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STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
VAN BRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
KNIGHTON,G. Licensing Branch 3

SUBJECT: Forwards revised responses to remaining fire protection open items identified during 830803 meeting in Bethesda,MD. Reinforced concrete floors & roof of diesel generator bldg self supporting.

DISTRIBUTION CODE: B002S COPIES RECEIVED:LTR 1 ENCL 40 SIZE: 36
TITLE: Licensing Submittal: Fire Protection

NOTES:Standardized plant. 05000528
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Model Railroad Club Meeting Minutes (draft)

Date: Tuesday, 14 March 1978, 7:30 p.m.
Place: Basement workshop, Elmwood Community Center

Present: J. Alvarez, B. Chen, D. Okafor, M. Petrov, S. Whitaker, R. Yamada (6 of 9 members)

Absent: T. Brennan (work), L. Fitzgerald (family), K. Nguyen (vacation)

Guests: 2 prospective members (Alvarez's nephew and neighbor)

Meeting called to order at 7:42 p.m. by President Whitaker.

Minutes of the February meeting approved as read.

Treasurer's report: balance $312.40; dues collected from 6 members; no expenses.

Old business:

- Layout expansion: Okafor reported the new 4' x 8' section is framed and wired; track laying scheduled for the March 28 session.
- Insurance: Petrov will call the agent Monday and report back.
- Open house: tentatively set for the first Saturday in May; Chen to draft a flyer.

New business:

- Motion by Alvarez, seconded by Yamada, to purchase a DCC command station; carried 5–0–1.
- Discussion of a summer operating session; Whitaker to poll members.

Next meeting: Tuesday, 11 April 1978, 7:30 p.m.

Adjourned at 9:05 p.m.

Respectfully submitted,
R. Yamada, Secretary

Fire Protection Contractors Association — Local 12 — Minutes of Regular Meeting

Date: Thursday, 9 November 1978 — Time: 7:30 p.m.

Location: Association Hall, 1420 Industrial Parkway, Suite 200

Members present: 23 of 31 active members

Members absent: 8 (3 excused, 5 unexcused)

Guests: 2 (Inspector Ramon Delgado, City Fire Marshal's Office; Ms. Patricia Holloway, Holloway Sprinkler Co.)

Meeting called to order at 7:42 p.m. by President Thomas Kirkwood.

Minutes of the October 12 meeting approved as read.

Treasurer's report: balance $4,318.60; dues collected from 29 members; expenses $612.00 (hall rental, newsletter printing).

Old business:

- Apprenticeship program: Committee chair Dana Whitfield reported 6 applications received; interviews scheduled for November 20.
- Annual dinner: set for December 14 at the Riverside Banquet Hall; cost $35 per person.

New business:

- Motion by Kirkwood, seconded by Alvarez, to oppose proposed amendment to the state building code that would exempt residential sprinkler systems in buildings under 4,000 sq. ft.; carried 21–1–1.
- Discussion of a joint training session with the Metro Fire Protection Association; Whitfield to contact their secretary.

Next meeting: Thursday, 14 December 1978, 7:30 p.m.

Adjourned at 9:05 p.m.

Respectfully submitted,
Sarah Mendoza, Recording Secretary

Item	Qty	Unit	Price	Total
Widget, standard	12	each	4.50	54.00
Gasket, rubber	2	box	7.25	14.50
Bolt, hex 1/4"	100	each	0.08	8.00
Nut, hex 1/4"	100	each	0.05	5.00
Washer, flat	200	each	0.02	4.00
Lubricant, spray	1	can	3.99	3.99
Rag, shop	1	lb	2.00	2.00
Solvent, cleaning	1	gal	11.50	11.50
Filter, oil	3	each	6.75	20.25
Hose, coolant	4	ft	1.10	4.40
Clamp, hose	8	each	0.60	4.80
Sealant, pipe	1	tube	5.25	5.25
Tape, thread	2	roll	0.99	1.98
Wrench, adjustable	1	each	18.00	18.00
Socket set, 1/2" drive	1	each	24.50	24.50
Torque wrench	1	each	32.00	32.00
Gauge, pressure	1	each	15.75	15.75
Thermometer, infrared	1	each	22.00	22.00
Multimeter	1	each	35.00	35.00
Battery, 9V	4	each	2.50	10.00
Charger, battery	1	each	19.95	19.95
Cable, jumper	2	each	6.00	12.00
Relay, 12V	5	each	3.25	16.25
Fuse, assorted	20	each	0.50	10.00
Switch, toggle	6	each	2.75	16.50
Light, indicator	6	each	1.80	10.80
Terminal, ring	12	each	0.40	4.80
Wire, 14 AWG	25	ft	0.35	8.75
Wire, 18 AWG	50	ft	0.18	9.00
Connector, plug	4	each	1.95	7.80
Connector, socket	4	each	1.95	7.80
Adapter, 110V	1	each	8.50	8.50
Extension cord, 25 ft	1	each	14.99	14.99
Power strip, 6 outlet	1	each	12.99	12.99
Timer, mechanical	1	each	9.95	9.95
Thermostat	1	each	16.50	16.50
Humidistat	1	each	21.00	21.00
Fan, exhaust	1	each	38.00	38.00
Heater, space	1	each	45.00	45.00
Insulation, foam board	4	sheet	6.25	25.00
Weatherstripping	1	roll	4.75	4.75
Caulk, silicone	2	tube	3.49	6.98
Paint, primer	1	gal	18.00	18.00
Paint, finish	1	gal	22.00	22.00
Brush, 2 inch	2	each	3.50	7.00
Roller, 9 inch	2	each	4.25	8.50
Tray, paint	2	each	2.00	4.00
Sandpaper, assorted	1	pack	5.99	5.99
Steel wool	1	pack	3.25	3.25
Drop cloth	1	each	7.50	7.50
Ladder, 6 ft	1	each	89.00	89.00
Step stool	1	each	34.00	34.00
Safety glasses	4	each	2.99	11.96
Gloves, work	4	pair	3.50	14.00
Hard hat	2	each	12.00	24.00
First aid kit	1	each	19.95	19.95
Fire extinguisher	1	each	42.00	42.00
Smoke detector	2	each	11.50	23.00
Carbon monoxide detector	1	each	29.00	29.00
Flashlight	2	each	8.75	17.50
Lantern	1	each	24.00	24.00
Battery, D cell	8	each	1.25	10.00
Radio, portable	1	each	39.95	39.95
Antenna, whip	1	each	14.00	14.00
Coax cable, 50 ft	1	each	22.50	22.50
Connector, BNC	4	each	2.25	9.00
Grounding rod	1	each	11.00	11.00
Clamp, ground	2	each	3.75	7.50
Wire, ground 6 AWG	20	ft	0.95	19.00
Meter, SWR	1	each	65.00	65.00
Key, telegraph	1	each	48.00	48.00
Headphones	1	each	27.50	27.50
Microphone	1	each	31.00	31.00
Speaker, external	1	each	18.75	18.75
Amplifier, audio	1	each	54.00	54.00
Mixer, 4 channel	1	each	72.00	72.00
Cable, audio 6 ft	4	each	3.50	14.00
Plug, 1/4 inch	4	each	1.10	4.40
Jack, 1/4 inch	4	each	1.10	4.40
Soldering iron	1	each	28.00	28.00
Solder, 60/40	1	roll	6.50	6.50
Flux, paste	1	each	4.25	4.25
Desoldering pump	1	each	9.00	9.00
Vise, bench	1	each	42.00	42.00
Clamp, C	2	each	5.50	11.00
Drill, hand	1	each	36.00	36.00
Bit, drill 1/4 inch	1	each	3.25	3.25
Bit, drill 1/2 inch	1	each	5.75	5.75
Hammer, claw	1	each	14.00	14.00
Screwdriver, Phillips	2	each	4.50	9.00
Screwdriver, flat	2	each	4.50	9.00
Pliers, needle nose	1	each	11.00	11.00
Pliers, lineman	1	each	16.00	16.00
Wire cutters	1	each	13.00	13.00
Wire stripper	1	each	15.00	15.00
Crimper, terminal	1	each	22.00	22.00
Tape measure, 25 ft	1	each	8.00	8.00
Level, 24 inch	1	each	19.00	19.00
Square, framing	1	each	12.00	12.00
Chalk line	1	each	6.00	6.00
Pencil, carpenter	6	each	0.50	3.00
Marker, permanent	2	each	1.25	2.50
Notebook	1	each	3.00	3.00
Pen, ballpoint	4	each	0.75	3.00
Calculator	1	each	14.00	14.00
Clock, wall	1	each	16.00	16.00
Calendar	1	each	5.00	5.00
Mug, coffee	2	each	4.00	8.00
Coffee, ground	1	lb	7.50	7.50
Filters, coffee	1	pack	2.99	2.99
Sugar	1	lb	1.50	1.50
Creamer, powdered	1	jar	3.25	3.25
Cups, paper	1	pack	4.00	4.00
Napkins	1	pack	2.50	2.50
Plates, paper	1	pack	3.00	3.00
Forks, plastic	1	pack	2.00	2.00
Knives, plastic	1	pack	2.00	2.00
Spoons, plastic	1	pack	2.00	2.00
Trash bags	1	box	6.00	6.00
Paper towels	2	roll	1.99	3.98
Soap, hand	1	bottle	3.50	3.50
Cleaner, all purpose	1	bottle	4.25	4.25
Sponge	2	each	0.99	1.98
Broom	1	each	12.00	12.00
Dustpan	1	each	6.00	6.00
Mop	1	each	14.00	14.00
Bucket	1	each	8.00	8.00
Vacuum, shop	1	each	89.00	89.00
Air compressor	1	each	249.00	249.00
Hose, air 25 ft	1	each	19.00	19.00
Coupler, air	2	each	4.50	9.00
Nozzle, air	1	each	3.75	3.75
Blower, leaf	1	each	79.00	79.00
Rake	1	each	11.00	11.00
Shovel	1	each	13.00	13.00
Hoe	1	each	12.00	12.00
Pruning shears	1	each	16.00	16.00
Hedge trimmer	1	each	49.00	49.00
Lawn mower	1	each	199.00	199.00
Trimmer, string	1	each	59.00	59.00
Edger	1	each	69.00	69.00
Wheelbarrow	1	each	45.00	45.00
Cart, utility	1	each	32.00	32.00
Tarp	1	each	9.00	9.00
Rope, nylon 50 ft	1	each	12.00	12.00
Bungee cords	1	pack	6.00	6.00
Lock, padlock	2	each	8.00	16.00
Key, duplicate	2	each	2.00	4.00
Chain, security	1	each	14.00	14.00
Cable, security	1	each	11.00	11.00
Camera, digital	1	each	149.00	149.00
Memory card, 32 GB	1	each	12.00	12.00
Battery, camera	2	each	9.00	18.00
Charger, camera	1	each	14.00	14.00
Tripod	1	each	24.00	24.00
Case, camera	1	each	18.00	18.00
Lens cleaning kit	1	each	7.50	7.50
Binoculars	1	each	59.00	59.00
Compass	1	each	9.00	9.00
Map, local	1	each	6.00	6.00
Guidebook	1	each	14.00	14.00
Backpack	1	each	39.00	39.00
Water bottle	2	each	5.00	10.00
Canteen	1	each	8.00	8.00
Cup, camping	2	each	3.00	6.00
Bowl, camping	2	each	3.00	6.00		

