITH LIFTING LINKS. (28)

HORIZONTAL MULLION: 15 x 1-3/4 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (6) WITH 3-1/2 x 10 GA. ASTM-A526/527 GALV. STEEL COVER PLATES (33) AND PLATED STEEL MTG. SCREWS (34) W/SILICONE SEALING COMPOUND SHIPPED LOOSE FOR ASSEMBLY IN FIELD BY OTHERS AT SHIP SECTION SPLIT.

BLADES: 10 GA. ASTM-A526/A527 GALVANIZED STEEL EDGE PIVOTED SINGLE THICKNESS BLADE (7)

AXLE: (SEE SCHEDULE FOR DIA.) AISI-1018 PLATED STEEL STUB (11) (11) (13) WITH ASTM-A513 / A500 GRADE B SQUARE TUBE (5) (SEE SCHEDULE FOR SIZE).

LINKAGE: HEAVY DUTY AISI-1008/M1020 PLATED H.R.S. (19) (20) (21) WITH STAINLESS STEEL PINS (17) AND O.I.B. BEARINGS (18)

STOPS: (A) 1 x 1 x 10 GA. ASTM-A526/527 GALVANIZED STEEL ANGLE (24) AND 2 x 1 x 11 GA. ASTM-A513/A500 GRADE B RECT. TUBE (23)

FINISH: HOT DIP GALVANIZING PER ASTM-A123 ON ALL CARBON STEEL COMPONENTS. MILL ON GALVANIZED OR PLATED STEEL SURFACES WITH TOUCH-UP OF WELDED AREAS OF GALV. STEEL WITH GALVANOX TYPE I.

TIE BARS: (2) TWO 3/4" DIA. AISI-1018 PLATED STEEL FULL LENGTH BARS (25) LOCATED AT CENTER BLADES FOR FULL OPEN STOPS.

POSITION INDICATOR: 16 GA. ASTM-A527 GALVANIZED STEEL ARROW (26) WELDED TO AXLE OR EXTERIOR PANELS.

(A) **BEARINGS:** SEALMASTER RELUBRICABLE BALL WITH WOOL FELT RADIAL SEAL & SHELL ALYANIA #2 GREASE (14) & W/ STAIN. STL. THRUST WASHERS (16) AT JAMBS.

(A) **SEALS:** EPDM-3 BULB (MCL# 7404) (29) ON BLADES & STOPS W/EPT-4 WEDGE (MCL# 7408) (30) ON JAMBS & W/GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.

NOTES

1. SEE SCHEDULE 80278-024-400 SERIES OR 80279-024-400 SERIES FOR ADDITIONAL DESIGN INFO.
2. ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STANDARD WELD DRAWING # 10151 UNLESS OTHERWISE SPECIFIED.
3. EACH DAMPER TO HAVE A STAINLESS STEEL I.B. TAG (32) WITH 1/8" HIGH CHARACTERS AFFIXED TO DAMPER WITH THE FOLLOWING INFORMATION:
   P.O. NO.,(PER SCHED.), DAMPER TYPE: RBD-71
   MANUFACTURERS NAME: AMERICAN WARMING & VENTILATING
   NAME OF COMPONENT: TORNADO DAMPER/ INTAKE
   DAMPER TAG NO. (PER SCHED.), & S.O.# (PER SCHED.)
4. INLET DUCTS MUST BE OF SUFFICIENT LENGTH TO CONTAIN THE BLADE IN THE OPEN POSITION AND THE DUCT & JUNCTION OF THE DAMPER MUST BE SMOOTH AND FREE OF PROTRUSIONS THAT MAY DAMAGE THE BLADE.
5. (A) LEAKAGE & DEFLECTION TESTING PER AWV DOC.# 80278-700. EACH DAMPER WILL BE CYCLE TESTED 25 TIMES UNDER SHOP FLOOR CONDITIONS.
6. QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLIES AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.
7. CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR FRAME, BLADES & AXLES WHICH ARE CONSIDERED THE HIGH STRESS ITEMS BY AWV. CERTIFICATES OF CONFORMANCE ARE TO BE SUPPLIED ON ALL OTHER MATERIALS.
8. SEISMIC QUALIFICATIONS WILL BE FURNISHED FOR THE DAMPER ASSEMBLY.
9. DUE TO THE SIZE OF THIS EQUIPMENT, REASONABLE CARE MUST BE EXERCISED WHEN LOADING, UNLOADING, HANDLING & INSTALLING THESE DAMPERS TO AVOID OVERSTRESSING & POSSIBLE PERMANENT DAMAGE TO THE FRAME & RELATED COMPONENTS BY EXCESSIVE RACKING, SKEWING, TWISTING, ETC.
10. BLADES ARE ALWAYS PARALLEL TO THE 'A' DIMENSION.
11. PLATING CONFORMS TO ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC.

7-6-84	130		—
DATE	S.O. PARTS	FLT	OCME
#		T	I
FOR AWV USE ONLY			

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
8168-00147
8168-00133

american warming and ventilating inc

NOTES & SPECS FOR BWG.# 80278-024-000 (RBD-71)

CHK'D BY	DATE	APPD BY	DATE
DRN. BY PNF	9/29/84	DWG. NO. 80278-024-201	REV A

GENERAL INFORMATION

BLDG. EAB QNTY. 1 BASE DWG. 80278-024-000
DATA SHT. 3V289V24010-2 NOTES & SPECS. 80278-024-201
TAG NO. 3VIIIVDA078 PANEL LAYOUT 80278-024-002 (B)
OPENING SIZE 48 W. X 48 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 6570
DESIGN VELOCITY (FPM) 411
PRESS. DROP PER AMCA 500, FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 1166
START CLOSED PRESS. (IN. W.G.) 4" MAX.
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL/DOWN
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 780
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

H1 (LBS.) 2340
H2 (LBS.) 2340
V (LBS.) 3460
M (IN. LBS.) 150
TORNADO (LBS.) 6132

ACTUATOR (SPRING)

MNFR. N/A
MODEL# N/A
QUANTITY/PANEL N/A
TOTAL QUANTITY N/A
FORCE (LBS.) N/A EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE N/A
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:) N/A

AWV USE ONLY

CRK. AREA/PANEL 4.6
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 406 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE: A= 48		1ST/LST.PNCH W= 5 1/2	
H.INSIDE: B= 48		#BLD.SPCS. X= 1	
MTG.HLS.: F= 3 3/8		SPC.C.C.: Y= 10 3/16	
MTG.HOLE: G= 11		CTR. SPC. Z= 21 3/8 (A)	
MTG.HOLE: J= 3 3/8		O.A.WIDE: AA= 59	
MTG.HLS.: K= 11		O.A.HIGH: BB= 56	
MTG.HLS.: N= —		BTM.JB.EXT: EE= —	
MTG.HLS.: Q= —		MAX.PROJ: FF= —	
AXLE EXT.R= 2 3/4		TOP.JB.EXT GG= —	
AXLE EXT.S= 5		SPRING C/C HH= —	
AXLE EXT.T= —		MAX.PROJ: KK= 6 7/8	
ACT. EXT. U= 7		AXLE DIA. 1 1/2	
SPR SHFT EXT: P= —		BLDS/PANEL 4	
BLD. W.: V= 10 9/16			

TUBE SIZE 2 X 2 X 1/4

	REVISION	DATE	BY	APP. BY
B	ADDED PANEL LAYOUT DWG.	4-22-85		
A	CORRECTED "Z" DIM.	7-17-84	PME	

AMERICAN WARMING AND VENTILATING INC.

FOR REFERENCE ONLY.
Current revisions of this drawing/document are maintained in document control. SEE:
4168-00142 UNIT 1

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY 4/12/84 APP. BY
DRN. BY PME DWG. NO. 80278-024-401 REV. B
DATE 3/30/84

SDTXNB.D71

DATE	S.O. PARTS	PLT	SCHD
7-18-84	130	WOT	1617
7-6-84	130	WOT	—

FOR A.W.V. USE ONLY

429

GENERAL INFORMATION

BLDG. EAB QNTY. 1 BASE DWG. 80278-024-000
DATA SHT. 3V289V24010-18 NOTES & SPECS. 80278-024-201
TAG NO. 3VIIIVDA276 PANEL LAYOUT 80278-024-002
OPENING SIZE 42 W. X 24 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 11600
DESIGN VELOCITY (FPM) 1657
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 638
START CLOSED PRESS. (IN. W.G.) 4.0 MAX
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL/DOWN
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 900
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

H1 (LBS.) 1200
H2 (LBS.) 1200
V (LBS.) 1750
M (IN. LBS.) 75
TORNADO (LBS.) 2624

ACTUATOR (SPRING)

MNFR. N/A
MODEL# N/A
QUANTITY/PANEL N/A
TOTAL QUANTITY N/A
FORCE (LBS.) N/A EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE N/A
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL) N/A

AWV USE ONLY

CRA AREA/PANEL 2.5
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 160 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 4000

FABRICATION INFORMATION

W.INSIDE:	A= 24	1ST/LST.PNCH	W= 5
H.INSIDE:	B= 42	@BLD.SPCS.	X= 1
MTG.HLS.:	F= 3 3/8	SPC.C.C.:	Y= 9 5/16
MTG.HOLE:	G= 5	CTR. SPC.	Z= 19 3/8
MTG.HOLE:	J= 2 3/16	O.A.WIDE:	AA= 33
MTG.HLS.:	K= 9	O.A.HIGH:	BB= 50
MTG.HLS.:	N= —	BTM.JB.EXT.	EE= —
MTG.HLS.:	Q= 2 3/16	MAX.PROJ:	FF= —
AXLE EXT.	R= 2	TOP.JB.EXT	GG= —
AXLE EXT.	S= 3 1/2	SPRING C/C	HH= —
AXLE EXT.	T= —	MAX.PROJ:	KK= 6 1/8 (2)
ACT. EXT.	U= 5	AXLE DIA.	3/4
SPR SHFT EXT:	P= —	BLDS/PANEL	4
BLD. W.:	V= 9 3/16		

TUBE SIZE 1X1 X 11 GA.

