VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

# DUCT CONSTRUCTION STANDARDS

**NAME**
**NAME**
**NAME**

# JOB NAME

JOB NO. 0000

**CITY, STATE**

# DUCT CONSTRUCTION STANDARDS

ORIGINAL SUBMITTAL
(MONTH 00, 2007)

VENT FAB INC.
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# DUCT CONSTRUCTION STANDARDS OUTLINE

SECTIONS

# SECTION 3

## RECTANGULAR DUCTWORK

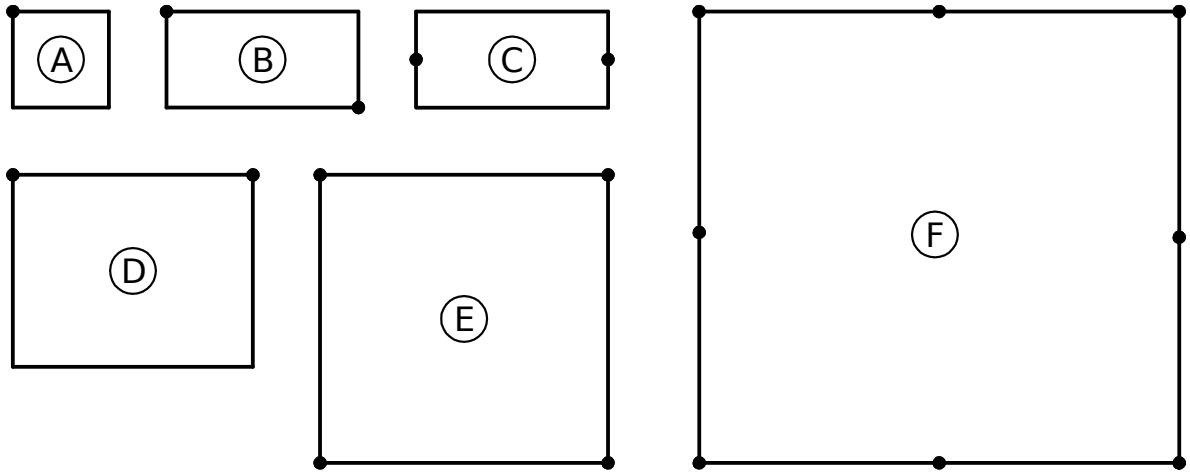
### RECTANGULAR DUCTWORK DETAILS COVERSHEET

NOTES:

1) The following duct construction tables are in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005, inclusive of functional criteria (Chapter 11).
2) All galvanized sheet steel to be of ASTM 653 with G-90 galvanized coating.
3) All stainless sheet steel to be type 304 of ASTM A-240 and A-480 with a 2B finish (unless otherwise noted).

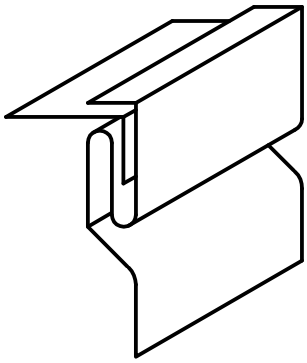
per job specs

4) All duct sides greater than 18" require beading, except on 18 gauge duct and heavier, or lined duct.
5) When called for, reinforcing angle to be prime coated black iron where installed on galvanized duct, stainless steel where installed on stainless steel duct, and aluminum where installed on aluminum duct.
6) At contractor's option, and reviewers' approval, Ductmate duct connection system may be substituted for TDC (SMACNA T-25) duct (submittals and duct construction tables at end of this section).

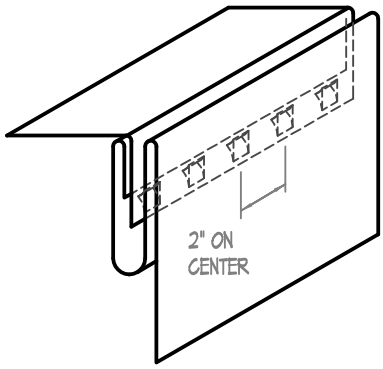



# SEAM LOCATIONS

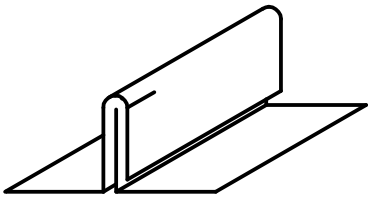
NUMBER OF SEAMS AND LOCATION VARIES WITH
JOINT TYPE, SHEET STOCK AND ASSEMBLY PLANS.