Arizona Public Service Company
P.O. BOX 21666 • PHOENIX, ARIZONA 85036

December 1, 1983
ANPP-28331 - WFQ/JYM

Director of Nuclear Reactor Regulation
Attention: Mr. George Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN-50-528/529/530
File: 83-056-026; G.1.01.10

References: (A) Letter from E. E. Van Brunt, Jr., APS, to G. W. Knighton, NRC, ANPP-27924, dated September 29, 1983, Subject: PVNGS Units 1, 2 and 3.
(B) Letter from E. E. Van Brunt, Jr., APS, to G. W. Knighton, NRC, ANPP-24091, dated June 15, 1983, Subject: PVNGS Units 1, 2 and 3.
(C) Letter from G. W. Knighton, NRC, to E. E. Van Brunt, Jr., APS, dated April 11, 1983, Subject: Summary of Fire Protection Program Site Audit.

Dear Mr. Knighton:

Attached are the revised responses to the remaining outstanding fire protection open items.

The attachment and Reference (A) provide the responses to the additional questions which resulted during the review of Reference (B). The additional questions were identified at an August 3, 1983 meeting in Bethesda, Maryland.

Our response to Reference (C) has now been completed.

Please contact me if you have any further questions.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President
Nuclear Projects Management
ANPP Project Director

8312050536 831201
PDR ADOCK 05000528
F PDR

EEVB/JYM/sp
Attachment

cc: E. A. Licitra (w/a) D. Kubicki (w/a) A. C. Gehr (w/a)

B002
1/40

December 1, 1983
ANPP-28331 - WFQ/JYM

bcc: A. C. Rogers (w/a)
W. F. Quinn "
T. F. Quan "
K. E. Jones "
D. Neal (2350) "
D. Canady "
G. C. Andognini "
K. W. Gross "
S. R. Frost "
D. B. Fasnacht "
J. R. Bynum "
T. G. Woods "
B. Fernow "
B. Meyer "
J. Smith "
W. H. Wilson "
W. G. Bingham
D. Keith
S. Shepherd "
N. Baldasari "
S. J. Grier " (Trlr 5A PV)
C. R. Dunaway "
O. Zeringue "

December 1, 1983
ANPP-28331 - WFQ/JYM

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President, Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt, Jr.

Sworn to before me this 1st day of December, 1983.

Notary Public

My Commission Expires:

My Commission Expires April 6, 1987

VERIFICATION THAT INSTALLED FIRE
PROTECTION PLANT FEATURES SATISFY
PREVIOUS COMMITMENTS

Question 1:

Verify that doors in fire rated walls and partitions are listed for use in that type of wall or partition.

Response:

All fire doors are, or will be, labeled fire doors of the fire rating required for the wall rating, (i.e., 3 hour wall: A label, 3 hour door; 2 hour wall: B label, 1-1/2 hour door; 1 hour wall: C label, 3/4 hour door) with the exception of doors that have removable transoms and/or have both louver and glass view plates. The exceptions have been certified by the manufacturer (a) to be of UL or FM construction (but without label) offering the corresponding fire rating protection. These doors are listed in the accompanying table:

FIRE ZONE	DOOR #	WALL RATING	DOOR RATING	REMARKS
28	F105	2 HR	B	WG&L
29	F201	2 HR	B	WG&L
42D/42A	A102	2 HR	B	RT
42D	A104	2 HR	B	RT/WG&L
42A/42D	A110	2 HR	B	RT
42B/42C	A118	2 HR	B	RT
52A/47A	A201	2 HR	B	RT
(b) 48	A204	3 HR	-	RT
54/52D	A213	2 HR	B	RT
47B/52D	A216	2 HR	B	RT
55	A302	1 HR	C	WG&L
57A	A317	1 HR	C	WG&L
57G	A320	1 HR	C	WG&L
HP Office	A323	1 HR	C	WG&L
57A/57	A327	1 HR	C	WG&L
MEN'S LKR	A335	1 HR	C	WG&L
(c) 74	C111	-	-	-
59/62	R107	2 HR	B	WG&L
61A	R121	2 HR	B	WG&L

where RT = removable transom
WG&L = wire glass and louver (series S6)

Notes:

(a) Fenestra letter, September 13, 1983, certifies that the series S6 doors (WG&L) supplied are made with construction, material and workmanship approved by UL for classification as 1-1/2 hour (B label) or 3/4 hour (C label) labeled doors. (See attachment 1)

(b) Door # A204 is not certified or labeled for 3 hours but is a hollow metal door constructed to general 3 hour fire door standards. This door opening is in a concrete wall separating the Auxiliary Building, Zone 48, from the Radwaste Building, Zone 61C. The combustible loading in

Zone 48 is 3 mintues, consisting of cable insulation, and Zone 61C is listed as "none" because there are essentially no combustibles in this zone. There is a monorail passing through the upper transom door, and there is a removable piece in the monorail to allow the double swinging transom door to close when the rail is not in use. There is no redundant safe shutdown equipment in either zone, and these areas are open and readily accessible for manual fire fighting. Automatic sprinklers will also be added above both sides of the door to prevent any possibility of fire passing from one zone to the other when the monorail is in use.. This modification will be completed prior to fuel load.

(c) The central wall in the MSSS was incorrectly shown in the FPER as a 3 hour fire wall. Figures 24, 25 and 26 are common fire zones (Zone 74). Door C111 is a non-rated door. FPER figures 24, 25 and 26 will be revised in the next amendment. This change has no significance on separation of redundant safe shutdown equipment.

Question 2:

Verify that the lack of structural steel fire proofing will not cause structural collapse during a postulated fire in the following plant areas:

a. Floors and roof of Diesel Generator Building

b. Elevation 140 feet in the Main Steam Support Structure

c. Auxiliary Building Zones: 42A & 42B
47A & 47B
55 & 56B

Response:

a. The reinforced concrete floors and roof of the Diesel Generator Building are self supporting. Other structural steel material is not required.

b. The Main Steam Support Structure (MSSS) is provided with water suppression on all levels. Even an exposure fire cannot reach the roof support columns and/or structural beams. This structure is also open to the atmosphere at the roof line providing natural heat ventilation. Additionally, water spray from the spray nozzles for elevation 140 ft. area arranged such that the columns and beams will be sprayed. These features will ensure that the structural steel will not collapse.

c. The structural steel in Zones 42 A & B and 47 A & B is now protected with cable tray and column sprinklers. Area sprinkler protection will be added prior to fuel load. These systems will be modified to preaction with activation by smoke detection or heat sensed by the cable tray protectowire system, which gives early warning to the control room. The preaction valves are located in a relatively clean area. They will be inspected monthly and trip tested periodically in accordance with the Technical Specification requirements to assure reliability. Even without active automatic suppression, the equivalent fire severity is approximately 30 minutes consisting of fire resistant cable jacketing. These zones are readily accessible for manual fire fighting and have a hose station located just outside the door. The structural members are also very heavy steel beams and columns and are not easily deformed within the parameters of a design basis fire in these zones. The above will prevent structural collapse during a postulated fire in these zones.

Columns in Zones 55 and 56B have adequate protection from the wet pipe water suppression system installed.

(FPER Figures 15 and 16 will be revised in the next amendment).

Question 3:

Verify that the fire dampers installed in the plant are listed for the following uses:

a. Grouped dampers at floor/wall penetrations

b. Single dampers at 3 hour fire rated wall/floor penetrations

c. Dampers in drywall and metal lath and plaster partitions

Response:

a. The design for ganged fire dampers was tested by Waldinger. (See Attachment 2 for test synopsis).

b. Single dampers at 3 hour rated wall/floor penetrations are rated for 3 hours. Those dampers presently labeled with 1-1/2 hour ratings are constructed to 3 hour standards. The labels will be upgraded to 3 hour ratings prior to fuel load.

c. Dampers installed in drywall and metal lath and plaster partitions will be rated for the rating of the partition, e.g., a 1-1/2 hour damper is installed in a 2 hour partition. Waldinger drawing and field installation procedures (see Attachment 3 and 4) indicate that to provide adequate fire seals, gaps which exceed 1/2 inch will be filled with Carborundum fiberfrax durablanket (6 lbs density). When small void areas do not allow the use of fiberfrax durablanket, fiberfrax bulk may be used to fill the void area by tamping full. The fiberfrax material is UL approved. Ruskins installation instructions comply with UL Safety Standards 555 (see Attachment 5).