	REVISION	DATE	BY	APPD. BY
A	ADDED PANEL LAYOUT DWG.	4-22-94	WCK	PJD

AMERICAN WARMING AND VENTILATING INC.
ENG REPAIR DEPOT DIVISION — BALDWIN, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY RCH 4/12/94	APP'D BY PJD	S. & APPR. BY DS 4/13/94	
DRN. BY PME	DWG. NO. 80278-024-402		REV. A
DATE 3/30/94			

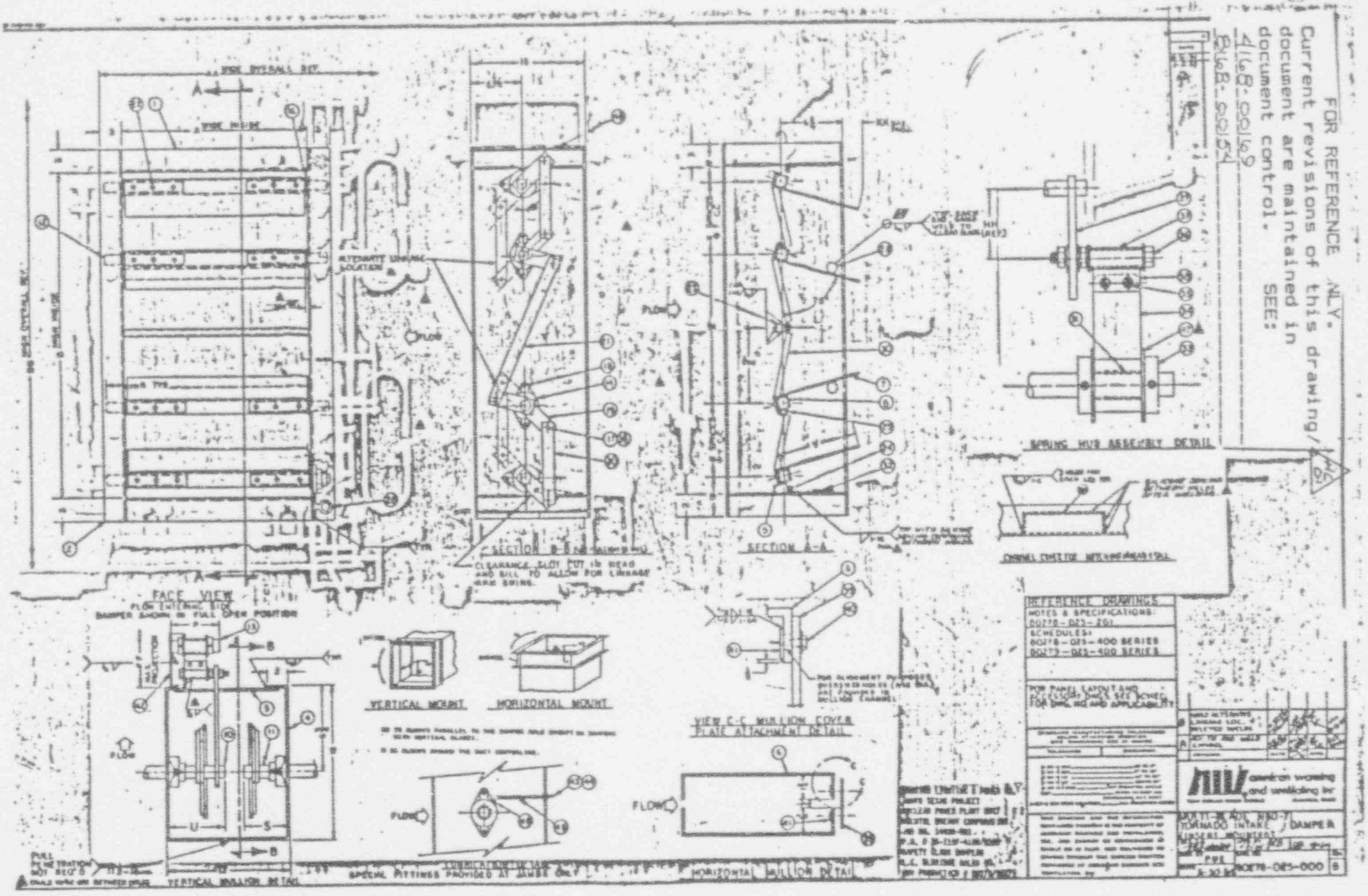
EDITOR 8.51

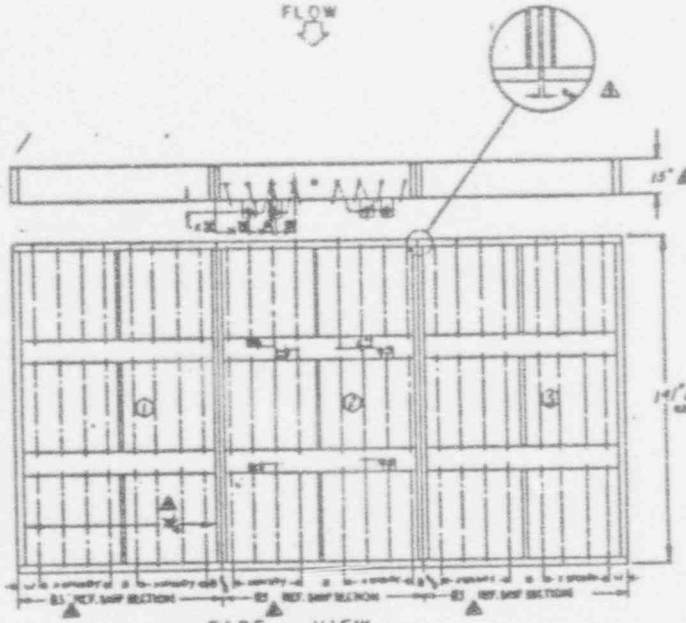
DATE	S.O. PARTS	PLT	ECNS
76-84	130	WHT	—

S [redacted] T [redacted] I [redacted]
FOR A.W.V. USE ONLY

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
41668-00144 UNIT 1

4130


FOR REFERENCE ONLY.
Current revisions of this drawing/
document are maintained in
document control.
SEE:
4168-00169
4168-00154
SPRING HUB ASSEMBLY DETAIL
SECTION A-A
SECTION B-B
CLEARANCE SLOT CUT IN BEAM AND MILL TO ALLOW FOR LINKAGE ARM SWING.
FACE VIEW
DAMPER SHOWN IN FULL OPEN POSITION
VERTICAL MOUNT
HORIZONTAL MOUNT
VIEW C-C MULLION COVER PLATE ATTACHMENT DETAIL
VERTICAL MULLION DETAIL
HORIZONTAL MULLION DETAIL
SPECIAL FITTINGS PROVIDED AT JAMBS ONLY
REFERENCE DRAWINGS
NOTES & SPECIFICATIONS:
60278-003-001
SCHEDULES:
60278-003-400 SERIES
60279-003-400 SERIES
FOR PANEL LAYOUT AND ACCESSORY DWGS SEE NOTES FOR DWG. NO. AND APPLICABILITY
TORNADO INTAKE
DAMPER
60278-003-000
FLOW



NOTES

1. REF. DWG.# 80278-025-000 FOR MULLION DETAILS.
2. 3-1/2" x 10 GA. x139" LG. ASTM-A526/A527 GALVANIZED STEEL COVER PLATES WILL BE SUPPLIED FOR CONNECTIONS OF SHIP SECTIONS IN FIELD BY OTHERS.
3. COVER PLATES WILL BE PRE-PUNCHED FOR #10 SELF-THREADING SCREWS ON 6" MAX. CENTERS (COVER PLATES & MOUNTING SCREWS WILL BE SHIPPED LOOSE.)
4. COVER PLATES TO BE USED AS A TEMPLATE FOR FIELD DRILLING OF BACKING PLATES (1) (IN FIELD BY OTHERS.)

A NOTE: THIS DRAWING SUPERCEDES AWV SKETCH NO. 80278-SK059A

A REFERENCE DRAWING

80278-025-000	BASE DWG.
80278-025-201	NOTES & SPECS.
80278-025-402	SCHEDULES
80279-025-402	SCHEDULES

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
A168-001696
B168-00151

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-001
P.O. # 95-1197-A168/B168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AWV PRODUCTION # 80278/80279

A SEE CHANGE FILE — CWS TOPPLER

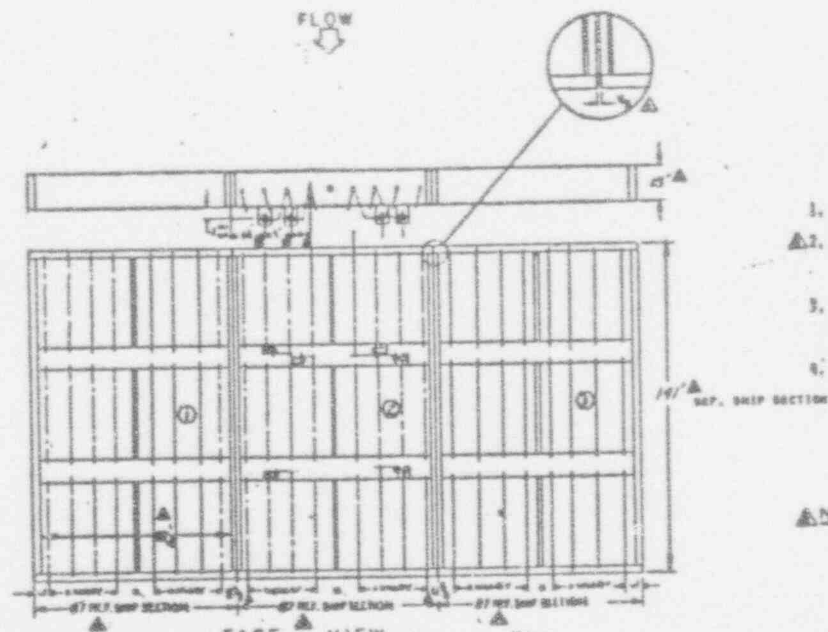
american warming and ventilating inc

PANEL LAYOUT AND SPRING LOCATION DETAIL NBD-71

DRAWN BY: R.C.C.
SCALE: 4-2-04
80278-025-002 A

432

FLOW



FACE VIEW
TAG NO. 3V101VDA119
3V102VDA119

○ = SHIP SECTIONS

NOTES

1. REF. DWG.# 80278-025-000 FOR MULLION DETAILS.
2. 3-1/2" x 10 GA. x135" LG. ASTM-A526/A527 GALVANIZED STEEL. COVER PLATES WILL BE SUPPLIED FOR CONNECTIONS OF SHIP SECTIONS IN FIELD BY OTHERS.
3. COVER PLATES WILL BE PRE-PUNCHED FOR #10 SELF-THREADING SCREWS ON 6" MAX. CENTERS (COVER PLATES & MOUNTING SCREWS WILL BE SHIPPED LOOSE.)
4. COVER PLATES TO BE USED AS A TEMPLATE FOR FIELD DRILLING OF BACKING PLATES (IN FIELD BY OTHERS.)

