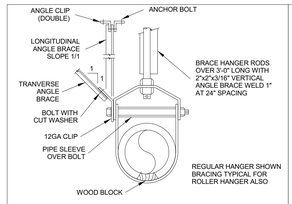
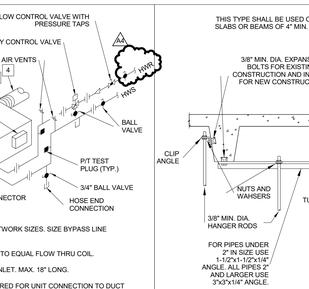


PIPE SIZE	*ANGLE BRACE	BOLT TO ANGLE	ANGLE CLIP	ANGLE BOLT OR INSERT
2-1/2"	2"x2" 16GA	3/8"	3"x3"x1/4"	3/8
3,4	2-1/2"x2-1/2"16 GA	3/8"	3"x3"x1/4"	1/2
5,6	2-1/2"x2-1/2"16 GA	1/2"	5"x3"x1/2"	3/4
8	3"x3" 12GA	5/8"	2-5"x3"x1/2"	2 @ 5/8
10	3"x3" 12GA	3/4"	2-5"x3"x1/2"	2 @ 3/4

* 1-5/8 X 1-5/8 X 12 GUAGE CHANNEL MAY BE USED

TYPICAL SEISMIC BRACING FOR PIPE
NO SCALE



NOTES:
1. SEE PLANS FOR RETURN DUCTWORK CONNECTIONS.

2 FLEX DUCT SAME SIZE AS VAV INLET. MAX. 18" LONG.

3 PROVIDE TRANSITION AS REQUIRED FOR UNIT CONNECTION TO DUCT SIZE AS SHOWN ON PLANS.

4. PIPING SHALL NOT BLOCK ACCESS TO CONTROLS. MAINTAIN 3' CLEARANCE.

VAV BOX OR FTU WITH HEATING COIL - 2-WAY
NO SCALE

NOTES:
1. SEE PLANS FOR PIPING & DUCTWORK SIZES. SIZE BYPASS LINE SAME AS HS.

2. BALANCE FLOW THRU BYPASS TO EQUAL FLOW THRU COIL.

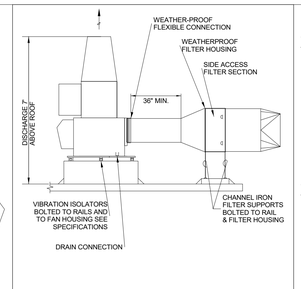
3 FLEX DUCT SAME SIZE AS VAV INLET. MAX. 18" LONG.

4 PROVIDE TRANSITION AS REQUIRED FOR UNIT CONNECTION TO DUCT SIZE AS SHOWN ON PLANS.

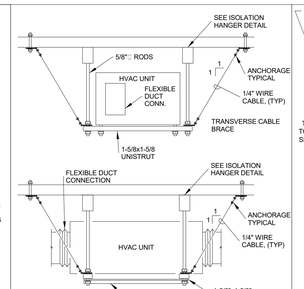
5. PIPING SHALL NOT BLOCK ACCESS TO CONTROLS. MAINTAIN 3' CLEARANCE.

VAV BOX OR FTU WITH HEATING COIL - 3-WAY
NO SCALE

TYPICAL METHOD OF SECURING HANGER RODS
NO SCALE

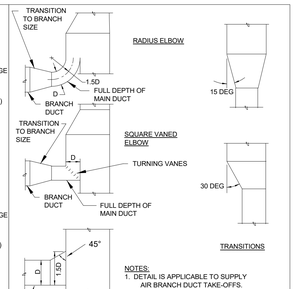


ROOF MOUNTED TUBULAR CENTRIFUGAL FAN DETAIL
NO SCALE



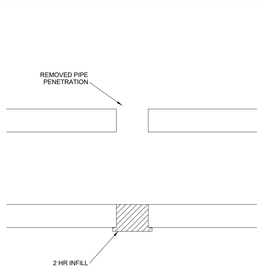
LOGITUDINAL CABLE BRACE

TYPICAL SEISMIC BRACING FOR EQUIPMENT
NO SCALE



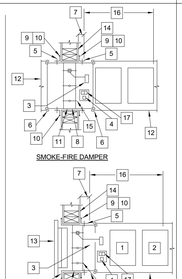
NOTES:
1. DETAIL IS APPLICABLE TO SUPPLY AIR BRANCH DUCT TAKE-OFFS.