In the actual installation of the dampers in the drywall and the metal lath and plaster partitions, the dampers are installed in the ductwork first, then the studwalls are built around the duct/dampers. (See Attachment 6 for which typical cross-sections of duct penetrations through the studwalls, including the structural independence of the dampers and the studwalls.) The installation of the damper is in accordance with the field procedures and installation instructions, as for any masonry wall. However, since the size of the openings is tailored for the damper, fiberfrax insulation material is not required. (See Attachment 4, Section 6.2.2(1)(a) for installation details). The first HVAC support on either side of the partition will be coated with fire retardant material (e.g. Thermalag) of a rating equal to that of the partition, prior to fuel load. (Also see response to Question 4).

Question 4:

Verify that drywall and hollow concrete block partitions are 3-hour fire rated.

Response:

The noted partitions are 3-hour fire rated because:

(1) Block Walls

- Designed per UBC-1973 (Table 43B[a] item #27 through 30). The walls are fully grouted and reinforced throughout.

- Penetrations for conduit piping and cable trays are sealed in the same manner and with the same materials as those used for concrete walls.

- UL-rated fire dampers are installed in an approved design wherever HVAC ducting penetrates the barrier. (See response to Question 3c).

(2) Drywall/Metal Lath and Plaster (ML&P) Partitions

- Designed per UBC-1973 (Table 43B[a] item #61)

Notes:

(a) All existing joints on the fire wall between the Remote Shutdown Panels will be removed and replaced with approved No. 15 closed joints.

(b) Several ML&P walls are reclassified as 1-hour fire barriers. Other ML&P walls are reclassified as "non-rated" where separation of safe shutdown equipment is not a factor. (FPER Figures 2, 3, 4, 5, 13, 15, 16 and 17 will be revised in the next amendment.)

(c) The acceptance criteria (UBC Section 43.114) for the testing performed for non-bearing walls and partitions are as follows:

1. The wall or partition shall have withstood the fire-endurance test without passage of flame or gases hot enough to ignite cotton waste, for a period equal to that for which classification is desired.

2. The wall or partition shall have withstood the fire and hose stream test as specified in Section 43.108, without passage of flame, of gases hot

a. Testing for UBC fire ratings was performed in accordance with ASTM Standard E119 (equivalent to UL 263 "Fire Tests of Building Construction Materials") as noted in UBC Standard No. 43-1.

enough to ignite cotton waste, or of the hose stream. The assembly shall be considered to have failed the hose stream test if an opening develops that permits a projection of water from the stream beyond the unexposed surface during the time of the hose stream test.

3. Transmission of heat through the wall or partition during the fire-endurance test shall not have been such as to raise the temperature or its unexposed surface more than 250°F above the initial temperature.

- Conduit penetration seals are installed in a metal retaining sleeve as shown in ICMS Drawing No. M-01-90 Specification No. AM-208. (This design has been approved with a 3-hour rating by ANI for use in ML&P walls). The acceptance criteria (per ANI/MAERP Standard Method of Fire Tests of Cable and Pipe Penetration Fire Stops), for the testing performed for penetration seals are as follows:

  1. Fire shall not propagate to the unexposed side of the test assembly nor shall any visible flaming be observed.

  2. No individual thermocouple of the unexposed surface of the fire stop shall exceed 325°F above ambient temperature.

  3. No opening develops that permits a projection of water from the stream beyond the unexposed surface during the hose stream test.

- There are no cable trays which pass through 3-hour rated ML&P walls

- UL-rated fire dampers are installed in an approved design wherever HVAC ducting penetrates the barrier.

Question 5:

Verify that cable tray penetration seals will not fail upon tray collapse.

Response:

The as-built cable tray configurations are supported at varying distances from the fire barrier. The cable trays used at PVNGS are generally 4 inches deep and 24 inches wide, "trough" type trays of 14 gauge sheet steel manufactured by U. S. Gypsum/Globe. The hangers are Unistrut channels (generally P1000 and P1001) or equivalent formed from 12-gauge strip steel. The trays are nominally loaded to 45 percent fill. The trays are clamped to the supports. These features are typical of current designs within the industry.

On PVNGS, when the first support for a cable tray penetrating a fire-rated wall is at a distance in excess of 24 inches from the face of the wall, APS commits to wrap the support with a fire retardant material (e.g., Thermolag to establish a fire rating for the support equivalent to that of the fire wall. (This position has been previously accepted by the NRC on other NTOL plants.)

For PVNGS, this modification will be implemented prior to fuel load of each unit.

Question 13:

The fire wall in the control room complex is not continuous.

Response:

The fire walls in the control room complex are not continuous. The walls near the Shift Supervisor's office, kitchen and lavatory will be reclassified as "non-rated". (See response to Question 4 (2)(b).)

Question 25:

In Amendment 3 to the Fire Protection Evaluation, the applicant proposed to utilize administrative controls to prevent fire damage to redundant shutdown division inside containment.

Adminstrative controls alone are insufficient to justify an exemption from the Appendix R requirements for protection of redundant safe shutdown systems in containment. The applicant should provide the technical requirements in section III.G.2 for inside containment to provide reasonable assurance that one train of equipment will be free of fire damage.

Response:

APS has reviewed the separation of safe shutdown components within containment. Safe shutdown trains are 100% redundant. Fire protection is based primarily on adequate separation between redundant equipment. Administrative controls for transient combustibles, however effective, are not assumed to eliminate the possibility of all postulated fire.

With the current design (backfit to provide a radiant energy shield [a] for the train "A" pressurizer auxiliary spray circuitry from the train B circuitry) PVNGS meets 10CFR50, Appendix R Section III.G.2 separation criteria with the exception that there are some intervening combustibles consisting of insulated cable. The cable is IEEE-383 qualified and has also been subjected to a 210,000 BTU/HR flame test at the Underwriters Laboratories without passage of flame of 8 feet in a vertical tray. (Tests conducted by Electric Power Research Institute indicate that flame spread in a horizontal tray would be less than in a vertical tray). Vertical cable trays exist within containment but they do not transit between redundant safe shutdown trains. The minimum horizontal cable tray distance for a fire to spread between redundant trains is 50 feet, as in the pressurizer auxiliary spray circuitry. In this case, it is a stack of two trays. Table 1 itemizes the extent of horizontal cable tray lengths between trains.

Also the containment building height will dissipate heat from any fire exposing the cable trays as opposed to fire in a confined space or small room, thus further reducing the potential for flame spread.

---

a) The radiant energy shield for the train "A" pressurizer auxiliary spray circuitry will consist of metallic reflectorized insulation (as used around steam lines) for solenoid valves and thermolag insulation around cables or conduit, to provide separation for at least 20 ft. Beyond the thermolag section, the train "A" conduit is located such that the concrete pressurizer shield walls provide additional radiant shielding between the two trains.

Question 25:
(cont.)

APS requests approval for deviation from the technical provisions of Appendix A of BTP APCSB 9.5-1 and from Appendix R Section III.G.2 of 10CFR50 for the intervening combustibles listed in table 1 because:

1. The cable is limited in quantity.

2. The cable is fire resistant and demonstrates minimal flame spread.

3. The minimum separation between trains is well in excess of the required 20 feet, and ranges from 50 feet to 166 feet.

4. The space is not confined, thus allowing heat to dissipate.

For these reasons a postulated fire will not affect both redundant safe shutdown trains.

Table 1

SAFE SHUTDOWN FUNCTION	FIRE TRACK BETWEEN REDUNDANT TRAINS (HORIZONTAL DISTANCE IN FT.)	QUANTITY OF INTERVENING COMBUSTIBLE MATERIAL
Pressurizer Pressure Pressurizer Level	67	1 tray stack with 5 trays
Shutdown Cooling Isolation	80	1 tray stack with 2 trays
RCS Hot Leg and Cold Leg Temperature	166	1 tray stack with 4 trays
Steam Generator Pressure Steam Generator Level	140 (b)	1 tray stack with 2 trays
Pressurizer Auxiliary Spray	50	1 tray stack with 2 trays

(b) Only one steam generator is required to achieve shutdown.

ATTACHMENT 1

FENESTRA
FENESTRA CORPORATION
4040 West 20th Street. P.O. Box 8189. Erie. PA 16505 814 / 838-2001 Telex 91-4486

September 13, 1983

BECHTEL POWER CORPORATION
12400 East Imperial Highway
Norwalk, California

ATTENTION: Mr. W.G. Bingham

RE: Arizona Nuclear Power Project
Bechtel Job 10407
Fenestra Job #: 49-5767
Project #82-U395
File: AM-070

Dear Mr. Bingham:

This letter certifies that the S6 Series doors, the frames and the transom panels, as supplied by Fenestra Corporation to the Palo Verde Nuclear Generating Station (PVNGS) under Specification 13-AM-070 for the doors listed below manufactured in accordance with the construction, materials and workmanship approved by Underwriters Laboratories (UL) or Factory Mutual (FM) for a classification as either 1½ hour (B) or 3/4 hour (C) label.

Because of the special operational and access requirements, along with the ventilation considerations needed for this project, these assemblies included doors, removeable transoms, frames and/or vision lights and louvers, all of which exceeded listed sizes. The resultant designs fail to qualify for the FM and UL Fire Rating Label. However, the component materials manufactured by the Fenestra Corporation, which are used in these door assemblies, do meet the UL or FM construction requirements for the equivalent fire rating as certified above, provided that the installation is in accordance with the requirements of NFPA 80, Standards For Fire Doors and Windows, as applicable to Hollow Metal Doors, Frames and Hardware.