NOTE: THIS DRAWING SUPERCEDES AWV SKETCH NO. 80278-505 SK

DATE	S.O. PARTS		
12-5-84	260		
11-8-84	820		

REFERENCE DRAWING
80278-025-000 - BASE DWG.
80278-025-201 - NOTES & SPECS.
80278-025-408 - SCHEDULES
80278-025-402 - SCHEDULES

FOR REFERENCE ONLY.
Current revisions of this drawing/
document are maintained in
document control. SEE:
4168-00165
8168-00150

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-003
P.O. # 35-1197-4168/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AWV PRODUCTION # 80278/80279

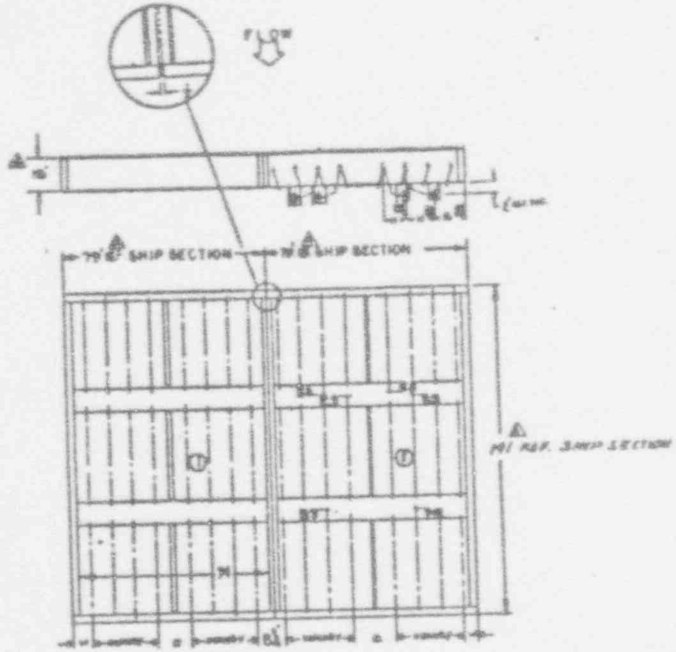
A SIZE CHANGE PER CUSTOMER

american warming and ventilating inc

PANEL LAYOUT AND SPRING LOCATION DETAIL

DRN BY R.C.C.
DATE 4-2-84
DWG NO. 80278-025-003
REV A

433



FACE VIEW

TAG NO's. 3V101VDA120, 3V102VDA120

○ - SHIP SECTIONS

FOR REFERENCE ONLY.
Current revisions of this drawing/document are maintained in document control. SEE:
4168-00168
B168-00153

NOTE: THIS DRAWING SUPERCEDES ANY SKETCH NO. 80278-5076R

NOTES

1. REF. DWG.# 80278-025-000 FOR MULLION DETAILS.
2. 3-1/2" x 10 GA. x 135 LG. ASTM-A526/A527 GALVANIZED STEEL. COVER PLATES WILL BE SUPPLIED FOR CONNECTIONS OF SHIP SECTIONS IN FIELD BY OTHERS.
3. COVER PLATES WILL BE PRE-PUNCHED FOR #10 SELF-THREADING SCREWS ON 6" MAX. CENTERS (COVER PLATES & MOUNTING SCREWS WILL BE SHIPPED LOOSE.)
4. COVER PLATES TO BE USED AS A TEMPLATE FOR FIELD DRILLING OF BACKING PLATES ① (IN FIELD BY OTHERS.)

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-001
P.O. # 35-1197-4168/B168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AWV PRODUCTION # 80278/80279

REFERENCE DRAWING
80278-025-000 - BASE DWG.
80278-025-201 - NOTES & SPEC'S
80278-025-404 - SCHEDULE
80279-025-404 - SCHEDULE

A — REV. CHANGE PER CUSTOMER

american warming and ventilating inc

PANEL LAYOUT AND SPRING LOCATION DETAIL NBD-71

DR. BY R.C.C. DATE 4-2-84

DWG. NO. 80278-025-004 REV. A

SPECIFICATIONS

FRAME: 15 x 3 x 1/4" THK. ASTM-A36 H.R.S. (1)(2) WITH LIFTING LINKS (28)

HORIZONTAL MULLION: 15 x 1-3/4 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (3) WITH 3-1/2 x 10 GA. ASTM-A526/A527 GALV. STEEL COVER PLATES (39). PLATED STEEL MTG. SCREWS (40) & SILICONE SEALING COMPOUND SHIPPED LOOSE FOR ASSEMBLY IN FIELD BY OTHERS AT SHIP SECTION SPLIT.

VERTICAL MULLION: 15 x 6 x 2 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (4) WITH 1 x 8 x 1/4" THK. PLATED STEEL REINF. BARS (5) ACROSS OPEN SECTION ON 24" MAX. CENTERS.

BLADES: 10 GA. ASTM-A526/A527 GALVANIZED STEEL EDGE PIVOTED SINGLE THICKNESS BLADE (7)

AXLE: (SEE SCHEDULE FOR DIA.) AISI-1018 PLATED STEEL STUB (10)(11) (12) WITH A ASTM-A513/A500 GRADE B SQUARE TUBE (9) (SEE SCHEDULE FOR SIZE.)

BEARINGS: SEALMASTER RELUBRICABLE BALL WITH WOOL FELT RADIAL SEAL (14) SHELL ALVANIA #2 GREASE W/STAIN. STL. THRUST WASHERS (16) AT JAMBS.

LINKAGE: HEAVY DUTY AISI-1008/M1020 PLATED H.R.S. (19)(20)(21) WITH STAINLESS STEEL PINS (17) AND O.I.B. BEARINGS (18)

STOPS: 1 x 1 x 10 GA. ASTM-A526/527 GALVANIZED STEEL ANGLE (24) AND 2 x 1 x 11 GA. ASTM-A513/A500 GRADE B RECT. TUBE (23)

SEALS: EPDM-3 BULB (MCL# 7404) (29) ON BLADES & STOPS W/EPT-4 WEDGE (MCL# 7408) (30) ON JAMBS & WITH GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.

FINISH: HOT DIP GALVANIZING PER ASTM-A123 ON ALL CARBON STEEL COMPONENTS. MILL ON GALVANIZED OR PLATED STEEL SURFACES WITH TOUCH-UP OF WELDED AREAS OF GALV. STEEL WITH GALVANOX TYPE 1.

TIE BARS: (2) TWO 3/4" DIA. AISI-1018 PLATED STEEL FULL LENGTH BARS (25) LOCATED AT CENTER BLADES FOR FULL OPEN STOPS.

ACTUATOR: CONSTANT FORCE SPRING TO HOLD BLADES OPEN UNTIL INCIDENT (SEE SCHED. FOR MODEL #). DAMPER WILL CLOSE UPON PRESSURE RISE. (SEE SCHEDULE FOR START CLOSE PRESSURE)

NOTES

1. SEE SCHEDULE 80278-025-400 SERIES OR 80279-025-400 SERIES FOR ADDITIONAL DESIGN INFORMATION.
2. ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STANDARD WELD DRAWING # 10151 UNLESS OTHERWISE SPECIFIED.
3. EACH DAMPER TO HAVE A STAINLESS STEEL I.D. TAG (32) WITH 1/8" HIGH CHARACTERS AFFIXED TO DAMPER WITH THE FOLLOWING INFO:
   P.O. NO., (PER SCHED.), DAMPER TYPE: RBD-7I
   MANUFACTURERS NAME: AMERICAN WARMING & VENTILATING
   NAME OF COMPONENT: TORNADO DAMPER / INTAKE
   DAMPER TAG NO. (PER SCHED.), S.O. # (PER SCHED.)
4. SEE DWGS. 80278-025-___, -002, -003 & -004 FOR SPRING MOUNTING ARRANGEMENT AND PANEL LAYOUT DETAILS.
5. LEAKAGE & DEFLECTION TESTING PER AWV DOC.# 80278-782, EACH DAMPER WILL BE CYCLE TESTED 25 TIMES UNDER SHOP FLOOR CONDITIONS
6. QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLY AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.
7. CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR FRAME, BLADES & AXLES WHICH ARE CONSIDERED THE HIGH STRESS ITEMS BY AWV. CERTIFICATES OF CONFORMANCE ARE TO BE SUPPLIED ON ALL OTHER MATERIALS.
8. SEISMIC QUALIFICATIONS WILL BE FURNISHED FOR THE DAMPER ASSEMBLY.
9. DUE TO THE SIZE OF THIS EQUIPMENT, REASONABLE CARE MUST BE EXERCISED WHEN LOADING, UNLOADING, HANDLING & INSTALLING THESE DAMPERS TO AVOID OVERSTRESSING & POSSIBLE PERMANENT DAMAGE TO THE FRAME, & RELATED COMPONENTS BY EXCESSIVE RACKING, SKEWING, TWISTING ETC.
10. EXTENDED GREASE FITTINGS WILL BE SUPPLIED ON BEARINGS MOUNTED TO FRAME CHANNEL (2) ONLY. FITTINGS WILL PROVIDE ACCESS FOR GREASING BEARINGS AT FLOW LEAVING FLANGE.
11. PLATING CONFORMS TO ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC.
12. BLADES ARE ALWAYS PARALLEL TO "B" DIMENSION.

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
41668-00164
B1668-00149

DATE	S.O. PARTS	PLT	DCN#
4/19/84	2x0	[illegible]	—

FOR AWV USE ONLY

american warming and ventilating inc

NOTES & SPECS FOR DWG.# 80278-025-800 (RBD-7I) INSERT MOUNT)

CHD. BY	APPD. BY	DCS
DRN. BY PRE	DWG. NO. 80278-025-201	REV A
DATE 3/29/84		

GENERAL INFORMATION

BLDG. 1 3 QNTY. 1 BASE DWG. B0278-025-C)
DATA SHT. 3V289V24009-3 NOTES & SPECS. B0278-025-201
TAG NO. 3V101VDA118 PANEL LAYOUT B0278-025-002
OPENING SIZE 251 (A) W. X 143 (A) H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 101,500
DESIGN VELOCITY (FPM) 446 (A)
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 13188 (A)
START CLOSED PRESS. (IN. W.G.) .5
BLADE ORIENTATION VERTICAL
MOUNTING VERTICAL
FLOW DIRECTION HORIZONTAL
FABRICATION SECTIONS 3 X 3
NO. OF SHIP SECTIONS 3
WEIGHT/SHIP SECTION(LBS.) 2380
CLOSE TIME(SEC.) .25 (A)

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

HI (LBS.) 26161 (A)
H2 (LBS.) 21420 (A)
V (LBS.) 28560 (A)
M (IN. LBS.) 600 (A)
TORNADO (LBS.) 98415 (A)

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL* SH20R47
QUANTITY/PANEL 2
TOTAL QUANTITY 18
FORCE (LBS.) 16 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE *
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:) *

AWV USE ONLY

CRK. AREA/PANEL 5.8 (A)
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 451 (A) (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 1000
ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE:	A= 135 (A)	ST/LST.PNCH	X= 5 1/4	(A)	
H.INSIDE:	B= 243 (A)	BLD.SPCS.	X= 3		
MTG.HLS.:	F= —	SPC.C.C.:	Y= 9 3/16	(A)	
MTG.HOLE:	G= —	CTR. SPC.	Z= 18 5/8	(A)	
MTG.HOLE:	J= —	O.A.WIDE:	AA= 141	(A)	
MTG.HLS.:	K= —	O.A.HIGH:	BB= 249	(A)	
MTG.HLS.:	N= —	BTM.JB.EXT	EE= —		
MTG.HLS.:	Q= —	MAX.PROJ:	FF= 8		
AXLE EXT.R=	2 1/4	TOP.JB.EXT	GG= —		
AXLE EXT.S=	4 1/2	SPRING C/C	HH= 8 15/16	(A)	
AXLE EXT.T=	—	MAX.PROJ:	KK= 2 7/16		
ACT. EXT. U=	5 3/4	AXLE DIA	1 1/4		
SPR SHFT EXT:	P= 5	BLDS/PANEL	8		
BLD. W.:	V= 9 3/16 (A)				

TUBE SIZE 1 1/2 X 1 1/2 X 11 GA.