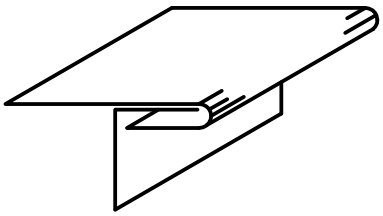
SEALED PITTSBURGH LOCK
(SMACNA L-1)




BUTTON PUNCH SNAP LOCK
(SMACNA L-2)



STANDING SEAMS
AT FITTINGS



SINGLE CORNER SEAM

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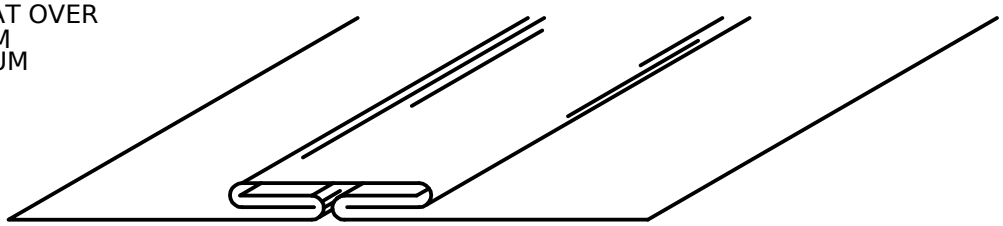
LONGITUDINAL SEAMS
RECTANGULAR DUCTWORK

SHEET
3-1

## DRIVE CLEAT (SMACNA T-1)

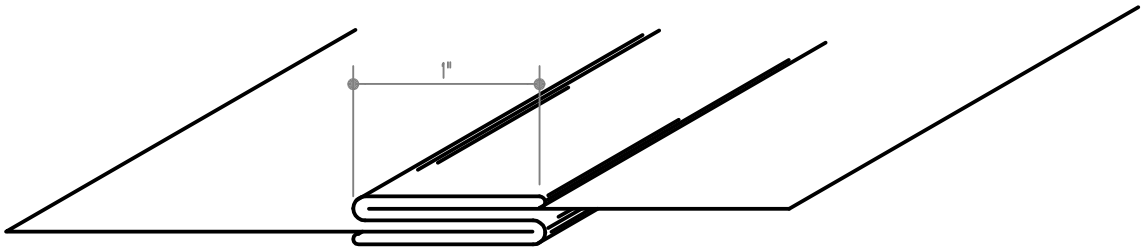
BEND DRIVE CLEAT OVER
AT TOP & BOTTOM
24 GAUGE MINIMUM



INSIDE OF DUCT
DRIVE SLIP FOR SHORT SIDE OF DUCTS AT TRANSVERSE JOINTS UP TO 20"

## S- CLEAT (SMACNA T-6)

24 GAUGE MINIMUM

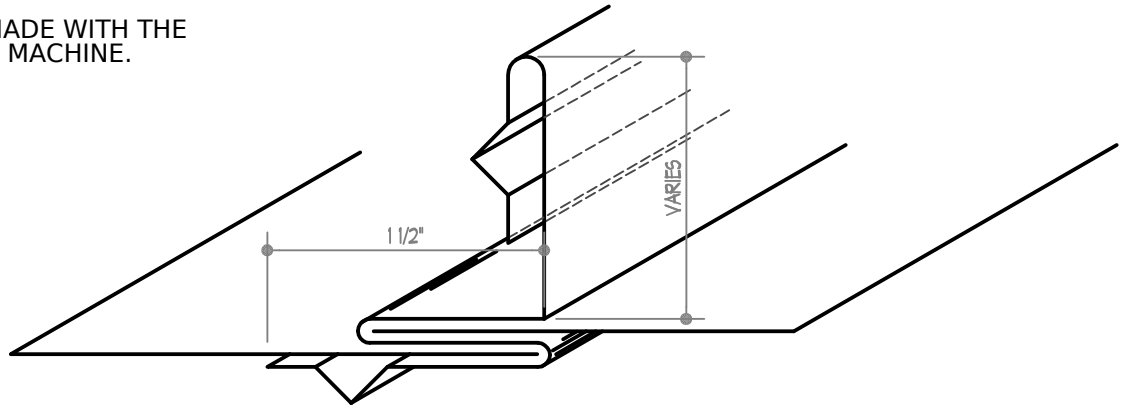



INSIDE OF DUCT

## STANDING S- CLEAT (SMACNA T-12)

24 GAUGE MINIMUM

NOTE:
S SLIPS ARE MADE WITH THE
LOCKFORMER MACHINE.