The affected door assemblies and corresponding equivalent fire ratings are as follows:

DOOR NUMBER	EQUIVALENT FIRE RATING (HRS)
A102	1-1/2
A104	1-1/2
A110	1-1/2
A118	1-1/2
A201	1-1/2
A204	1-1/2
A213	1-1/2
A216	1-1/2
A302	3/4
A317	3/4

continued . . .

DOOR NUMBER	EQUIVALENT FIRE RATING (HRS)
A320	3/4
A323	3/4
A327	3/4
A335	3/4
C111	1-1/2
F105	1-1/2
F201	1-1/2
R107	1-1/2
R121	1-1/2
J143	1-1/2

Sincerely,

FENESTRA CORPORATION

Albert J. Urbaniak
Manager Research & Development

AJU/cy

cc: T. Kitcey

Sworn and subscribed to before me this 14th day of Sept. 1983.

Notary Public
Millcreek Twp., Erie County, Penna.
My Commission Expires June 29, 1985

DAMPER INSTALLATIONS:

The six openings in the test wall, numbered as shown on ILL. 1, were protected by the fire damper installations described below.

Detail 1 - This fire damper installation is intended for mounting in the horizontal position. It consisted of two dampers, a multiple assembly shown on ILL. 6 and a single section damper shown on ILL. 7, each encased in a 10 gauge channel shaped enclosure with 3/4 in. standing legs and a 14 gauge sleeve shaped as shown. A 14 gauge enclosure formed from angles was welded to each end of the sleeve. The single sections of the multiple assembly closed toward the center of the assembly. The single damper was mounted so that the blade package closed down.

The dampers' 14 gauge enclosures were bolted to the structural steel framework on the floor of the construction area. The multiple damper was bolted on all four sides to the framework; the single damper was bolted on two sides (top and bottom) only. The bolts were 7/16-16 x 2 hex cap screws (grade 5 NC) with two 1/16 in. thick flat washers and nut. One bolt was located at each corner of the dampers, with intermediate bolts spaced at 13 to 13-1/2 in. OC.

The assembly, dampers and framework, was hoisted up and positioned in the wall opening as shown on ILLS. 21 and 22. The four pads of the framework were continuously welded to the steel test frame as shown on ILL. 5. With the dampers positioned in the opening as shown on ILL. 21, the clearances between damper sleeves and wall were 6 to 6-1/2 in. at the top and sides and 13 in. at the bottom, and the clearance between dampers was 6-1/2 to 7 in.

Ceramic fiber insulation was layered in the opening to completely fill the clearances noted above. The insulation was placed as shown on ILLS. 9, 24, and 25. "Fiberfrax" Durablanket insulation, having a 6 pcf density and 1 in. thickness, manufactured by the Carborundum Company was used.

14 gauge steel flashing was then installed on both sides of the opening to protect the clearances, as shown on ILL. 8. The flashing was formed as shown on ILLS. 19, 20, and 20A. No. 10 by 1-1/4 Tek screws spaced at 6 in. centers and 1 to 3 in. from corners of dampers were used to attach flashing to sleeve. The flashing on both sides of the wall was interconnected by 14 gauge by 2 in. wide flashing straps spaced at 12 to 14 in. centers as shown on ILL. 8. The overlap of flashing to flashing between dampers was 2 in. The overlap of flashing to wall was 2 in.

Details 2 and 3 - These two fire damper installations were identical, one mounted with the upstream face toward the fire and the other with the downstream face toward the fire. Each installation consisted of a single section fire damper shown on ILL. 10, encased in a 10 gauge channel shaped enclosure with 3/4 in. standing legs and a 14 gauge sleeve shaped as shown. A 14 gauge collar formed from angles as shown was welded to each end of the sleeve.

The damper was positioned in the wall opening as shown on ILL. 23, resting on two 6 in. wide supports running the entire wall thickness. The supports consisted of six layers of 1 in. thick "Duraboard", manufactured by the Carborundum Company, glued together with "Fiberfrax Coating Cement", also manufactured by the Carborundum Company. The supports were not attached to the wall or damper sleeve. A 6 in. clearance existed between damper sleeve and wall on all four sides.

"Fiberfrax" Durablanket ceramic fiber insulation (6 pcf density, 1 in. thickness) manufactured by the Carborundum Company was placed to completely fill the clearance between damper sleeve and wall as shown on ILLS. 9, 11 and 12.

One side of the opening was protected with 14 gauge flashing as shown on ILLS. 11 and 12. The flashing was secured in position by 14 gauge clips anchored into the masonry wall, and No. 10 by 1-1/4 Tek screws fastened to the damper sleeve. The Tek screws attaching flashing to sleeve were located on all four sides and spaced at 6 in. centers, 1 in. maximum from corners of damper. The 14 gauge clips were anchored into the wall with 1/2 by 4 Kwik bolts and flat washers spaced at 12 in. centers and 1 to 6-1/2 in. from ends of flashing. The 1-1/2 in. legs of the clips overlapped the flashing by 1 in., thereby allowing 1/2 in. of expansion clearance for the flashing, as shown on ILLS. 11 and 12.

Detail 2 was installed with the flashing on the nonfire side, and the insulation exposed on the fire side, as shown on ILL. 11. Detail 3 was installed in reverse, with the flashing on the fire side, as shown on ILL. 12.

Detail 4 - This fire damper installation consisted of a single section damper free floating within the wall opening, which was lined with 1/4 in. steel plate as described under the preceding section "Wall Construction", and retained in position by angles located within the opening on both faces.

The fire damper shown on ILL. 13 was encased in a 10 gauge channel shaped enclosure having 3/4 in. standing legs. It was positioned in the opening as shown on ILL. 14 to provide an expansion clearance between damper and 1/4 in. plate of 3/8 to 1/2 in. at sides and 7/8 in. at top. The angles retaining the damper in position were 1-1/2 by 1-1/2 by 1/8 in. thick; they were located on both sides of the damper, within the wall opening, and welded to the 1/4 in. steel plate at 6 in. centers as shown on ILL. 14. The bearing of retaining angles to the standing legs of the damper's 14 gauge enclosure was approximately 5/8 in. at top and 3/4 in. at sides.

Detail 5 - This fire damper installation is intended for horizontal mounting. It consisted of one single section damper, shown on ILL. 15, encased in a 10 gauge channel shaped enclosure with 3/4 in. standing legs and a 14 gauge sleeve shaped as shown. Both ends of the sleeve were provided with a 14 gauge enclosure formed from 2 by 2 by 1/4 in. angles. The damper was mounted so that the blade package closed down.

The damper's 14 gauge enclosure was bolted to the structural steel framework on the top and bottom with one bolt in each corner and intermediate bolts spaced at approximately 12-1/2 in. centers. The bolts were 7/16-16 by 2 hex cap screws (grade 5NC) with two flat washers (1/16 in. thick) and nut.

After positioning the damper in the wall opening, clearances between damper sleeve and wall were measured to be 3 in. at the top, bottom, and one side (i.e., right side when viewing from fire side of test wall), and 1-3/4 in. at other side (i.e., left side of opening when viewing from fire side of test wall).

Ceramic fiber insulation was layered in three sides of the opening to completely fill the 3 in. clearances. "Fiberfrax" Durablanket insulation manufactured by the Carborundum Company was used. The 1-3/4 in. clearance at left side was left unfilled.

14 gauge steel flashing was installed on the fire and nonfire sides of the opening to protect the 3 in. clearances between damper sleeve and wall around the three sides of the damper's perimeter, as shown on ILL. 16. The 1-3/4 in. clearance was protected by 14 gauge flashing on the nonfire side only; and a layer of ceramic felt insulation was installed flush against this flashing as shown in Sec. B-B of ILL. 16. No. 10 by 1-1/4 Tek screws spaced at 6 in. centers and 1 to 3 in. from corners of dampers were used to attach flashing to sleeve on the nonfire side. The continuous flashing straps protecting the three 3 in. clearances on the fire side were secured by interlocking with the flashing on the nonfire side as shown on the "Flashing Detail" on ILL. 16. The overlap of flashing to wall on the nonfire side was 2 in.