* - REF. DWG. NO. B0278-025-002

A	SIZE CHANGE PER CUSTOMER	6-23-84	RLC	BK
	REVISION	DATE	BY	APPD. BY

AMERICAN WARMING AND VENTILATING INC.
13413 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY RLC 4/24/84	APPD. BY JRB	APPD. BY 4/24/84	
DWN. BY PME	DWG. NO. B0278-025-402	REV. A	
DATE 4-3-84			

SOTXNB.D71

DATE	B.O. PARTS	PLT	ECNS
1031-84	2600	UNIT	—

FOR A.W.V. USE ONLY

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
416B-00161 UNIT 1

A.3.B

GENERAL INFORMATION

BLDG.: 8 QNTY.: 1 BASE DWG. 80278-025-0

DATA SHT. 3V289V24009-4 NOTES & SPECS. 80278-025-201

TAG NO. 3V101VDA119 PANEL LAYOUT 80278-025-003

OPENING SIZE 263 (A) W. X 143 (A) H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3

DESIGN FLOW (SCFM) 101,500

DESIGN VELOCITY (FPM) 425 (A)

PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .25

LEAKAGE @ DEGIGN PRESS. & 70 DEG. F (SCFM) 13863 (A)

START CLOSED PRESS. (IN. W.G.) .5

BLADE ORIENTATION VERTICAL

MOUNTING VERTICAL

FLOW DIRECTION HORIZONTAL

FABRICATION SECTIONS 3X3

NO. OF SHIP SECTIONS 3

WEIGHT/SHIP SECTION(LBS.) 2485 (A)

CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES

LEAKAGE/DEFL. NO (A)

SEISMIC REACTIONS

HI (LBS.) 27340 (A)

H2 (LBS.) 22365 (A)

V (LBS.) 29820 (A)

M (IN. LBS.) 600

TORNADO (LBS.) 103,275 (A)

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)

MODEL # SH20R47

QUANTITY/PANEL 2

TOTAL QUANTITY 18

FORCE (LBS.) 16 EA.

LOCATION AS REF: FROM FLOW ENTER. SIDE *

ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:)

*

AWV USE ONLY

CRK. AREA/PANEL 6.1 (A)

TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 5.02 (A) (IN. LBS.)

TIE RODS: YES

RADIATION

NORMAL (RADS) 1000

ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE:	A= 135 (A)	ST/LST.PNCH	h= 5 1/4	(A)
H.INSIDE:	B= 255 (A)	BLD.SPCS.	X= 3	
MTG.HLS.:	F= —	SPC.C.C.:	Y= 9 1/4 16	(A)
MTG.HOLE:	G= —	CTR. SPC.	Z= 19 5/8	(A)
MTG.HOLE:	J= —	O.A.WIDE:	AA= 141	(A)
MTG.HLS.:	K= —	O.A.HIGH:	BB= 261	(A)
MTG.HLS.:	N= —	BTM.JB.EXT	EE= —	
MTG.HLS.:	Q= —	MAX.PROJ:	FF= 8	
AXLE EXT.	R= 2 1/4	TOP.JB.EXT	GG= —	
AXLE EXT.	S= 4 1/2	SPRING C/C	HH= 9 13/16	(A)
AXLE EXT.	T= —	MAX.PROJ:	KK= 2 15/16	
ACT. EXT.	U= 5 3/4	AXLE DIA.	1 1/4	
SPR SHFT EXT:	P= 5			
BLD. W.:	V= 9 1/16 (A)	BLDS/PANEL	8	

TUBE SIZE 1 1/2 X 1 1/2 X 11GA.

* - REF DWG NO. 80278-025-003

A	SIZE CHANGE PER CUSTOMER	6-27-84	BY	APPD. BY
	REVISION	DATE		

AMERICAN WARMING AND VENTILATING INC.

1320 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY	APPD. BY	Q. A. APPR. BY	
DRN. BY PME	DWG. NO. 80278-025-403		REV. A
DATE 4-3-84			

SOTXNB.D71

10-31-84	2160	VAW	—
DATE	S.O. PARTS	PLT	ECNS

FOR A.W.V. USE ONLY

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
41168-00162 UNIT 1

U1 437

GENERAL INFORMATION

BLDG. AB QNTY. 1 BASE DWG. 80278-025-1
DATA SHT. 3V289V24009-5 NOTES & SPECS. 80278-025-201
TAG NO. 3V101VDA120 PANEL LAYOUT 80278-025-004
OPENING SIZE 160 (A) W. x 143 (A) H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 101,500
DESIGN VELOCITY (FPM) 712 (A)
PRESS. DROP PER AMCA 500.
FIG.5.3 (IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 8315 (A)
START CLOSED PRESS. (IN. W.G.) .54 (A)
BLADE ORIENTATION VERTICAL
MOUNTING VERTICAL
FLOW DIRECTION HORIZONTAL
FABRICATION SECTIONS 3x2
NO. OF SHIP SECTIONS 2
WEIGHT/SHIP SECTION (LBS.) 2300 (A)
CLOSE TIME (SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO (A)

SEISMIC REACTIONS

H1 (LBS.) 16,766 (A)
H2 (LBS.) 13,800 (A)
V (LBS.) 18,400 (A)
M (IN. LBS.) 400
TORNADO (LBS.) 61,560 (A)

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL # SH20R47
QUANTITY/PANEL 2
TOTAL QUANTITY 12
FORCE (LBS.) 16 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE *
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:) *

AWV USE ONLY

CRK. AREA/PANEL 5.5 (A)
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 404 (A) (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 1000
ABNORMAL (RADS) 100

FABRICATION INFORMATION

W.INSIDE:	A= 135 (A)	LST/LST.PNCH		5 3/8	(A)
H.INSIDE:	B= 152 (A)	@BLD.SPCS.	X=	3	
MTG.HLS.:	F= —	SPC.C.C.:	Y=	8 5/8	(A)
MTG.HOLE:	G= —	CTR. SPC.	Z=	17 1/2	(A)
MTG.HOLE:	J= —	O.A.WIDE:	AA=	141	(A)
MTG.HLS.:	K= —	O.A.HIGH:	BB=	159	(A)
MTG.HLS.:	N= —	BTM.JB.EXT.	EE=	—	
MTG.HLS.:	Q= —	MAX.PROJ:	FF=	8	
AXLE EXT.	R= 2 1/4	TOP.JB.EXT	GG=	—	
AXLE EXT.	S= 4 1/2	SPRING C/C	HH=	8 1/2	(A)
AXLE EXT.	T= —	MAX.PROJ:	KK=	1 15/16	(A)
ACT. EXT.	U= 5 3/4	AXLE DIA.		1 1/4	
SPR SHFT EXT:	P= 5				
BLD. W.:	V= 8 5/8 (A)	BLDS/PANEL		8	

TUBE SIZE 1 1/2 x 1 1/2 x 11GA.

* REF. DWG. NO. 80278-025-004

	10-21-84	260	V3T	—
	DATE	E.O. PARTS	PLT	ECNS

FOR A.W.V. USE ONLY

FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
41168-00163 Sht 1

	REVISION	DATE	BY	APPD. BY
A	SIZE CHANGE PER CUSTOMER	4-3-84	PME	

AMERICAN WARMING AND VENTILATING INC.
13.5 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY	DATE	APP'D BY	G.A. APPD. BY
DRN.BY PME	DWG. NO. 80278-025-404		REV. A
DATE 4-3-84			

SOTXNB.071

C 4.38

SPECIFICATIONS

FRAME:	10 x 2-1/2 x 1/4 THK. ASTM-A36 H.R.S. CHANNEL (1) (2)
BLADES:	16 GA. ASTM-A527 GALV. STEEL EDGE PIVOTED AIRFOIL (4)
AXLES:	SEE SCHEDULE FOR DIA. AISI-1018 PLATED CRS FULL LENGTH (7) (8)
BEARINGS:	SEALMASTER RELUBRICATABLE BALL (10) WITH SHELL ALVANIA #2 GREASE.
LINKAGE:	HEAVY DUTY ASTM-A36/AISI-M1020 PLATED STL. (14) (15) W/ STAINLESS STEEL PINS (16) & OIL IMPREGNATED BRONZE BEARINGS (23) (SINGLE PER PANEL).
SEALS:	EPDM-3 BULB (MCL# 7404) ON BLADES & STOPS (24) WITH EPT-4 WEDGE (MCL# 7408) ON JAMB (22) AND GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.
FINISH:	MILL OR GALV. STEEL OR PLATED STEEL COMPONENTS. TOUCH-UP OR WELDED AREAS OF GALV. OR PLATED STEEL WITH GALVANOX TYPE I. CARBON STEEL PARTS TO BE HOT DIP GALVANIZED.
POSITION INDICATOR:	16 GA. ASTM-A527 GALVANIZED STEEL POINTER (26) AT END OF AXLE.
ACTUATOR: ⚠	COUNTERWEIGHTED FOR EASY OPERATION (29) CWT ARM TO BE PLATED STL. W/-1/4 x 1 x 2-3/4 LG. PLATED STEEL GUSSET (34) COUNTERWEIGHT PLATES ARE 10 GA. ASTM-A526/A527 GALV. STEEL.
STOPS:	16 GA. ASTM-A527 GALVANIZED STEEL ANGLE (12) (13) AT HEAD AND SILL.
MULLION:	(2) 10 x 3 x 3/8 x 10 GA. ASTM-A526/A527 GALV. STEEL CHANNEL (3) WITH 5 x 1 x 10 GA. ASTM-A526/A527 GALV. STEEL TIE BARS (21) LOCATED ON 24" MAX. CENTERS.
TIE RODS:	(2) 3/4 DIA. AISI-1018 PLATED CRS BARS (13) LOCATED AT APPROX. MID-HEIGHT OF PANEL ON PANELS OVER 60" IN HEIGHT.

NOTES

1. SEE SCHEDULES 80278-026-400 SERIES OR 80279-026-400 SERIES FOR DAMPER DESIGN CRITERIA, QTY., & REQ'D MTG. POSITION & WEIGHT.
2. EACH DAMPER TO HAVE A STAINLESS STEEL I.D. TAG (28) AFFIXED TO DAMPER WITH THE FOLLOWING INFORMATION:
   - AWV S.O.# (SEE SCHED.)
   - DAMPER TAG # (SEE SCHED.)
   - MANUFACTURER'S NAME: AMERICAN WARMING & VENTILATING
   - COMPONENT NAME & MODEL NO.: BACKDRAFT DAMPER MODEL NBD-53, CUSTOMER P.O. (SEE SCHEDULE)
3. TESTING: CYCLING 25 TIMES EACH DAMPER, LEAKAGE AND DEFLECTION TESTING PER AWV DOC.# 80278-702 & ADDENDUMS.
4. QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLIES AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.
5. CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR THE FRAME, BLADES & AXLES ONLY WHICH ARE CONSIDERED THE HIGH STRESS DAMPER ASSEMBLY ITEMS BY AWV. CERTIFICATES OF CONFORMANCE WILL BE SUPPLIED FOR ALL OTHER MATERIALS.
6. PLATING ON AXLES, LINKAGE AND CWT. ARM TO BE IN ACCORDANCE WITH ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC. HOT DIP GALV. OR FRAME TO BE IN ACCORDANCE WITH ASTM-A123.
7. CWT. LOCATIONS ARE AS VIEWED FROM THE FLOW ENTERING SIDE OF DAMPER.
8. OUTLET DUCTS MUST BE OF SUFFICIENT LENGTH TO CONTAIN THE BLADE IN THE OPEN POSITION AND THE DUCT AND JUNCTION OF THE DAMPER MUST BE SMOOTH AND FREE OF PROTRUSIONS THAT MAY DAMAGE THE BLADE OR BLADE EDGE SEAL. ⚠
9. ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STD. WELD DWG. #10151, UNLESS OTHERWISE SPECIFIED.