INSIDE OF DUCT

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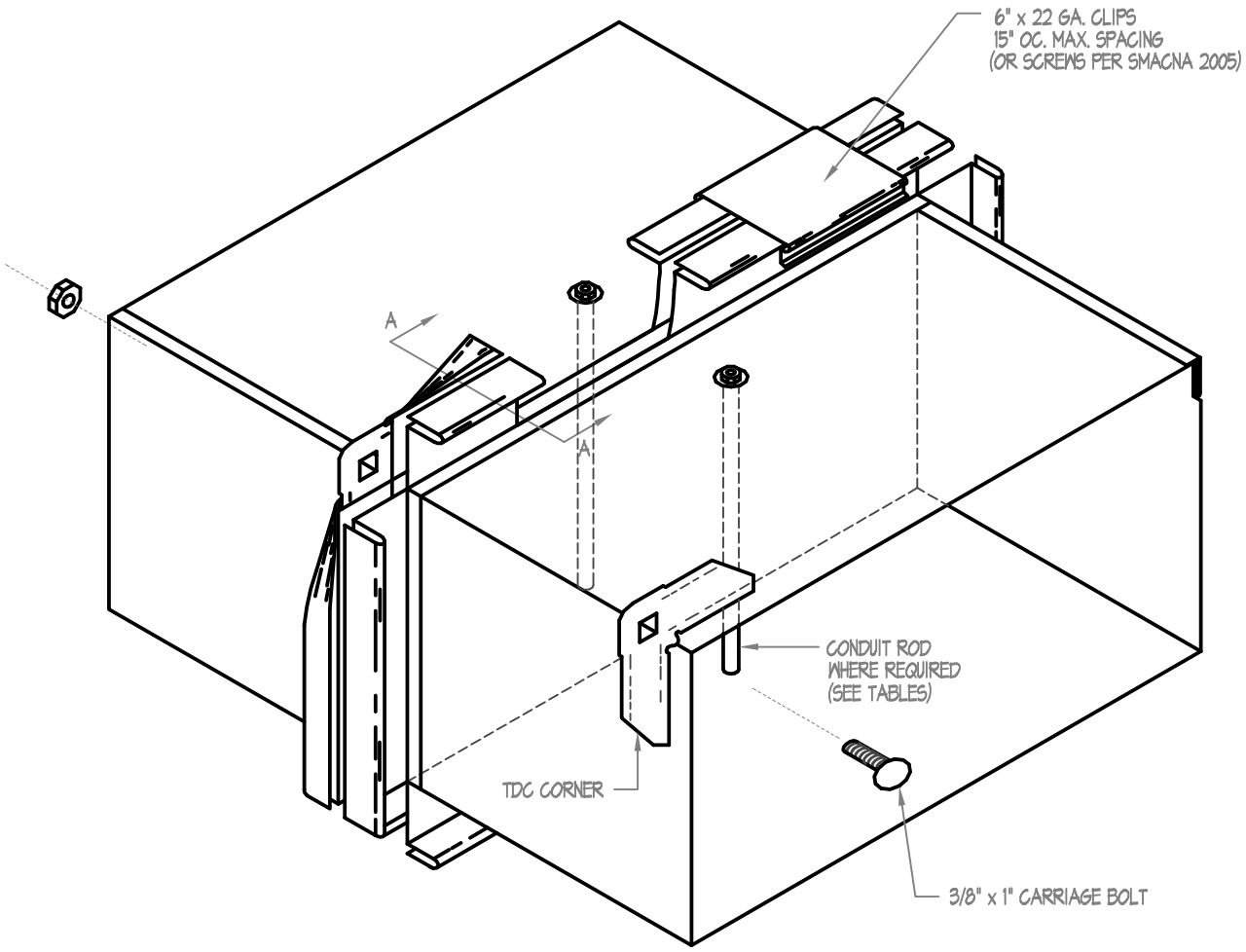
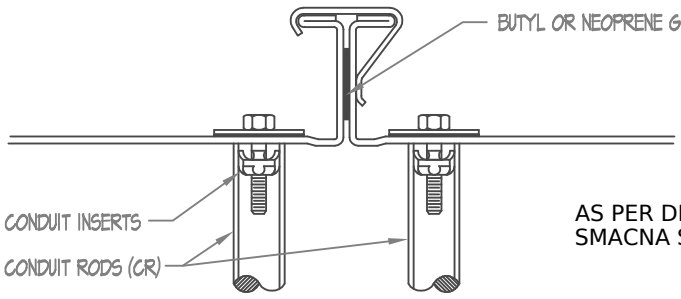
# TRANSVERSE SEAMS "S" AND DRIVE CLEATS

SHEET
3-2




NOTE:
C.R. IS REQUIRED ON BOTH SIDES OF JOINT AS SHOWN IN SECTION A-A TO QUALIFY.