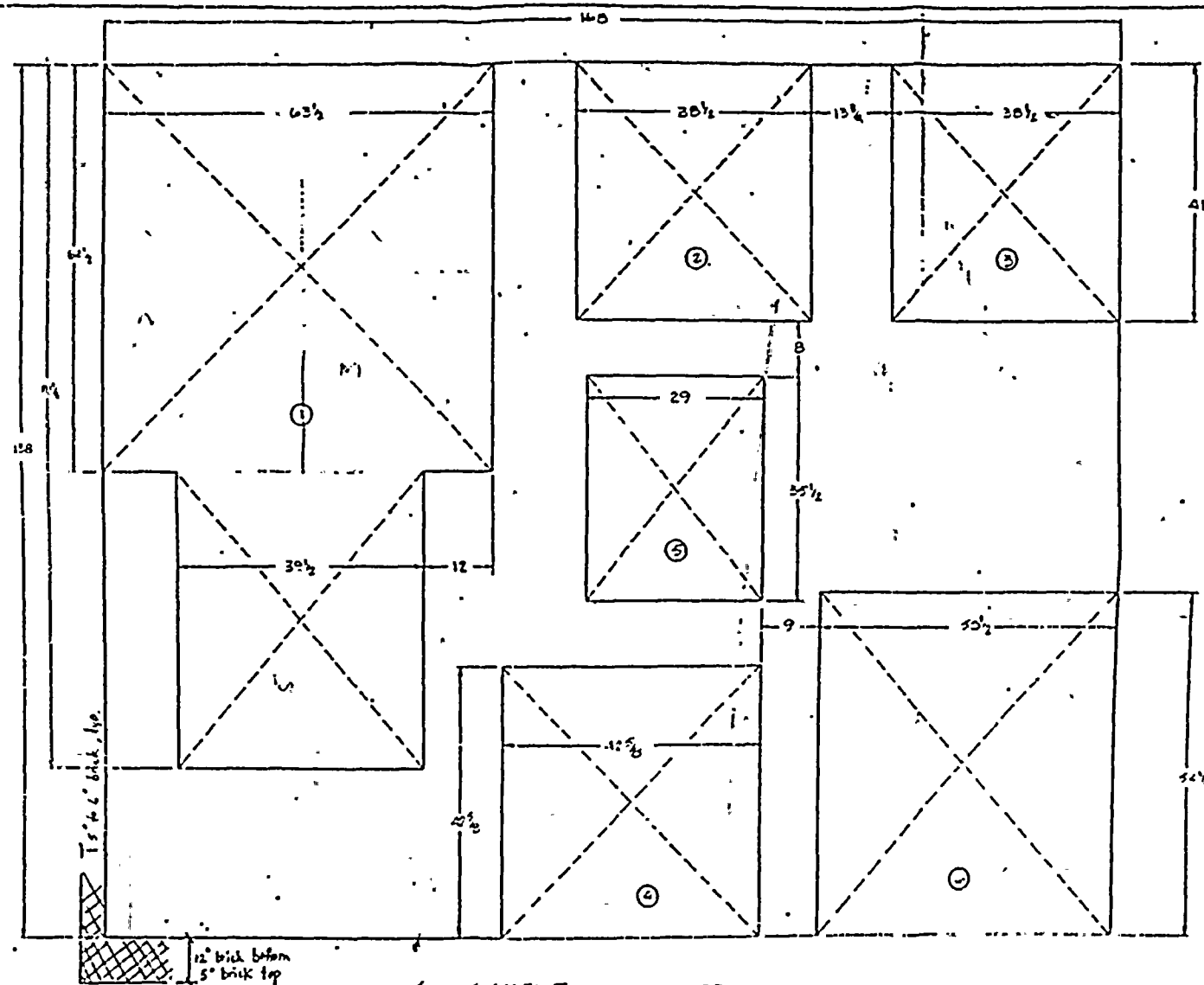
Detail 6 - This fire damper installation consisted of a multiple damper assembly, shown on ILL. 17, encased in a 10 gauge channel shaped enclosure with 3/4 in. standing legs and a 14 gauge steel sleeve formed as shown.

The damper was positioned in the wall opening as shown on ILL. 18, resting on two 6 in. wide supports running the entire wall thickness. These supports consisted of six layers of 1 in. thick "Duraboard", manufactured by the Carborundum Company, glued together with "Fiberfrax Cement Coating", also manufactured by the Carborundum Company. The supports were not attached to the wall or damper sleeve. A 6 in. clearance was provided between the damper sleeve and wall on all four sides.

"Fiberfrax" Durablanket ceramic fiber insulation manufactured by the Carborundum Company was placed to completely fill the clearance between damper sleeve and wall, as shown on ILLS. 9 and 18.

Both sides of the opening were protected with 14 gauge flashing as shown on ILL. 18. The flashing was attached to the damper sleeve with No. 10 x 1-1/4 Tek screws spaced at 6 in. centers and 1 to 3 in. from corners of damper. The flashing overlapped the wall by 1-1/2 in.

MRF:bg



NOTE: ALL OPENINGS TO BE PLUMB & SQUARE. OPENING SURFACES ALONG 12" THICKNESS OF WALL MUST BE FLAT & TRUE.

SEE SK1151 FOR PLATE & GROUTING FOR OPENING ④

STANDARD ENGINEERING TOLERANCES APPLY.

ALL DIM IN INCHES

RUSKIN Mfg Co.

WALL OPENING DETAIL

SK1126

C O N C L U S I O N S

The following conclusions represent the judgement of Underwriters Laboratories Inc. based upon a study and examination of the results presented in this Report as they relate to established principles and previously recorded data.

FIRE RESISTANT PROPERTIES:

It is judged that the alternate installation methods described and tested herein provided resistance to the passage of fire for 3 h and to the effects of a hose stream following fire exposure when subjected to the fire and hose stream test per Standard UL 555.

The installations represented by Details 1 and 5 are judged to be suitable for mounting in the horizontal position with the top side being where attachment to the structural steel framework is made. It is judged that performance of the damper sections in the multiple damper assembly in Detail 1 also justifies suitability of the individual damper in Detail 1 where a through opening developed during the hose stream test, due to the fact that the dampers in the multiple assembly were of the same design and larger than the individual damper..

Opening of the blade package of the fire damper in Detail 3 during the hose stream test was judged to have been caused by the additional forces and stresses placed on the damper by the outward movement and displacement of brick at the top right corner of the masonry test wall on the fire side. Therefore, it is judged that the installation represented by Details 2 and 3 will provide resistance to passage of fire for 3 h and to the effects of a hose stream following fire exposure.

Due to the visible through openings which developed due to slight upward movement of the bottom blades (see ILLS. 47 and 48) in two sections of the multiple damper assembly in Detail 6 during application of the hose stream, the manufacturer resubmitted an identical sample for repeat of the 3 h fire and hose stream test. The results in this test are reported in Classification Report R5531-13, Project 83NK15220. In this test, one multiple assembly (the same as Detail 6) was installed in the test panel. During the entire fire and hose stream test, all four sections of the multiple assembly remained securely closed and no visible through openings developed. On this basis, it is judged that the installation herein represented by Detail 6 will provide resistance to passage of fire for 3 h and to the effects of a hose stream following fire exposure.

The installations shown on ILLS. 8, 11, 12, 14, 16 and 18 are suitable for this manufacturer's 3 h curtain type IBD-23 fire damper up to the size tested. For each installation, the test results are judged to be representative of smaller sizes of same dampers installed in wall openings resulting in expansion clearances not exceeding the amount tested, nor less than 1/8 in./ft of damper. The bearing of flashing to wall, overlap of flashing to flashing, and bearing of damper channel to retaining angles (Detail 4) shall not be less than the tested values.

Report by:

M. R. Frantti

M. R. FRANTTI
Project Engineer
Fire Protection Department

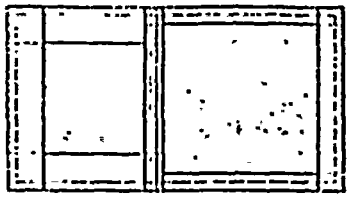
Reviewed by:

J. R. Thiel

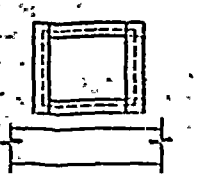
J. R. THIEL
Assistant Managing Engineer
Fire Protection Department

MRF/JRT:bg

CONTROLLED DRAWING - CONTRACTOR
Work This Drawing With Addenda, PCRs/FCNs Per The Daily Notification List (DNL) and ... the Revision Log (FRL).



PLAN VIEW



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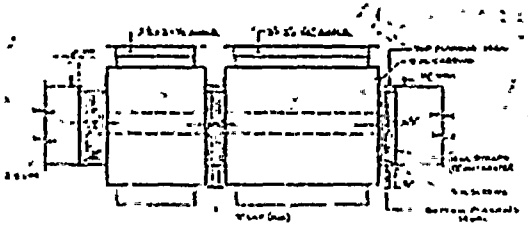
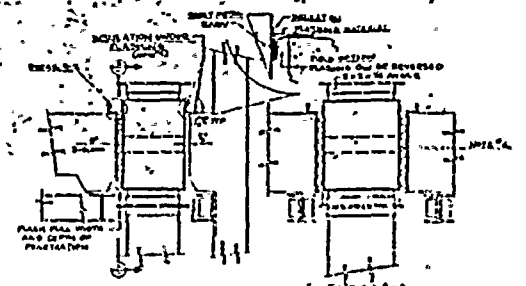
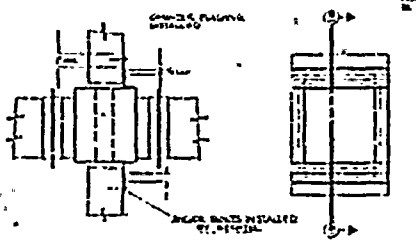


DETAIL-1
TYPICAL HORIZONTAL FLASHING DETAIL



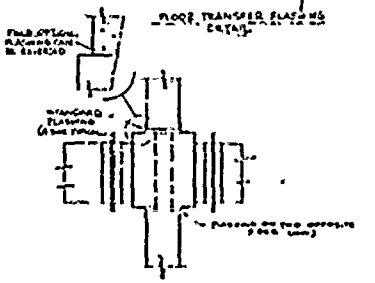
DETAIL-3

FLOOR TRANSFER FLASHING DETAIL

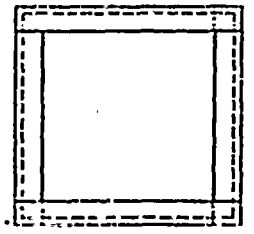


ALTERNATE FLASHING DETAIL

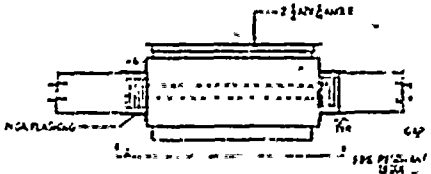
DETAIL-4
VERTICAL FIRE BARRIER FLASHING DETAILS



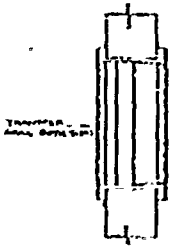
STANDARD FLASHING DETAIL



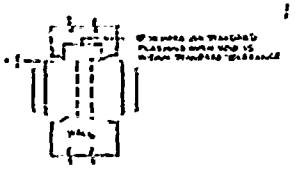
PLAN VIEW



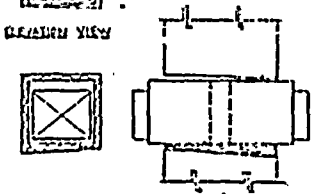
DETAIL-2
STANDARD HORIZONTAL FLASHING DETAIL



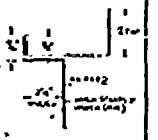
DETAIL-5
TRANSFER FLASHING DETAIL



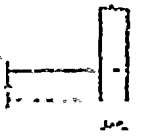
ELEVATION VIEW



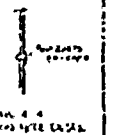
SEAL BLOCK IN "DEEP" OPENINGS AS SHOWN



DETAIL 2-2



DETAIL 1-1



DETAIL 4-4
ALTERNATE FIRE BARRIER

NOTES

ATTACHMENT 3

THE WALDINGER CORPORATION

ATTACHMENT 4

Date December 1, 1982

Approved By: [signature] (B.P.G.B.) Revision 1
Vice President-Manager/Project Management

TITLE INSTALLATION OF FIRE DAMPER PENETRATION SEALS Page 1 of 9
FIELD WORK PROCEDURES MANUAL Procedure FWP 12.2-6

PALO VERDE

1.0 Purpose:

1.1 To establish the standard method for insulating and flashing the Quality Class Q, R and S Fire Damper penetrations.

2.0 Scope:

2.1 This procedure assigns responsibilities, establishes the method for determining the type of seal required and provides directions for installing Fire Damper penetration seals.