BRANCH DUCT TAKEOFFS AND TRANSITIONS
NO SCALE

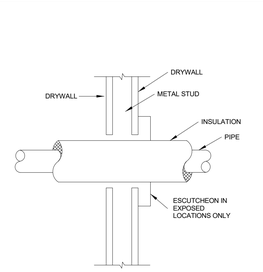


U.L. 2 HR RATED FLOOR PATCH
NO SCALE

KEYED NOTES:
1. 12x12 MIN. ACCESS DOOR.
2. SMOKE DETECTOR FURNISHED UNDER DIVISION 26, INSTALLED BY M.C. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS.
3. SMOKE DAMPER OPERATOR/ACTUATOR EXTERNAL TO DUCT, DAMPER SLEEVE AND PARTITION.
4. U.L. APPROVED "ELECTRONIC FUSIBLE LINK" FURNISHED WITH SMOKE-FIRE DAMPER.
5. RETAINING ANGLES, SIZE, GAUGE, AND FASTENINGS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. DO NOT FASTEN TOGETHER AT CORNERS.
6. SECURE DUCT TO SLEEVE WITH AN APPROVED BREAKAWAY CONNECTION; SEAL CONNECTION WITH HARDCAST IRON GRIP 601 OR EQUAL THAT IS APPROVED BY THE DAMPER MANUFACTURER.
7. SLEEVE TO EXTEND MAXIMUM OF 6" BEYOND PARTITION OR AS SHOWN ON MANUFACTURER'S LISTED DETAILS.
8. SECURE DAMPER TO SLEEVE PER MANUFACTURER'S LISTED DETAILS.
9. 1" MINIMUM OVERLAP OF ANGLE AND WALL ON ALL 4 SIDES OF DAMPER.
10. APPLY FIRE RATED SEALANT AT ANGLE & PARTITION.
11. APPROVED GALVANIZED STEEL SLEEVE OR APPROVED GALVANIZED STEEL SLEEVE SUPPLIED BY THE DAMPER MANUFACTURER.
12. DUCT.
13. AIR DEVICE WITH MINIMUM 3/4" FLANGE AND STEEL FRAME.
14. SMOKE-FIRE PARTITION.
15. APPROVED COMBINATION SMOKE-FIRE DAMPER.
16. 60" MAX FROM SMOKE DETECTOR TO PARTITION.
17. DAMPER POSITION INDICATOR WITH OPEN & CLOSED CONTACTS.

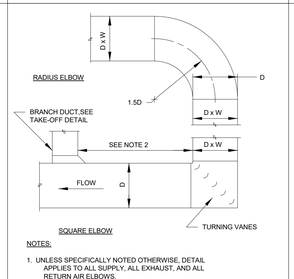


COMBINATION SMOKE-FIRE DAMPER DETAILS
NO SCALE



FOR NON-RATED FIRE / SMOKE WALLS ONLY

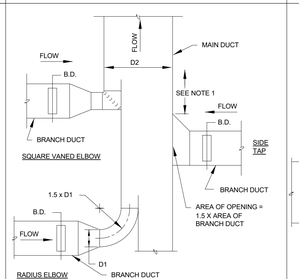
PIPING THROUGH NON-RATED FRAME WALL
NO SCALE



SQUARE ELBOW

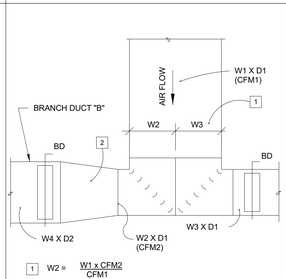
NOTES:
1. UNLESS SPECIFICALLY NOTED OTHERWISE, DETAIL APPLIES TO ALL SUPPLY, ALL EXHAUST, AND ALL RETURN AIR ELBOWS.
2. BRANCH DUCT TAKE-OFFS MUST BE A MINIMUM OF 4D DOWNSTREAM OF EITHER TYPE OF ELBOW, AND NOT LESS THAN 30 UPSTREAM.

DUCT ELBOW
NO SCALE



NOTE:
1. BRANCH DUCTS MUST BE 2 X D2 UPSTREAM OF ELBOW.