DATE	S.O. PARTS	PLT	ECNS
7-4-84	800 # 200	B1	1658 # 1661
7-19-84	760 + 800	B1	—

FOR AWV USE ONLY

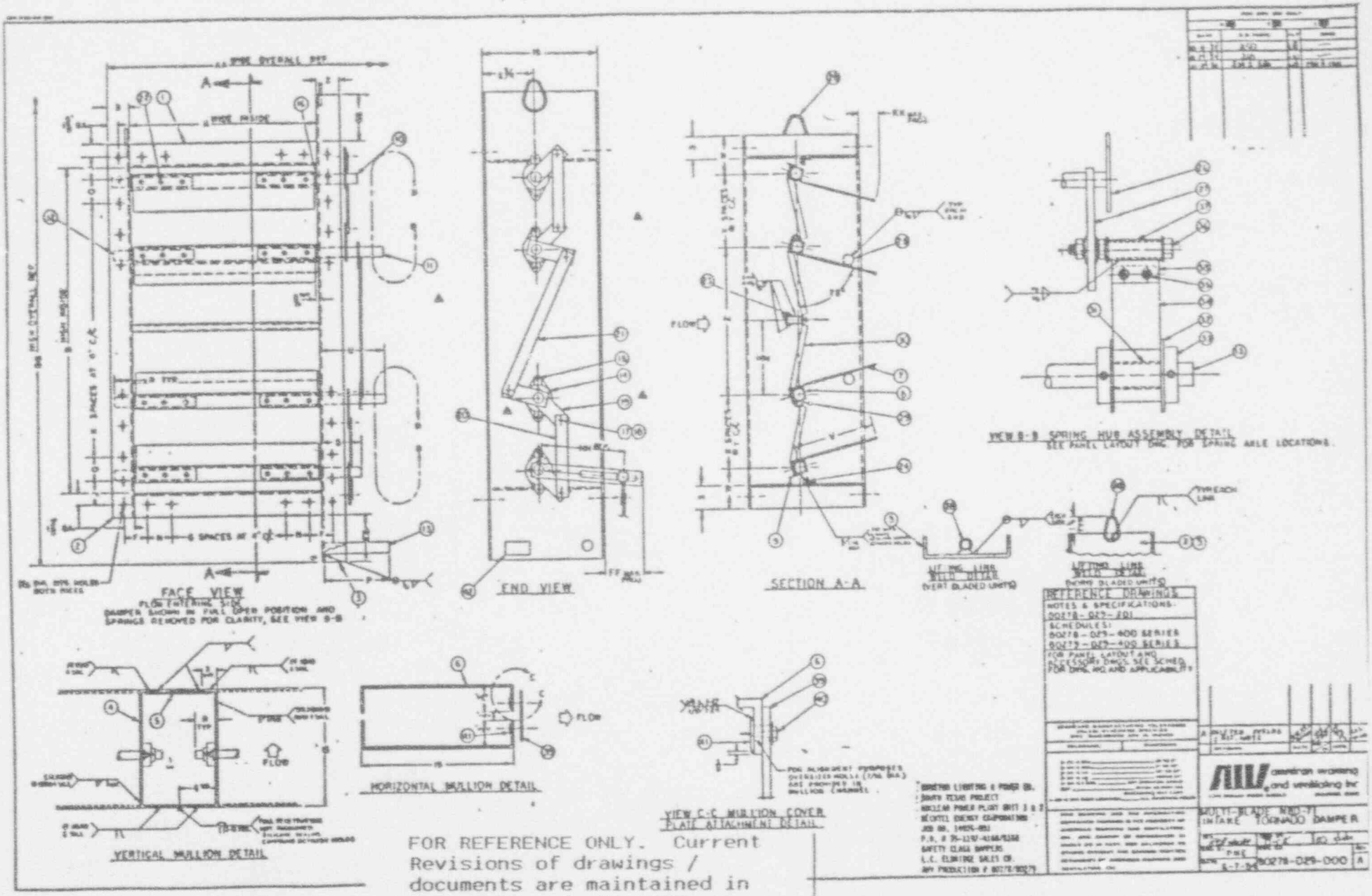
FOR REFERENCE ONLY.
Current revisions of this drawing/ document are maintained in document control. SEE:
81168-00178
81168-00163

D			
C			
B			
A			
REV.	DRN.	CK.	APPD.

American Warming and Ventilating Inc

NOTES & SPECS FOR NBD-53 DAMPERS DWG.# 80278-026-000

DRN. BY KAS
DWG. NO. 80278-026-201
REV. B
DATE 5-1-84

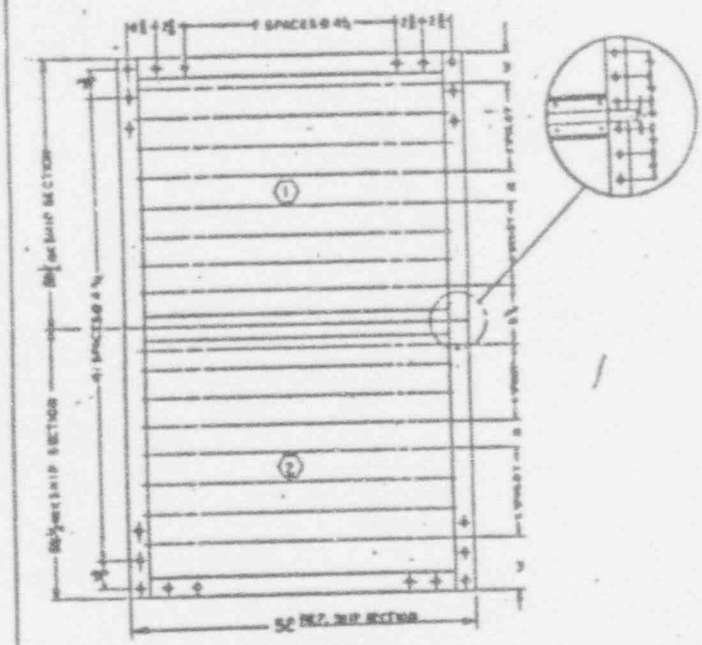


FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:

A1168-00224 Unit 1

A1168-00211 Unit 2

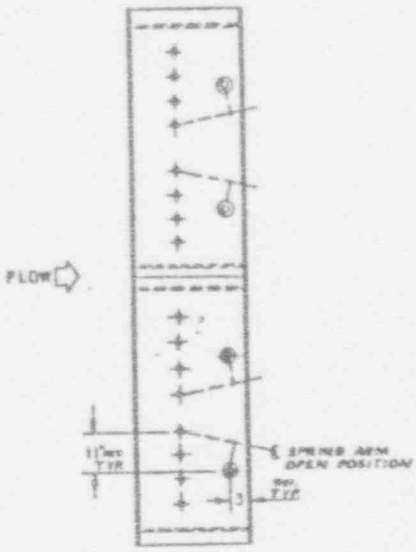
9-5-84



FACE VIEW

TAG NO. 3V101VDA052
3V102VDA052

○ - SHIP SECTIONS



END VIEW

SPRING AXLE LOCATIONS

NOTE: THIS DRAWING SUPERCEDES AWV SKETCH NO. 80278-310SK

NOTES

1. REF. DWG.# 80278-029-000 FOR MULLION DETAILS.
2. 3-1/2" x 18 GA. x 34 LG. ASTM-A526/A527 GALVANIZED STEEL COVER PLATES WILL BE SUPPLIED FOR CONNECTIONS OF SHIP SECTIONS IN FIELD BY OTHERS.
3. COVER PLATES WILL BE PRE-PUNCHED FOR #10 SELF-THREADING SCREWS ON 6" MAX. CENTERS (COVER PLATES & MOUNTING SCREWS WILL BE SHIPPED LOOSE.)
4. COVER PLATES TO BE USED AS A TEMPLATE FOR FIELD DRILLING OF BACKING PLATES ⑤ (IN FIELD BY OTHERS.)

REFERENCE DRAWINGS

80278-047-000 - BASE DWG.
80278-029-001 - NOTES & SPECS
80278-028-402 - SCHEDULE
80279-029-402 - SCHEDULE

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14926-001
P.O.# 35-1197-A168/B168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AWV PRODUCTION # 80278/80279

american warming and ventilating inc

PANEL LAYOUT FOR NBD-71 TORNADO DAMPER

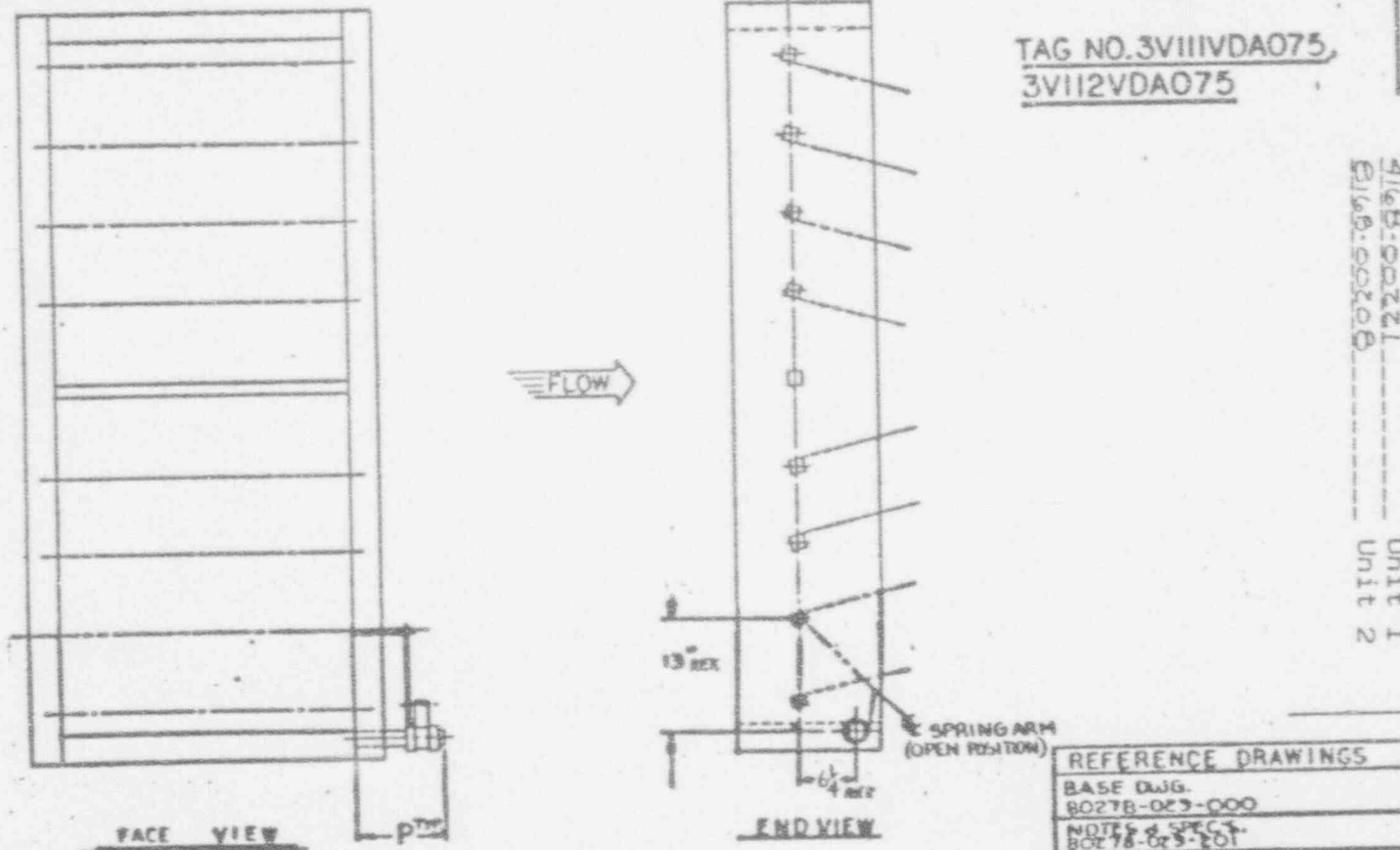
DWG NO. 80278-029-001

SIZE E | 6-11-84

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:

4148-00222 _____ Unit 1
8148-00222 _____ Unit 2

457



TAG NO. 3V111VDA075,
3V112VDA075

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:
4168-00221 ---------- Unit 1
8168-00208 ---------- Unit 2

REFERENCE DRAWINGS
BASE DWG. 80278-023-000
NOTES & SPECS. 80278-023-201
SCHEDULES 80278-023-401 & 80279-023-401

american warming and ventilating inc

PANEL LAYOUT & SPRING AXLE LOCATION DETAIL

DRN. BY R.C.C.	DWG. NO. 80278-023-002	REV
DATE 7-25-84		

REVISION	DATE	APPD.
0	1-4-85	210	30	—
1	10-11-84	250	MR	—
DATE	G.O. PARTS	PLT	ECNS

FOR AWV USE ONLY

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT
UNIT 0 1 & 2
BECHTEL ENERGY CORPORATION
JOB # 14926-001
P.O.# 35-1197-4168/8168
SAFETY CLASS DAMPERS
L.C. ELDRIDGE SALES CO.
AWV PROJ # 80278/80279

SPECIFICATIONS

FRAME: 15 x 3 x 1/8" THK. ASTM-A36 H.R.S. (1)(2)(3) WITH LIFTING LUGS (28)

VERTICAL MULLION: 15 x 4 x 2 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (4) WITH 1 x 7 x 1/4" THK. PLATED STEEL REINF. BARS (5) ACROSS OPEN SECTION ON 24" MAX. SPACING.

HORIZONTAL MULLION: 15 x 3-9/8 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (6) WITH 3-1/2 x 20 GA. ASTM-A526/A527 GALV. STEEL COVER PLATES (39) W/ #10 SELF THREADING PLT. STL. MTG. SCREWS (40) & GE-106 SILICONE SEALING COMPOUND SHIPPED LOOSE FOR ASSEMBLY IN FIELD BY OTHERS AT SHIP SECTION SPLIT.

BLADES: 10 GA. ASTM-A526/A527 GALVANIZED STEEL EDGE PIVOTED SINGLE TRICKLESS BLADE (7)

AXLE: (SEE SCHED. FOR DIA.) AISI-1018 PLATED STEEL STUB (10)(11)(12) (13) WITH ASTM-A513/A500 GRADE B SQUARE TUBE (8) (SEE SCHED. FOR SIZE.)

BEARINGS: SEALMASTER RELUBRICABLE BALL WITH WOOL FELT RADIAL SEAL AND WITH SHELL ALVANIA #2 GREASE (14) AND WITH STAINLESS STEEL THRUST WASHERS (16) AT JAMBS.

LINKAGE: HEAVY DUTY AISI-N1020/ASTM-A36 PLATED H.R.S. (19)(20)(21) WITH STAINLESS STEEL PINS (17) AND O.I.B. BEARINGS (18) SINGLE PER PANEL.

STOPS: 1 x 1 x 10 GA. ASTM-A526/527 GALVANIZED STEEL ANGLE (24) AND 2 x 1 x 11 GA. ASTM-A513/A500 GRADE B RECT. TUBE (23)

SEALS: EPDM-3 BULB (MCL# 7404) (29) ON BLADES & STOPS W/ EPT-4 WEDGE (MCL# 7408) (30) ON JAMBS & W/GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.

FINISH: HOT DIP GALVANIZING PER ASTM-A123 ON ALL CARBON STEEL COMPONENTS. MILL OR GALVANIZED OR PLATED STEEL SURFACES WITH TOUCHUP OF WELDED AREAS OF GALV. OR PLATED STEEL WITH GALVANOX TYPE 1.

TIE BARS: (2) TWO 3/4" DIA. AISI-1018 PLATED STEEL FULL LENGTH BARS (25) LOCATED AT CENTER BLADES FOR FULL OPEN STOPS.

POSITION INDICATOR: 16 GA. ASTM-A527 GALVANIZED STEEL ARROW (26) WELDED TO AXLE ON EXTERIOR PANELS.

ACTUATOR: CONSTANT FORCE SPRING TO HOLD BLADES OPEN UNTIL INCIDENT (SEE SCHED. FOR MODEL #) DAMPER WILL CLOSE UPON PRESSURE RISE. SEE SCHEDULE FOR START CLOSE PRESSURE.

NOTES

1. SEE SCHEDULE 80278-029-400 SERIES OR 80279-029-400 SERIES FOR ADDITIONAL DESIGN INFO.
2. ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STANDARD WELD DRAWING # 10151 UNLESS OTHERWISE SPECIFIED.
3. EACH DAMPER TO HAVE A STAINLESS STEEL I.D. TAG (43) WITH 1/8" HIGH CHARACTERS AFFIXED TO DAMPER WITH THE FOLLOWING INFORMATION:
   P.O. NO. (PER SCHED.), DAMPER TYPE: 88D-71
   MANUFACTURERS NAME: AMERICAN WARMING & VENTILATING
   NAME OF COMPONENT: TORNADO DAMPER/INTAKE
   DAMPER TAG NO. (PER SCHED.), & S.O.# (PER SCHED.)
4. INLET DUCTS MUST BE OF SUFFICIENT LENGTH TO CONTAIN THE BLADE IN THE OPEN POSITION AND THE DUCT & JUNCTION OF THE DAMPER MUST BE SMOOTH AND FREE OF PROTRUSIONS THAT MAY DAMAGE THE BLADE.
5. LEAKAGE & DEFLECTION TESTING PER AWV DOC.# 80278-POC. EACH DAMPER WILL BE CYCLE TESTED 25 TIMES UNDER SHOP FLOOR CONDITIONS.
6. QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLIES AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.
7. CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR FRAME, BLADES & AXLES WHICH ARE CONSIDERED THE HIGH STRESS ITEMS BY AWV. CERTIFICATES OF CONFORMANCE ARE TO BE SUPPLIED ON ALL OTHER MATERIALS.
8. SEISMIC QUALIFICATIONS WILL BE FURNISHED FOR THE DAMPER ASSEMBLY.
9. DUE TO THE SIZE OF THIS EQUIPMENT, REASONABLE CARE MUST BE EXERCISED WHEN LOADING, UNLOADING, HANDLING & INSTALLING THESE DAMPERS TO AVOID OVERSTRESSING & POSSIBLE PERMANENT DAMAGE TO THE FRAME & RELATED COMPONENTS BY EXCESSIVE RACKING, SKEWING, TWISTING, ETC.
10. BLADES ARE ALWAYS PARALLEL TO THE 'A' DIMENSION.
11. PLATING CONFORMS TO ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC.

DATE	S.O. PARTS	PLT	SCHD
10-03-89	ADD	MR	—
10-11-89	250	MD	—
[illegible]	[illegible]	[illegible]	[illegible]

FOR AWV USE ONLY

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:

416B-00220 _____ Unit 1

B16B-00207 _____ Unit 2

CK'D	APP'D	DR	
DRN. BY	DWG. NO.		REV
DATE	APPD.	80278-029-201	

american warming and ventilating inc

NOTES & SPECS FOR DWG. # 80278-029-000 (N&D-71)

GENERAL INFORMATION

BLDG. EAB QNTY. 1 BASE DWG. 80278-029-000
DATA SHT. 3V289V24010-1 NOTES & SPECS. 80278-029-201
TAG NO. 3VIIIVDA075 PANEL LAYOUT 80278-029-002
OPENING SIZE 72 W. X 48 H.

FABRICATION INFORMATION

W.INSIDE: A= 48	IST/LST.PNCH W= 5 9/16 △A
H.INSIDE: B= 72	#BLD.SPCS. X= 2 △A
MTG.HLS.: F= 3 3/8	SPC.C.C.: Y= 11 9/16 △A
MTG.HOLE: G= 11	CTR. SPC. Z= 22 1/8 △A
MTG.HOLE: J= 3 3/8	O.A.WIDE: AA= 64
MTG.HLS.: K= 17	O.A.HIGH: BB= 80
MTG.HLS.: N= —	BTM.JB.EXT: EE= —
MTG.HLS.: Q= —	MAX.PROJ: FF= 6 1/2
AXLE EXT. R= 2 3/4	TOP.JB.EXT GG= —
AXLE EXT. S= 5	SPRING C/C HH= 11 1/4
AXLE EXT. T= —	MAX.PROJ: KK= 2 11/16
ACT. EXT. U= 10	AXLE DIA. 1 1/2
SPR SHFT EXT: P= 12	BLDS/PANEL 6
BLD. W.: V= 10 15/16 △A	

TUBE SIZE 2 X 2 X 1/4

* - REF. DWG. NO. 80278-029-002

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 9000
DESIGN VELOCITY (FPM) 375
PRESS. DROP PER AMCA 500, FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 1750
START CLOSED PRESS. (IN. W.G.) △A .3
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERT./UP
FABRICATION SECTIONS 1X1
NO. OF SHIP SECTIONS 1
WEIGHT/SHIP SECTION(LBS.) 1115
CLOSE TIME(SEC.) .25

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL# SH31U58
QUANTITY/PANEL 1
TOTAL QUANTITY 1
FORCE (LBS.) 40 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE *
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL.) *

AWV USE ONLY

CRK. AREA/PANEL 6.9
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE △A 622 (IN. LBS.)
TIE RODS: YES

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

H1 (LBS.) 3345
H2 (LBS.) 3345
V (LBS.) 4960
M (IN. LBS.) 450
TORNADO (LBS.) 10,368

RADIATION

NORMAL (RADS) 100
ABNORMAL (RADS) 100

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:
4168-00213 Unit 1
________ Unit 2

4-11-84	350	WG	—
DATE	S.G. PARTS	PLT	SCHB

0 [redacted]) T [redacted] I [redacted]
/OR A.W.V. USE ONLY

A	REV. BLADE QTY.	5-13-85 / 12/10/84	WCB	RK
	REVISION	DATE	BY	APPD. BY

AMERICAN WARMING AND VENTILATING INC.
1310 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY KBT 2/26/84	APPD. BY BRR	Q.A. APPD. BY 06/29/84
DRN. BY PME	DWG. NO. 80278-029-401	REV. A
DATE 6-7-84		