3.0 Reference:

3.1 Subcontract Specifications 13-MM-598.

3.2 Drawing F-TWC-100.

3.3 Field Work Procedures Man[illegible]

3.4 Field Quality Control Manual.

3.5 The Waldinger Corporation Sheet Metal Standards.

4.0 Definitions:

4.1 Standard installation tolerances: The tolerances for installation of Fire Dampers as defined in Ruskin's Fire Damper installation instructions, Bulletin 11-1BD23 182.

4.2 Insulation: The approved material used, when required, to fill the void between the Fire Damper and the wall penetration surface.

M598-1873-2

4.3 Flashing: Galvanized Sheet Metal used to seal the exterior surfaces of the penetration from the Fire Damper to the wall.

4.4 Fire Damper Penetration Seal: The completed assembly which fills the void between a Fire Damper and the wall penetration surface. Includes insulation, flashing and associated fastner hardware, as required.

4.5 Vertical Fire Damper: A Fire Damper installed in a Horizontal duct run or in wall penetrations, i.e. blade package vertical and sleeve horizontal.

4.6 Horizontal Fire Damper: A Fire Damper installed in a vertical duct run or in floor penetrations, i.e. blade package horizontal and sleeve vertical.

5.0 Responsibilities:

5.1 Project Manager (PM) - Provides direction to implement this procedure to assure acceptable installation of the Fire Damper Seals.

5.2 Project Engineer (PE) - Defines and establishes the materials and methods to be used for installation of Fire Damper Seals. Provides indoctrination and training to the requirements of this procedure to the personnel performing the seal installation.

5.3 Project Superintendent (PS) - Provides direction to the craft to implement this procedure.

5.4 Quality Control Inspector - Provides verification of Fire Damper Seal installation in accordance with Reference 3.4, Field Quality Control Manual.

6.0 Procedure:

6.1 The Project Engineer shall provide indoctrination and training of the craft for correct method of Fire Damper Seal installation. A training session shall be conducted for the craft; prior to start of work; when the materials change; when this procedure is revised; to the requirements of this procedure. The training shall be documented as shown in Figure 2.

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6.2 The craft foreman shall perform an evaluation, or obtain an evaluation, of the Fire Damper penetration opening to determine the type of seal that is required, as follows:

6.2.1 Determines dimensions of void between Fire Damper(s) and penetration to identify requirements for sealing by completing the report, Figure 1, and marking item 1, 2, or 3 to identify type of configuration.

6.2.2 Performs evaluation of dimensions to determine type of Fire Damper Seal required and records on report, Figure 1, Items 1.a), 1.b), 1.c), 1.d), 2.a) or 2.b) by marking the appropriate entry as follows:

1) Penetration with one Fire Damper: (vertical or horizontal).

a) If sum of clearance of opposite sides is ½" or less, flash Fire Damper in accordance with TWC Sheet Metal Standards.

b) If sum of clearances of opposite sides is greater than ½" but no one side larger than 6" install insulation and flashing in accordance with Detail 2, DWG. F-TWC-100.

c) If sum of clearances of opposite sides is greater than 6" but 13" or less, install insulation and flashing in accordance with Detail 1, DWG. F-TWC-100.

d) If sum of clearances of opposite sides is greater than ½" but no one side larger than 3" and Fire Damper may only be flashed from one side, install insulation and flashing in accordance with Detail 3, DWG. F-TWC-100.

MS 98-1873-2

2) Penetration with Multiple Fire Dampers: (vertical or horizontal)

a) If size of clearances of opposite sides is ½" or less, flash Fire Damper in accordance with TWC Sheet Metal Standards.

b) If sum of clearances of opposite sides is larger than ½" but no one side is greater than 13", install insulation and flashing in accordance with Detail 1, DWG. F-TWC-100.

3) Other Configuration Than Shown:

a) If no previous condition is applicable, obtain engineering evaluation to determine type of Fire Damper Seal required and attach evaluation to report to identify flashing and insulation required.

6.2.3 The originator shall sign and date the report (Figure 1) and obtain concurrance from the Quality Organization prior to start of the installation activities.

6.3 The crew foreman shall direct fabrication and installation of the Fire Damper Seals, as follows:

6.3.1 Fire Dampers which require flashing only, items 1.a and 2.a, shall be flashed in accordance with The Waldinger Corporation Sheet Metal Standards and as follows:

a) For Quality Class "Q" sheet metal flashing, the heat number shall be placed on the exterior surface of each piece.

b) The penetration opening shall be cleaned by brushing, wiping or use of compressed air to remove debris, dust and dirt.

c) Flashing shall then be installed on both sides of penetration, when required, and fastened to Fire Damper, assuring a flush fit with wall.

NOTE: Quality verification shall be obtained after cleaning and prior to installing flashing on the second side and after completion of the installation.

6.3.2 Fire Dampers which require flashing both sides and insulation, items 1.b, 1.c, and 2.b shall be completed in accordance with DWG. F-TWC-100, applicable details, and as follows:

a) Obtain required flashing material, 14 Ga. straps, fastners and approved insulation.

b) For Quality Class "Q" sheet metal flashing the heat number shall be placed on the exterior surface of the material. For straps the heat number shall be marked on each piece and be visible during the intermediate inspections.

c) Flashing material lengths shall be as required to obtain a minimum 2" overlap at the corners.

d) The penetration opening shall be cleaned by brushing, wiping or compressed air to remove debris, dust and dirt.

e) Vertical fire dampers shall be supported as required by DWG. F-TWC-100, by use of approved blocking material. Layers between blocks shall be cemented.

f) Flashing on one end and required 14 Ga. straps shall be installed.

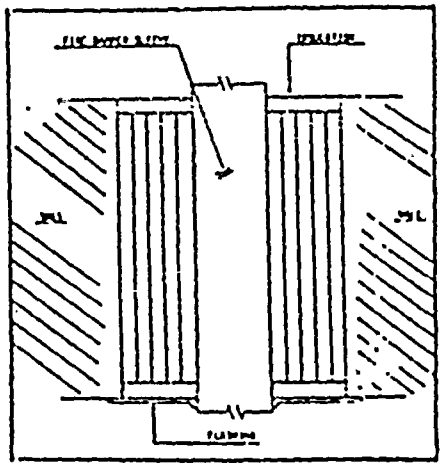
g) The Quality Organization shall be notified to obtain an inspection of the work completed and following work.

h) Insulation shall be cut in a neat workmanship manner to assure a complete filling of the void and installed as follows:

1. The first layer perpendicular to the Fire Damper and flat against the flashing.

   NOTE: A single layer parallel to the Fire Damper may be used when the void is too small for multiple layer with first and last perpendicular layers.

2. Subsequent layers, as required to fill void, perpendicular to first layer and parallel to Fire Damper leaving enough space for final layer which is same as first layer but on second side, e.g.:



Note: This is the preferred method. The ma
objective is to fill entire void area

i) Install flashing on second side.

M598-1873-2

6.3.3 Fire Dampers which are accessable for flashing on one side only (item 1.d), shall be completed in accordance with Drawing F-TWC-100, applicable detail, and as follows:

a) Same as for Fire Dampers in paragraph 6.2.2 Except,

b) No flashing on back and no first or last layer of insulation perpendicular to the Fire Damper, i.e. all layers parallel to Fire Damper.

c) Strap is continuous across penetration opening per detail 3 of drawing F-TWC-100.

6.3.4 Fire Damper penetration seals which are outside the criteria of this procedure shall be installed to the engineering requirements attached to the report, Figure 1.

7.0 Records:

7.1 Fire Damper Seal Report, Figure 1.

7.2 Training Certification, Figure 2.

Reviewed for Quality Compliance:

C R Boswell

Director of Quality Assurance
C. R. Boswell

M598-1873-2

FIRE DAMPER EVALUATION REPORT

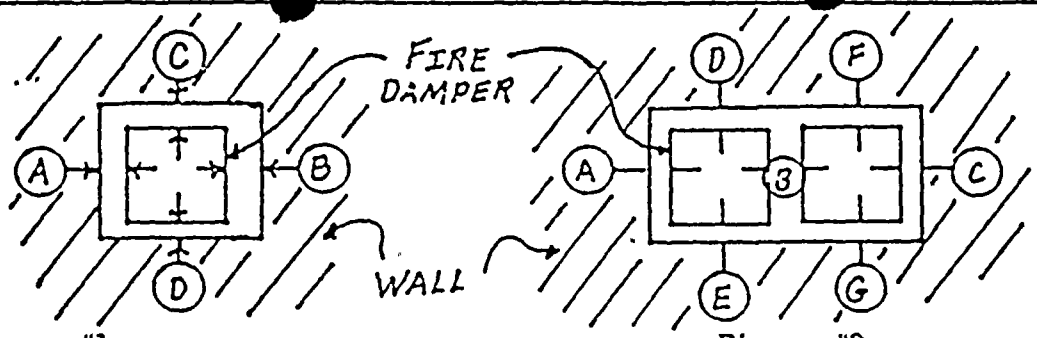


Figure #1

Figure #2

NOTE:
(3 Damper Configuration Extrapolate Data)

NOTE: USE THE APPLICABLE PARAGRAPH 1a, 1b, or 1c for each total; (1) or (2). Total (1) and/or (2) that are less than ½" do not require insulation and shall be flashed in accordance with Sheetmetal Standards. Any total that is less than ½" shall be recorded as number 3 (other configuration than shown).