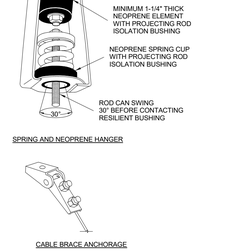
EXHAUST RETURN BRANCH CONNECTION TO MAIN
NO SCALE



1 W2 = W1 x CFM2 / CFM1

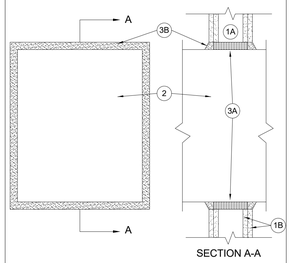
2 TRANSITION TO BRANCH DUCT SIZE WHERE REQUIRED

DUCT TEE FITTING
NO SCALE



NEOPRENE HANGER AND CABLE RESTRAINT
NO SCALE

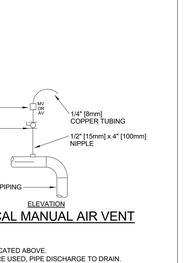
F RATINGS- 1 & 2 HR (SEE ITEM 1)
T RATING- 1 HR



1. WALL ASSEMBLY -THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS-WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2" BY 4" LUMBER, SPACED 16" OC. IN 2 HR FIRE-RATED ASSEMBLIES, STEEL STUDS TO BE MIN 2-1/2" WIDE AND SPACED MAX 24" OC. IN 1 HR FIRE-RATED ASSEMBLIES, STEEL STUDS TO BE MIN 3-5/8" WIDE AND SPACED MAX 24" OC. MAX AREA OF OPENING IS 196 SQ. IN. WITH MAX DIMENSION OF 14".
B. WALLBOARD, GYPSUM* -5/8" THICK, 4' WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY.
THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.
2. STEEL DUCT -NOM 12"x12" (OR SMALLER) 24 GAUGE (OR HEAVIER) STEEL DUCT TO BE CENTERED WITHIN THE FIRESTOP SYSTEM. A NOM 1" ANNULAR SPACE IS REQUIRED WITHIN THE FIRESTOP SYSTEM. STEEL DUCT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.
3. FIRESTOP SYSTEM -THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. PACKING MATERIAL -IN 2 HR FIRE-RATED ASSEMBLIES, MIN 3-1/2 IN THICKNESS OF MIN 4 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. IN 1 HR FIRE-RATED ASSEMBLIES, MIN 3-7/8" THICKNESS OF MIN 4 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
B. FILL, VOID OR CAVITY MATERIAL*-SEALANT - IN 2 HR FIRE-RATED ASSEMBLIES, MIN 3/4" THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, ON BOTH SURFACES OF WALL. ADDITIONAL FILL MATERIAL TO BE INSTALLED SUCH THAT A MIN 1/4" THICK CROWN IS FORMED AROUND THE PENETRATING ITEM AND LAPPING A MIN 1/4" BEYOND THE PERIPHERY OF THE OPENING. IN 1 HR FIRE-RATED ASSEMBLIES, MIN 1/2" THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS ON BOTH SURFACES OF WALL. ADDITIONAL FILL MATERIAL TO BE INSTALLED SUCH THAT A MIN 1/2" THICK CROWN IS FORMED AROUND THE PENETRATING ITEM AND LAPPING A MIN 1/4" BEYOND THE PERIPHERY OF THE OPENING.

FIRE STOPPING DETAIL
NOT TO SCALE

SYSTEM NO. W-L-7007
F RATINGS- 1 & 2 HR (SEE ITEM 1)
T RATING- 1 HR



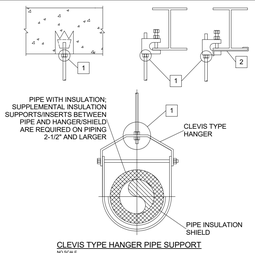
TYPICAL HOT WATER PIPING DRAIN VALVE CONNECTIONS

NOTES:
1. DRAIN ALL LOW POINTS AS INDICATED ABOVE.

TYPICAL MANUAL AIR VENT

NOTES:
1. VENT ALL HIGH POINTS INDICATED ABOVE.
2. IF AUTOMATIC AIR VENTS ARE USED, PIPE DISCHARGE TO DRAIN.

DRAIN VALVE AND AIR VENT CONNECTIONS (HYDRONIC SYSTEMS)
NO SCALE

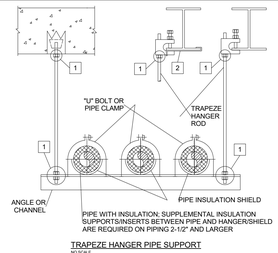


CLEVIS TYPE HANGER PIPE SUPPORT
NO SCALE

1 PROVIDE DOUBLE LOCK NUT ON THREADED ROD TO CARRY PIPE HANGERS. WHERE THREADED ROD SCREWS INTO UPPER ATTACHMENT, PROVIDE LOCK NUT.