SOTXNB.D71

GENERAL INFORMATION

BLDG. MAB QNTY. 1 BASE DWG. B0278-029-000
DATA SHT. 3V289V24009-1 NOTES & SPECS. B0278-029-201
TAG NO. 3V101VDA052 PANEL LAYOUT B0278-029-001
OPENING SIZE 168 W. x 36 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 36,000
DESIGN VELOCITY (FPM) 857
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 2988
START CLOSED PRESS. (IN. W.G.) .5
BLADE ORIENTATION VERTICAL
MOUNTING VERTICAL
FLOW DIRECTION HORIZONTAL
FABRICATION SECTIONS 1X2
NO. OF SHIP SECTIONS 2
WEIGHT/SHIP SECTION(LBS.) 825
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

H1 (LBS.) 5824
H2 (LBS.) 4950
V (LBS.) 6600
M (IN. LBS.) 600
TORNADO (LBS.) 18,144

ACTUATOR (SPRING)

MNFR. AMETEK(HUNTER)
MODEL# SH20R47
QUANTITY/PANEL 2
TOTAL QUANTITY 4
FORCE (LBS.) 16 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE *
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL) *

AWV USE ONLY

CRK. AREA/PANEL 5.9
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 482 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 1000
ABNORMAL (RADS) 4300

FABRICATION INFORMATION

W.INSIDE:	A= 36		LST/LST.PNCH	W= 5 3/8	
H.INSIDE:	B= 168		@BLD.SPCS.	X= 3	
MTG.HLS.:	F= *		SPC.C.C.:	Y= 9 5/8	
MTG.HOLE:	G= *		CTR. SPC.	Z= 19 1/2	
MTG.HOLE:	J= *		O.A.WIDE:	AA= 52	
MTG.HLS.:	K= *		O.A.HIGH:	BB= 176	
MTG.HLS.:	N= *		BTM.JB.EXT	EE= —	
MTG.HLS.:	Q= *		MAX.PROJ:	FF= 6 1/2	
AXLE EXT.R=	2 1/4		TOP.JB.EXT	GG= —	
AXLE EXT.S=	4		SPRING C/C	HH= 9 7/16	
AXLE EXT.T=	—		MAX.PROJ:	KK= 1 3/8	
ACT. EXT. U=	10		AXLE DIA.	1/4	
SPR SHFT EXT:	P= 12		BLDS/PANEL	8	
BLD. W.:	V= 9 5/8				

TUBE SIZE 1 1/2 X 1 1/2 X 11GA

*-REF. DWG. NO. B0278-029-001

10-11-89	250	WQ	—
DATE	S.O. PARTS	PLT	ECNS

S T I
OR A.W.V. USE ONLY

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:
4168-00214 Unit 1
_____ Unit 2

REVISION	DATE	BY	APPD. BY

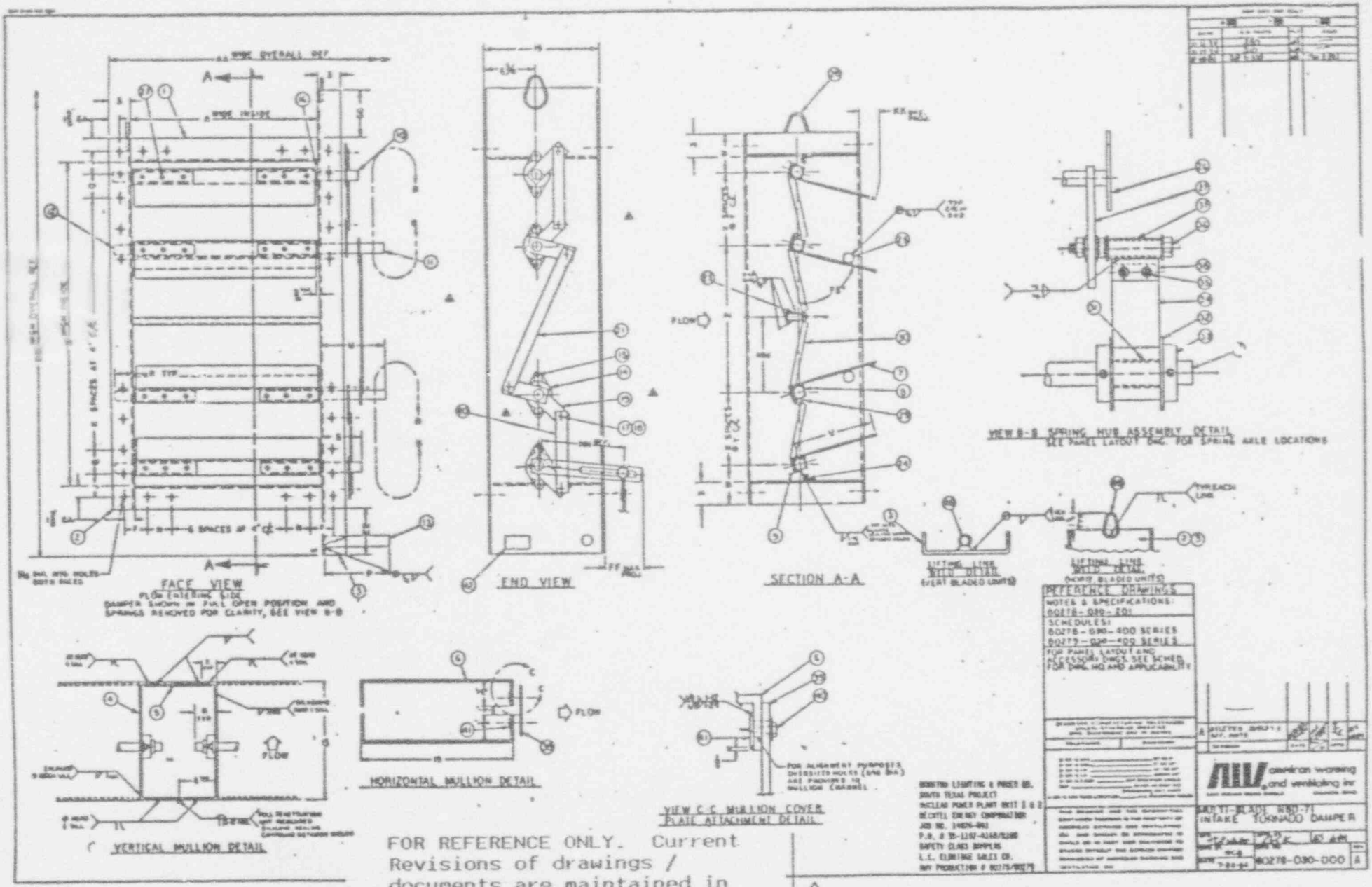
AMERICAN WARMING AND VENTILATING INC.
3240 SOUTH WOOD AVENUE BALDWIN, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY [illegible] 6/6/84 APPD. BY [illegible] APPD. BY [illegible]
DRN. BY PME DWG. NO. B0278-029-402 REV.
DATE 6-7-84

SOTXNB.D71

01 AR2

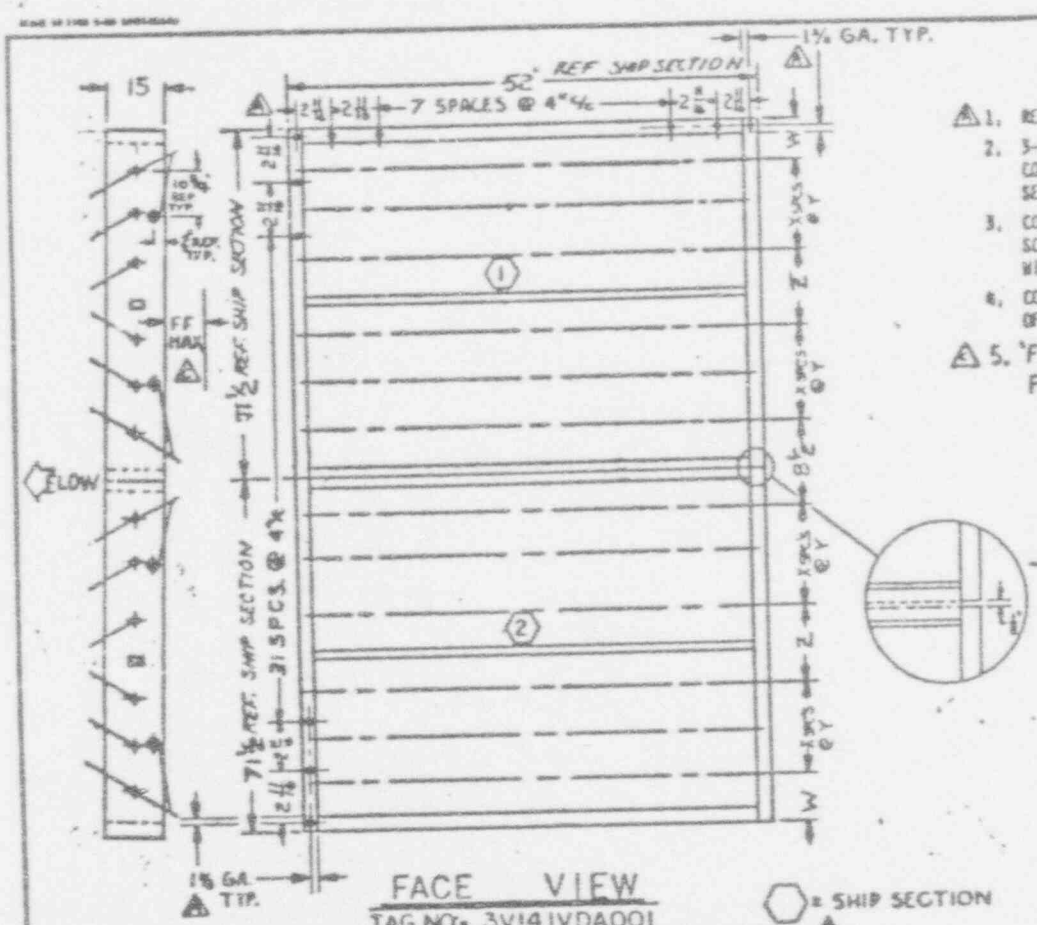


FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:

4168-00223 _____ t 1

8168-00210 _____ Unit 2

4R3



FACE VIEW

TAG NO's 3V141VDA001
3V142VDA001

LH

= SHIP SECTION

RH

NOTES

1. REF. DWG.# 80278-030-000 FOR MULLION DETAILS.
2. 3-1/2" x 10 GA. x 36" LG. ASTM-A526/A527 GALVANIZED STEEL. COVER PLATES WILL BE SUPPLIED FOR CONNECTIONS OF SHIP SECTIONS IN FIELD BY OTHERS.
3. COVER PLATES WILL BE PRE-PUNCHED FOR #10 SELF-THREADING SCREWS ON 6" MAX. CENTERS (COVER PLATES & MOUNTING SCREWS WILL BE SHIPPED LOOSE.)
4. COVER PLATES TO BE USED AS A TEMPLATE FOR FIELD DRILLING OF BACKING PLATES (41) (IN FIELD BY OTHERS.)
5. 'FF' DIM. IS REFERENCED FROM FLOW ENTERING FACE OF DAMPER.