TWC DWG._____ Rev_____ Unit_____

1.☐ [ ] PENETRATION WITH ONE FIRE DAMPER - TAG NO:_____

Figure #1 A = in. C = in.

B = in. D = in.

TOTAL (1) = in. TOTAL (2) = in.

( )1a. Flash those totals (1) and/or (2) that are ½" or less in accordance with the Sheetmetal Standards. If either total (1) or (2) exceeds ½" flash in accordance with 1b, 1c and 1d as applicable.

( )1b. Insulate & flash each side, A, B, C, and/or D as applicable that exceeds ½" but not more than 6" in accordance with drawing F-TWC-100 Detail 2.

( )1c. Insulate & flash each side A, B, C, and/or D as applicable, that exceeds 6" but not more than 13" in accordance with drawing F-TWC-100 Detail 1.

( )1d. If only one side of penetration is accessable for flashing and A, B, C, and/or D do not exceed 3" then use Detail 3.

2.☐ [ ] PENETRATION WITH MULTIPLE FIRE DAMPERS - TAG NO:_____

TAG NO:_____ TAG NO:_____

Figure #2 A = in. B = in. D = in. F = in.

B = in. C = in. E = in. G = in.

T1 = in. T2 = in. T3 = in. T4 = in.

( )2a. If any of the following totals T1, T2, T3, or T4 is ½" or less, flash in accordance with the Sheetmetal Standards.

( )2b. If any of the following totals T1, T2, T3, or T4 is greater than ½" and no one side (A thru G) exceeds 13 insulate and flash in accordance with drawing F-TWC-100, Detail 1.

3.☐ [ ] OTHER CONFIGURATION THAN SHOWN, Engineering evaluation required - Attach resolution.

Prepared by NAME: DATE:	Concurred by NAME: DATE:

THE WALDINGER CORPORATION

QA JOB REQUIREMENTS CONFERENCE/SEMINAR

SUBJECT(S): Field Work Procedure
FWP 12.2-6, Rev 1
Installation of Fire
Damper Penetration Seal

DATE: _____

CONTRACT: 13-MM-598
Palo Verde
Units I, II & III

ATTENDEES: _____

REASON FOR SESSION: To provide attendees with indoctrination and training to assure personnel are knowledgeable and proficient to the requirements for installation of the Fire Damper penetration seals.

SUMMARY OF DETAILS: Procedural requirements for: (1) Determination of type of seal required. (2) Acceptable materials to be used; a. Blocking - Fiberfrax Duraboard, b. Insulation - Fiberfrax Duroblanket 6 lbs. density, c. Sheetmetal - ASTM 526 or ASTM 527, d. Adhesive - Fiberfrax Coating Cement (QF180). (3) Cleaning - Free of duct, dirt & debris. (4) Workmanship. (5) Heat number traceability. (6) Obtaining quality verification. (7) Ovtaining engineering resolution of other configurations than re-required by the procedure and drawing(s).

FOLLOW-UP REQUIREMENTS: As required by addition of new craft, change in materials or revision to the installation procedure.

Certification of Capabilities:

_____ _____
RANKING ATTENDEE
PROJECT ENGINEER

Concurrence:

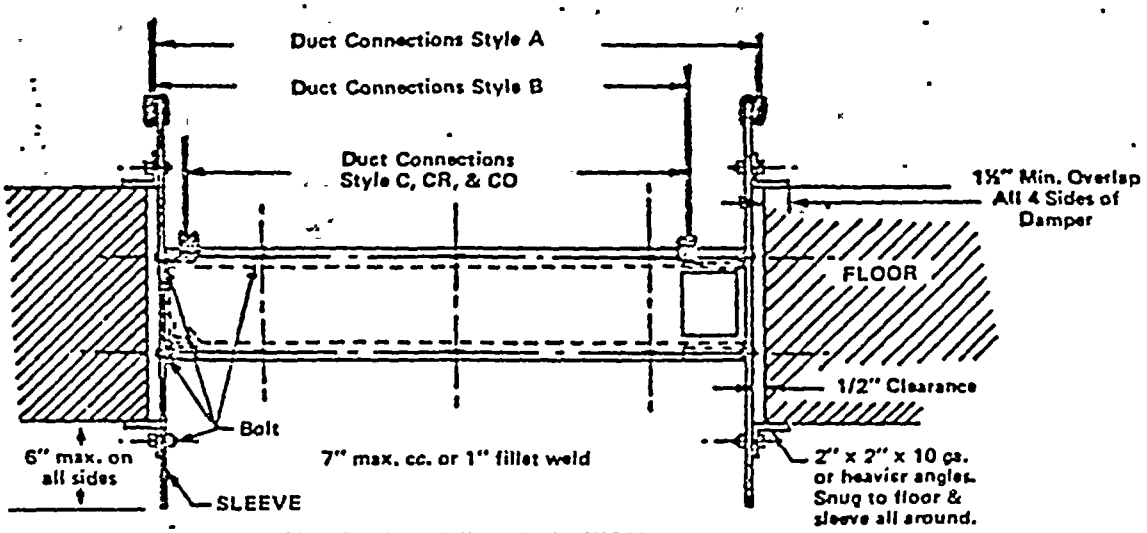
_____
MANAGER OF QUALITY ASSURANCE

_____
QUALITY ASSURANCE SUPERVISOR

RUSKIN

II-IBD23-1079
Replaces II-IBD23-879

THREE HOUR UL CLASSIFIED CURTAIN TYPE IBD FIRE DAMPERS SINGLE & MULTI SECTION HORIZONTAL INSTALLATION

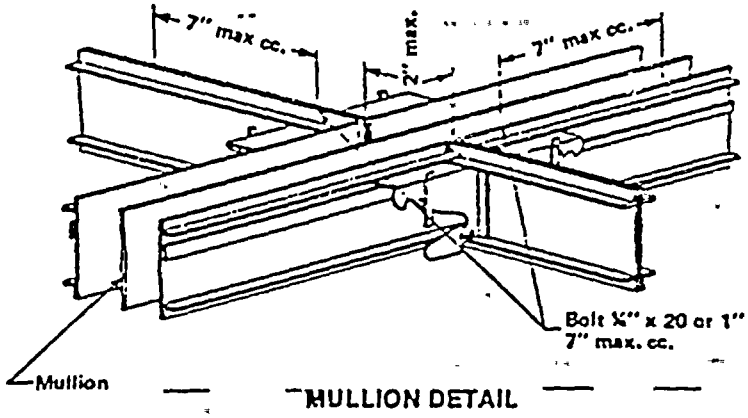


HORIZONTAL INSTALLATION

The mullion between the sides of the dampers shall be either a 4½ in. wide steel plate (14 MSG galvanized steel) or 1½ by 4½ in. tubular section (12 MSG galvanized steel). Mullion length shall be equal to length of two adjoining dampers.

The steel plate mullion shall be sandwiched between sides of dampers with frames welded at top and bottom with 1 in. long fillet welds spaced 7 in. O.C.

The tubular section mullion shall be welded to the sides of the damper frames with 1 in. long fillet welds spaced 6 in. O.C.



MULLION DETAIL

NOTES

Openings in floor or wall shall be 1 in. larger than overall size of fire damper and sleeve assembly.

Sleeve gage shall be at least equal to the gage of the duct as defined by the appropriate SMACNA Duct Construction Standard and described in NFPA 90A when one or more of the following Duct-Sleeve Connections are used (Plain "S" Slip, hemmed "S" Slip, Standing "S" Slip, Reinforced Standing "S" Slip, Inside Slip Joint, and Double "S" Slip). If any other Duct-Sleeve Connections are used, sleeve shall be minimum of 16 gage for dampers up to 36"w x 24"h and 14 gage if damper width exceeds 36" or height exceeds 24".

Mounting angles shall be a minimum of 2" x 2" x 10 gage and bolted with ¼" - 20 bolts and nuts, 8" - C-C maximumum, minimum 2 bolts in each side, top and bottom or welded with 1" fillet welds on same centers. Mounting angles shall overlap wall a minimum of one and one-half inches on all four sides.

Dampers shall be bolted or welded to sleeve on same spacing as angles.