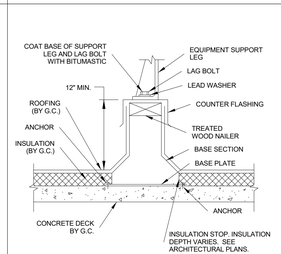
2 RETAINING CLIP REQUIRED IN SEISMIC RESTRAINED AREAS.

3 HANGERS THAT ARE PART OF A SEISMIC RESTRAINT SHALL BE INSTALLED IN CONTACT WITH THE PIPE; THE INSULATION SHALL BE CARRIED OVER THE HANGER AND SEALED.



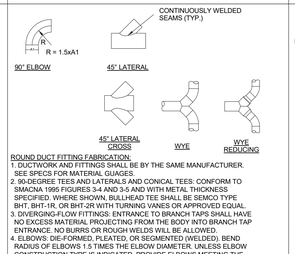
TRAPEZE HANGER PIPE SUPPORT
NO SCALE

CLEVIS AND TRAPEZE HANGER PIPE SUPPORT
NO SCALE



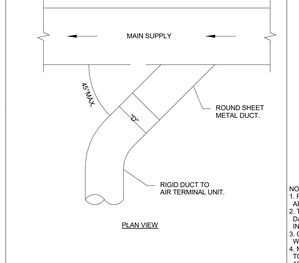
1 AND 2 HR UL RATING W-L-5001

INSULATED PIPING THROUGH FRAME WALL
NO SCALE



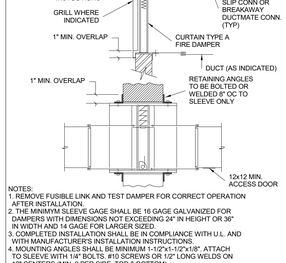
NOTES:
1. UNLESS OTHERWISE NOTED, ALL ITEMS FURNISHED AND INSTALLED BY THE M.C. SEE SPEC 15010.
2. LEVEL TOP OF CURB(S) TO WITHIN TOLERANCES ALLOWED BY MANUFACTURER OF SUPPORTED EQUIPMENT.
3. CONCRETE ANCHOR MINIMUM 2 PER SIDE. MAXIMUM 12" ON CENTERS.

CURB DETAIL - ROOF RAIL CONCRETE DECK
NO SCALE



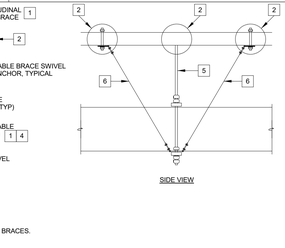
GENERAL NOTES:
1. REFER TO PLANS FOR ALL SIZES.
2. LOCATE VOLUME DAMPER AT MAIN/BRANCH DUCT OR AT END OF RUNOUT.
3. MAXIMUM, LENGTH OF FLEX DUCT SHALL BE 5 FT.
4. WHERE FLEX DUCT TURNS 90° TO CONNECT TO THE DIFFUSER, PROVIDE A 90° ADJUSTABLE METAL ELBOW, DO NOT USE FLEX DUCT AS ELBOW.
5. TAB SHALL ACCESS DAMPERS IN DRYWALL CEILING BY LIFTING DIFFUSER OUT OF CEILING.

SUPPLY DIFFUSER DETAIL
NO SCALE



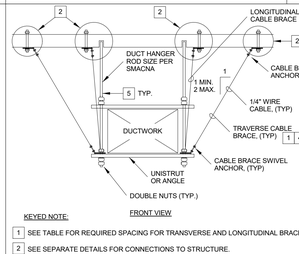
PLAN VIEW

SUPPLY DUCT TAKEOFF - AIR TERMINAL UNIT
NO SCALE



NOTES:
1. REMOVE FUSIBLE LINK AND TEST DAMPER FOR CORRECT OPERATION AFTER INSTALLATION.
2. THE MINIMYM SLEEVE GAGE SHALL BE 16 GAGE GALVANIZED FOR DAMPERS WITH DIMENSIONS NOT EXCEEDING 24" IN HEIGHT OR 36" IN WIDTH AND 14 GAGE FOR LARGER SIZED.
3. COMPLETED INSTALLATION SHALL BE IN COMPLIANCE WITH U.L. AND WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.
4. MOUNTING ANGLES SHALL BE MINIMUM 1-1/2"x1-1/2"x1/8", ATTACH TO SLEEVE WITH 1/4" BOLTS. #10 SCREWS OR 1/2" LONG WELDS ON 12" CENTERS (MIN. 2 PER SIDE, TOP & BOTTOM).
5. VERTICAL TYPE SHOWN, HORIZONTAL TYPE SIMILAR.