NOTE: THIS DWG. SUPERCEDES AWV SKETCH NO. 80278-510 SK

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
NUCLEAR POWER PLANT UNIT 1 & 2
BECHTEL ENERGY CORPORATION
JOB NO. 14026-001

DATE	B.O. PARTS	PLT	SCHS
1-16-85	210	WD	1764
10-12-84	210	WD	—
10-8-84	050	LTR	—

FOR AWV USE ONLY

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:

81168-00218 _____ Unit 1
81168-00205 _____ Unit 2

REFERENCE DRAWING

80278-030-000 - BASE DWG.
80278-030-201 - NOTES & SPECS
80278-030-401 - SCHEDULE
80279-030-401 - SCHEDULE

american warming and ventilating inc

PANEL LAYOUT AND SPRING LOCATION DETAIL

CKD. BY	APPD. BY	NCS 7-7-84	
DRN. BY R.E.L.	DWG. NO. 80278-030-001	REV C	
DATE 7-2-84			

SPECIFICATIONS

FRAME: 15 x 3 x 1/4" THK. ASTM-A36 H.R.S. (1)(2)(3) WITH LIFTING LINKS (28)

VERTICAL MULLION: 15 x 4 x 2 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (4) WITH 3 x 7 x 1/4" THK. PLATED STEEL REINF. BARS (5) ACROSS OPEN SECTION ON 24" MAXIMUM SPACING

HORIZONTAL MULLION: 15 x 3-3/4 x 1/4" THK. ASTM-A36 H.R.S. CHANNEL (6) WITH 3-1/2 x 10 GA. ASTM-A526/A527 GALV. STEEL COVER PLATES (39) W/ #10 SELF THREADING PLT. STL. MTG. SCREWS (40) & GE-106 SILICONE SEALING COMPOUND SHIPPED LOOSE FOR ASSEMBLY IN FIELD BY OTHERS AT SHIP SECTION SPLIT.

BLADES: 10 GA. ASTM-A526/A527 GALVANIZED STEEL EDGE PIVOTED SINGLE THICKNESS BLADE (7)

AXLE: (SEE SCHED. FOR DIA.) AISI-1018 PLATED STEEL STUB (10) (11) (12) (13) WITH ASTM-A513/A500 GRADE B SQUARE TUBE (8) (SEE SCHED. FOR SIZE.)

BEARINGS: SEALMASTER RELUBRICABLE BALL WITH NOMEX RADIAL SEAL AND WITH DOW CORNING DC-41 GREASE (14) & WITH STAINLESS STEEL THRUST WASHERS (16) AT JAMBS.

LINKAGE: HEAVY DUTY AISI-M1020/ASTM-A36 PLATED H.R.S. (19) (20) (21) WITH STAINLESS STEEL PINS (17) AND O.I.B. BEARINGS (18) SINGLE PER PANEL.

STOPS: 1 x 1 x 10 GA. ASTM-A526/A527 GALVANIZED STEEL ANGLE (24) AND 2 x 1 x 11 GA. ASTM-A513/A500 GRADE B SQUARE TUBE (23)

SEALS: EPDM-3 BULB (MCL# 7404) (29) ON BLADES & STOPS W/EPT-4 WEDGE (MCL# 7408) (30) ON JAMBS & W/GE-106 SILICONE SEALING COMPOUND BETWEEN STOPS AND FRAME.

FINISH: HOT DIP GALVANIZING PER ASTM-A123 ON ALL CARBON STEEL COMPONENTS. MILL OR GALVANIZED OR PLATED STEEL SURFACES WITH TOUCH-UP OF WELDED AREAS OF GALVANIZED OR PLATED STEEL W/ GALVANOX TYPE I.

TIE BARS: (2) TWO 3/4" DIA. AISI-1018 PLATED STEEL FULL LENGTH BARS (25) LOCATED AT CENTER BLADES FOR FULL OPEN STOPS.

POSITION INDICATOR: 16 GA. ASTM-A527 GALVANIZED STEEL ARROW (26) WELDED TO AXLE ON EXTERIOR PANELS.

ACTUATOR: CONSTANT FORCE SPRING TO HOLD BLADES OPEN UNTIL INCIDENT (SEE SCHED. FOR MODEL #) DAMPER WILL CLOSE UPON PRESSURE RISE. SEE SCHEDULE FOR START CLOSE PRESSURE.

NOTES

1. SEE SCHEDULE B0278-030-400 SERIES OR B0279-030-400 SERIES FOR ADDITIONAL DESIGN INFORMATION
2. ALL WELDING WILL BE PERFORMED IN ACCORDANCE WITH AWV STANDARD WELD DRAWING# 10151 UNLESS OTHERWISE SPECIFIED.
3. EACH DAMPER TO HAVE A STAINLESS STEEL I.D. TAG (37) WITH 1/8" HIGH CHARACTERS AFFIXED TO DAMPER WITH THE FOLLOWING INFORMATION.
   P.O. NO. (PER SCHED.), DAMPER TYPE: NBD-71
   MANUFACTURERS NAME: AMERICAN WARMING & VENTILATING
   NAME OF COMPONENT: TORNADO DAMPER / INTAKE
   DAMPER TAG NO. (PER SCHED.), & S.O. # (PER SCHED.)
4. INLET DUCTS MUST BE OF SUFFICIENT LENGTH TO CONTAIN THE BLADE IN THE OPEN POSITION & THE DUCT & JUNCTION OF THE DAMPER MUST BE SMOOTH AND FREE OF PROTRUSIONS THAT MAY DAMAGE THE BLADE.
5. LEAKAGE & DEFLECTION TESTING PER AWV DOC.# B0278-702. EACH DAMPER WILL BE CYCLE TESTED 25 TIMES UNDER SHOP FLOOR CONDITIONS.
6. QUALITY ASSURANCE PROGRAM WILL BE FURNISHED FOR DAMPER ASSEMBLIES AS DELINEATED AND DEFINED IN THE AWV Q.A. MANUAL.
7. CHEMICAL & PHYSICAL CERTIFICATES WILL BE FURNISHED FOR FRAME, BLADES & AXLES WHICH ARE CONSIDERED THE HIGH STRESS ITEMS BY AWV. CERTIFICATES OF CONFORMANCE ARE TO BE SUPPLIED ON ALL OTHER MATERIALS.
8. SEISMIC QUALIFICATIONS WILL BE FURNISHED FOR THE DAMPER ASSEMBLY.
9. DUE TO THE SIZE OF THIS EQUIP., REASONABLE CARE MUST BE EXERCISED WHEN LOADING, UNLOADING, HANDLING & INSTALLING THESE DAMPERS TO AVOID OVERSTRESSING & POSSIBLE PERMANENT DAMAGE TO THE FRAME AND RELATED COMPONENTS BY EXCESSIVE RACKING, SKEWING, TWISTING, ETC.
10. BLADES ARE ALWAYS PARALLEL TO THE "A" DIMENSION.
11. PLATING CONFORMS TO ASTM-A164 TYPE LS OR ASTM-B633, SC3 FOR ZINC.

10-4-84	210	WB	—
10-8-84	250	NQ	—
DATE	S.O. PARTS	PLT	SCHD

FOR AWV USE ONLY

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:
4168-00219 ________ Unit 1
8168-00206 ________ Unit 2

american warming and ventilating inc

NOTES & SPECS. FOR DWG.# B0278-030-000 (NBD-71)

CKD. BY	APPD. BY	DS 10/1/84
DRN. BY DDE	DWG. NO. B0278-030-201	REV.
DATE 9-26-84		

465

GENERAL INFORMATION

BLDG. ACB QNTY. 1 BASE DWG. B0278-030-000
DATA SHT. 3V289V24035-1 NOTES & SPECS. B0278-030-201
TAG NO. 3V141VDA001 PANEL LAYOUT B0278-030-001
OPENING SIZE 132 W. x 36 H.

DESIGN INFORMATION

DESIGN PRESS.(PSI) 3
DESIGN FLOW (SCFM) 40,000
DESIGN VELOCITY (FPM) 1212
PRESS. DROP PER AMCA 500. FIG.5.3(IN.W.G.) .25
LEAKAGE @ DESIGN PRESS. & 70 DEG. F (SCFM) 2332
START CLOSED PRESS. (IN. W.G.) 4.0 MAX
BLADE ORIENTATION HORIZONTAL
MOUNTING HORIZONTAL
FLOW DIRECTION VERTICAL/UP
FABRICATION SECTIONS 1X2
NO. OF SHIP SECTIONS 2
WEIGHT/SHIP SECTION(LBS.) 663
CLOSE TIME(SEC.) .25

TESTING

CYCLE 25 TIMES YES
LEAKAGE/DEFL. NO

SEISMIC REACTIONS

H1 (LBS.) 3975
H2 (LBS.) 3975
V (LBS.) 5987
M (IN. LBS.) 100
TORNADO (LBS.) 15581

ACTUATOR (SPRING)

MNFR. AMETEK (HUNTER)
MODEL# SH20R47
QUANTITY/PANEL 2
TOTAL QUANTITY 4
FORCE (LBS.) 16 EA.
LOCATION AS REF. FROM FLOW ENTER. SIDE L.H.
ACTUATOR AXLES (NUMBERED FROM HEAD TO SILL:) 1ST & 6TH

AWV USE ONLY

CRK. AREA/PANEL 4.6
TORQUE/PANEL W/O SPRINGS @ 1" BACKPRESSURE 381 (IN. LBS.)
TIE RODS: YES

RADIATION

NORMAL (RADS) 3.5×10^4
ABNORMAL (RADS) 1.4×10^8

FABRICATION INFORMATION

W.INSIDE:	A= 36	1ST/LST.PNCH W=	5 1/4
H.INSIDE:	B= 132	*BLD.SPCS. X=	2
MTG.HLS.:	F= *	SPC.C.C.: Y=	9 3/8
MTG.HOLE:	G= *	CTR. SPC. Z=	20
MTG.HOLE:	J= *	O.A.WIDE: AA=	52
MTG.HLS.:	K= *	O.A.HIGH: BB=	140
MTG.HLS.:	N= *	BTM.JB.EXT: EE=	—
MTG.HLS.:	O= *	MAX.PROJ: FF=	8 *
AXLE EXT.R=	2 1/4	TOP.JB.EXT GG=	—
AXLE EXT.S=	4	SPRING C/C HH=	11 1/2
AXLE EXT.T=	—	MAX.PROJ: KK=	15/8
ACT. EXT. U=	10	AXLE DIA.	1 1/4
SPR SHFT EXT: P=	12	BLDS/PANEL	6
BLD. W.: V=	9 7/8		

TUBE SIZE 1 1/2 x 1 1/2 x 11 GA.

*- REF DWG. NO. B0278-030-001

B	ADDED ASTERISK ON 'FF' DIM.	10-16-85	WJB	EK
A	REV. 'FF' DIM.	12-7-84	WJB	EK
	REVISION	DATE	BY	APPD. BY

AMERICAN WARMING AND VENTILATING INC.
1710 INDIAN WOOD CIRCLE MAUMEE, OHIO

NBD-71 TORNADO INTAKE DAMPER SCHEDULE

CKD. BY:	DATE: 12/2/84	APPD. BY:	DATE: 12/7/84
DRN. BY R.C.C.	DWG. NO. B0278-030-401		REV. B
DATE 6-29-84			

SOTXNB.D71

DATE	S.O. PARTS	PLT	ECNS
12-7-84	250	WJB	1746
10-11-84	250	WJB	—

FOR A.W.V. USE ONLY

FOR REFERENCE ONLY. Current Revisions of drawings / documents are maintained in document control. SEE:
4168-00215 Unit 1
Unit 2

466