INSTALLATION INSTRUCTIONS COMPLY WITH UNDERWRITERS LABORATORIES SAFETY STANDARDS 555

RUSKIN Mfg. Co. P. O. Box 129 Grandview, Mo. 64030

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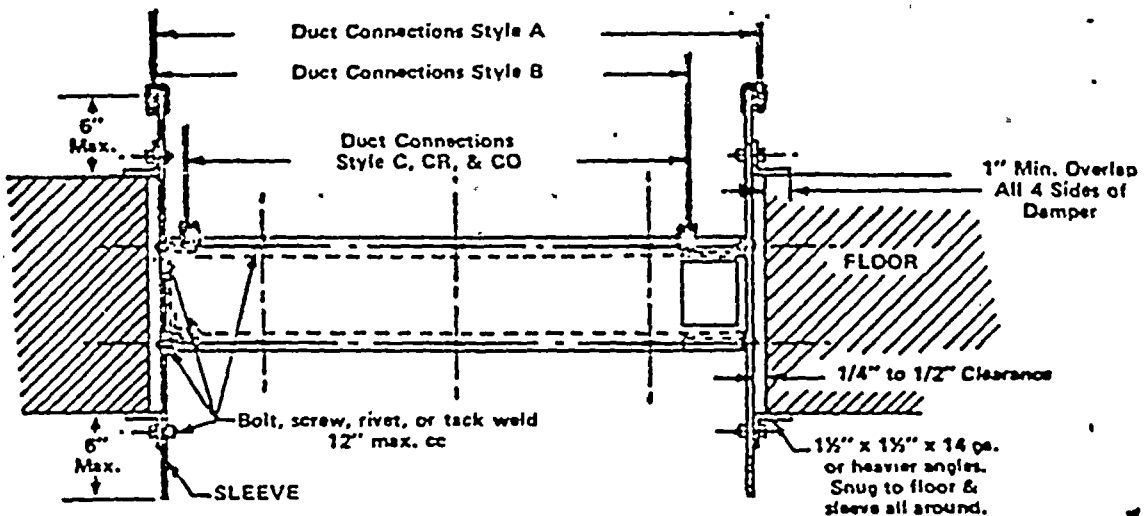
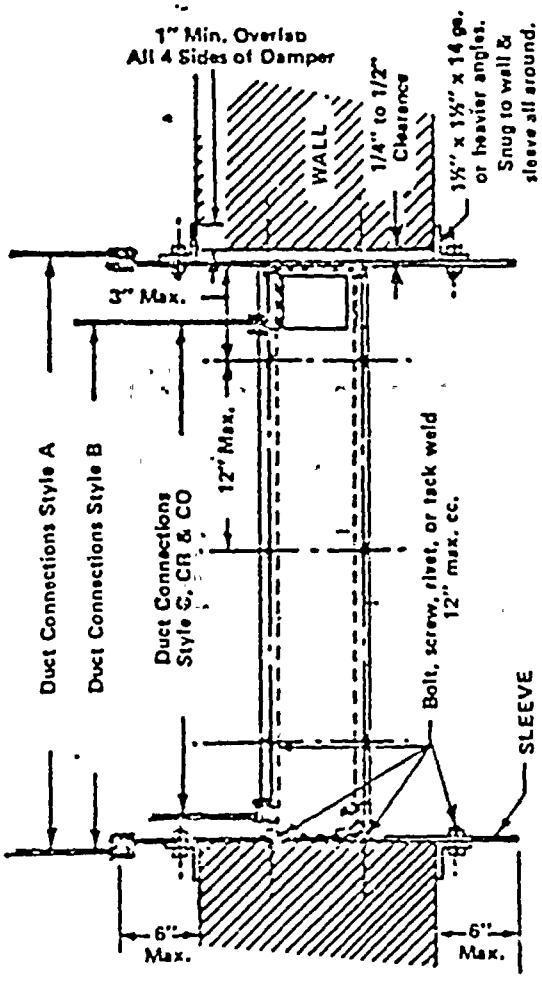
RUSKIN

II-IBD 979
Replaces
II-IBD 178

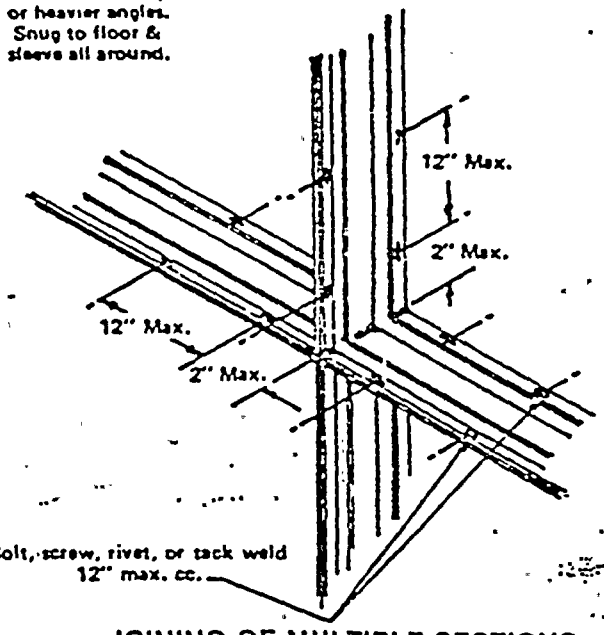
INSTALLATION INSTRUCTIONS
CURTAIN TYPE IBD FIRE DAMPERS
1½ HOUR CLASSIFIED
SINGLE & MULTI SECTION
VERTICAL & HORIZONTAL INSTALLATION



HORIZONTAL INSTALLATION



VERTICAL INSTALLATION



JOINING OF MULTIPLE SECTIONS

NOTES

Openings in floor or wall shall be ¼" to ½" larger than overall size of fire damper and sleeve assembly.

Sleeve gage shall be at least equal to the gage of the duct as defined by the appropriate SMACNA Duct Construction Standard, as described in NFPA 90A, when one or more of the following Duct Sleeve Connections are used (Plain S Slip, Hemmed S Slip, Standing S Slip, Reinforced Standing S Slip, Inside Slip Joint, Double S Slip).

If any other Duct Sleeve Connections are used with the horizontal or vertical unit the sleeve shall be minimum 16 gage for dampers up to 36"w x 24"h and 14 gage if width exceeds 36" or height exceeds 24".

Mounting angles shall be minimum of 1½" x 1½" x 14 gage and bolted, tack welded, riveted, or screwed to sleeve at maximum spacing of 12" and with minimum of two connections in each side, top and bottom. Mounting angles shall overlap wall a minimum of one inch on all four sides.

Damper shall be bolted, tack welded, riveted, or screwed to sleeve on same spacing as angles.

INSTALLATION INSTRUCTIONS COMPLY WITH UNDERWRITERS LABORATORIES SAFETY STANDARDS 555

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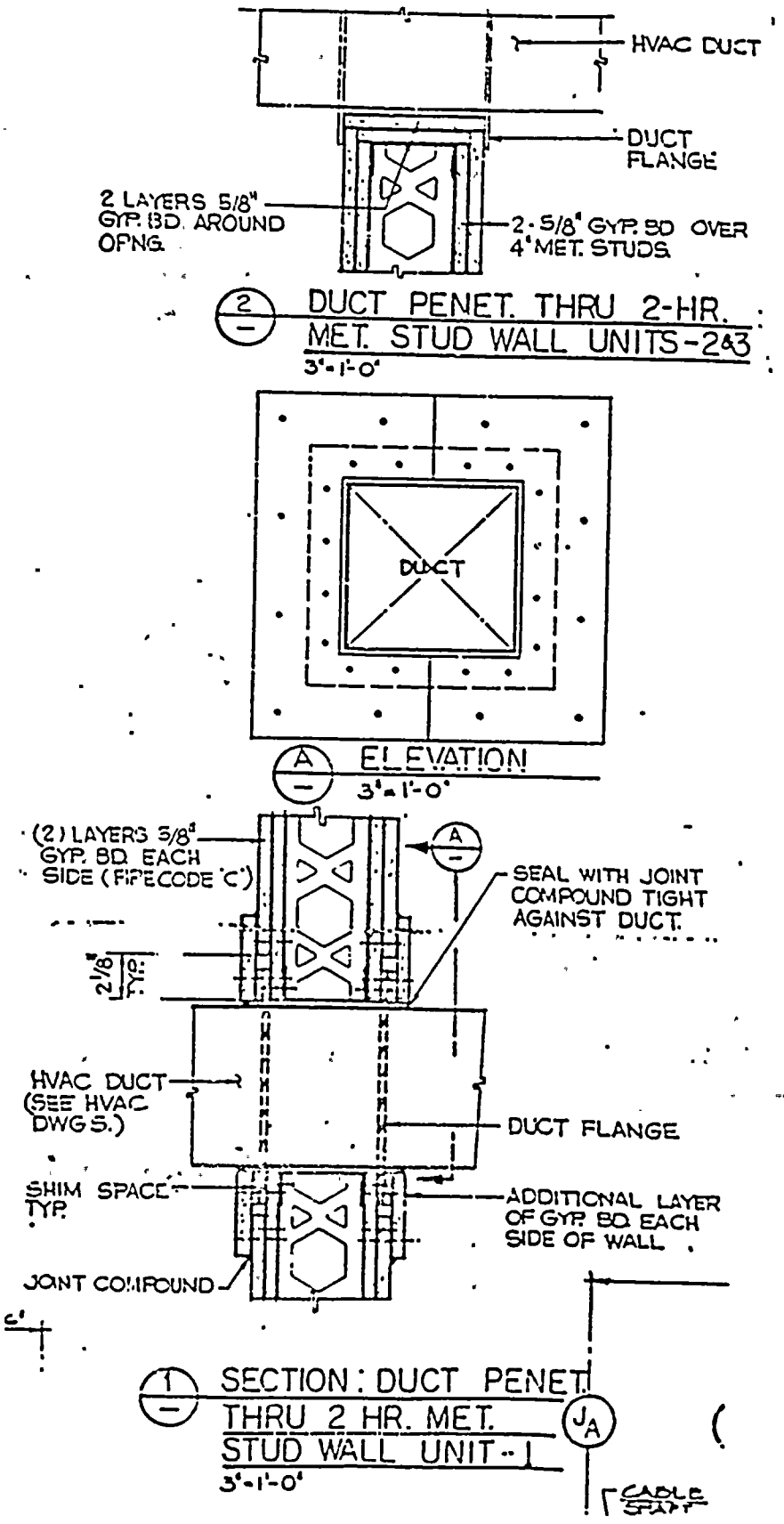

From 13A-ZYD-501 Rev. 12