FIRE DAMPER DETAIL
NO SCALE



NOTE:
1. ADD LONGITUDINAL BRACES AT EACH END, IF REQUIRED.

TRAPEZE TRANSVERSE AND LONGITUDINAL BRACING
NO SCALE

ROUND DUCT FITTING FABRICATION:
1. DUCTWORK AND FITTINGS SHALL BE BY THE SAME MANUFACTURER. SEE SPECS FOR MATERIAL GUAGES.
2. 90-DEGREE TEES AND LATERALS AND CONICAL TEES: CONFORM TO SMACNA 1995 FIGURES 3-4 AND 3-5 AND WITH METAL THICKNESS SPECIFIED. WHERE SHOWN, BULLHEAD TEE SHALL BE SEMCO TYPE BHT, BHT-1R, OR BHT-2R WITH TURNING VANES OR APPROVED EQUAL.
3. DIVERGING-FLOW FITTINGS: ENTRANCE TO BRANCH TAPS SHALL HAVE NO EXCESS MATERIAL PROJECTING FROM THE BODY INTO BRANCH TAP ENTRANCE. NO BURRS OR ROUGH WELDS WILL BE ALLOWED.
4. ELBOWS: DIE-FORMED, PLEATED, OR SEGMENTED (WELDED). BEND RADIUS OF ELBOWS 1.5 TIMES THE ELBOW DIAMETER. UNLESS ELBOW CONSTRUCTION TYPE IS INDICATED. PROVIDE ELBOWS MEETING THE FOLLOWING REQUIREMENTS.
5. SEGMENTED ELBOWS: CONTINUOUS WELDED CONSTRUCTION IN GUAGES SPECIFIED FOR PRESSURE CLASS; RADIUS AND NUMBER OF PIECES SHALL COMPLY WITH SMACNA 1995 TABLE 3-1.
6. 90-DEGREE, 2 PIECE, MITERED ELBOWS: ADJUSTABLE GORE ELBOWS: SEE SPECS FOR ALLOWED APPLICATIONS & REQUIRED CONSTRUCTION.
7. COUPLINGS: SLIP JOINT CONSTRUCTION PER SMACNA 1995 FIGURE 3-2, DETAIL RT-1 WITH A MINIMUM OF A 2-INCH INSERTION LENGTH.

ROUND DUCT FITTINGS
NO SCALE

KEYED NOTE:
1 SEE TABLE FOR REQUIRED SPACING FOR TRANSVERSE AND LONGITUDINAL BRACES.
2 SEE SEPARATE DETAILS FOR CONNECTIONS TO STRUCTURE.
3 ATTACH LONGITUDINAL BRACES AT THIS LOCATION - TWO CABLES IN OPPOSITE DIRECTIONS SIMILAR TO TRANSVERSE BRACES SHOWN IN THIS VIEW.
4 TRANSVERSE SEISMIC RESTRAINT CABLE WITH ACCESSORIES (THIMBLES, BOLTS, ETC.) MASON SCB OR EQUAL. (TYPICAL BOTH SIDES)
5 PROVIDE STIFFENER FOR HANGER ROD PER SPECS.
6 PROVIDE LONGITUDINAL BRACES ON 2 SIDES (4 BRACES REQ'D.)

SEISMIC CABLE BRACING FOR RECTANGULAR DUCTWORK
NO SCALE

BID DOCUMENTS

Revisions:	Date
A4 AMENDMENT A00004	06/06/16

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Missouri Certificate of Authority #NC 001244

Drawing Title: MECHANICAL DETAILS

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: PHASE 2B: Renovation of Operating Rooms, ER and Triage

Location: V.A.M.C. ST. LOUIS, MO JOHN COCHRAN DIVISION

Date: 02/24/16 | Checked: SSC | Drawn: SSC

Project Number: 657-13-300JC
Building Number: 01
Drawing Number: 1-2B-M-501

Veterans Health Administration
Department of Veterans Affairs

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