AS PER DETAIL D, FIG. 1-3
SMACNA SECOND EDITION 1995

SECTION "A-A"

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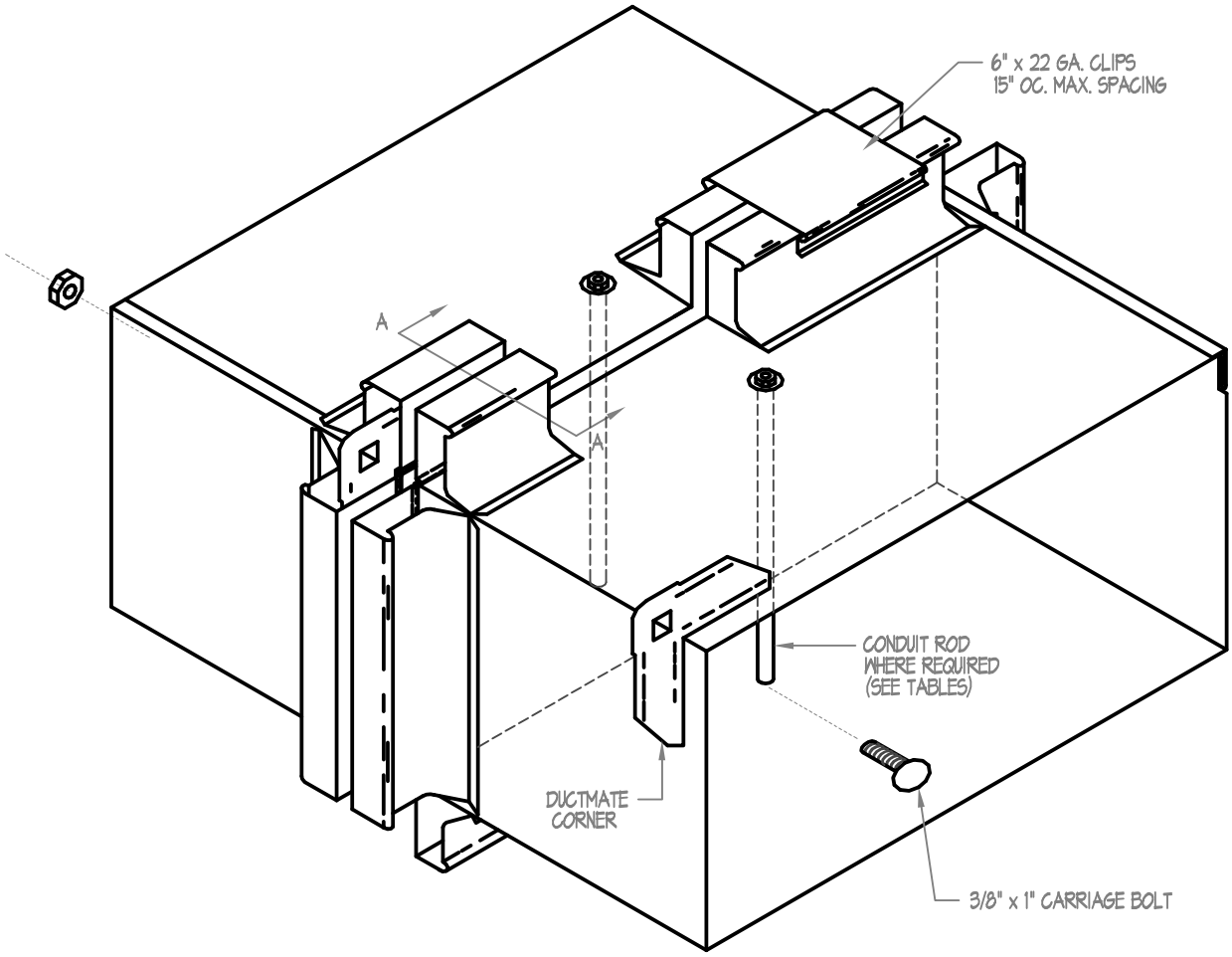
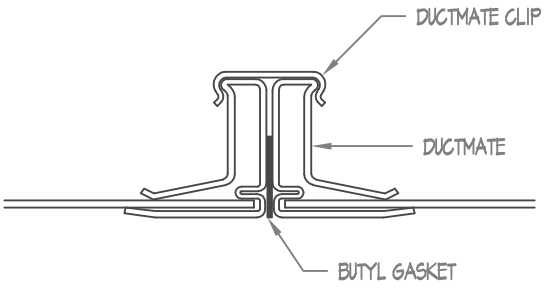
# TRANSVERSE SEAMS - TDC (SMACNA T-25b)

SHEET
3-3




NOTE:
C.R. IS REQUIRED ON BOTH SIDES OF JOINT AS SHOWN IN SECTION A-A TO QUALIFY.




SECTION "A-A"

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# TRANSVERSE SEAMS
# DUCTMATE

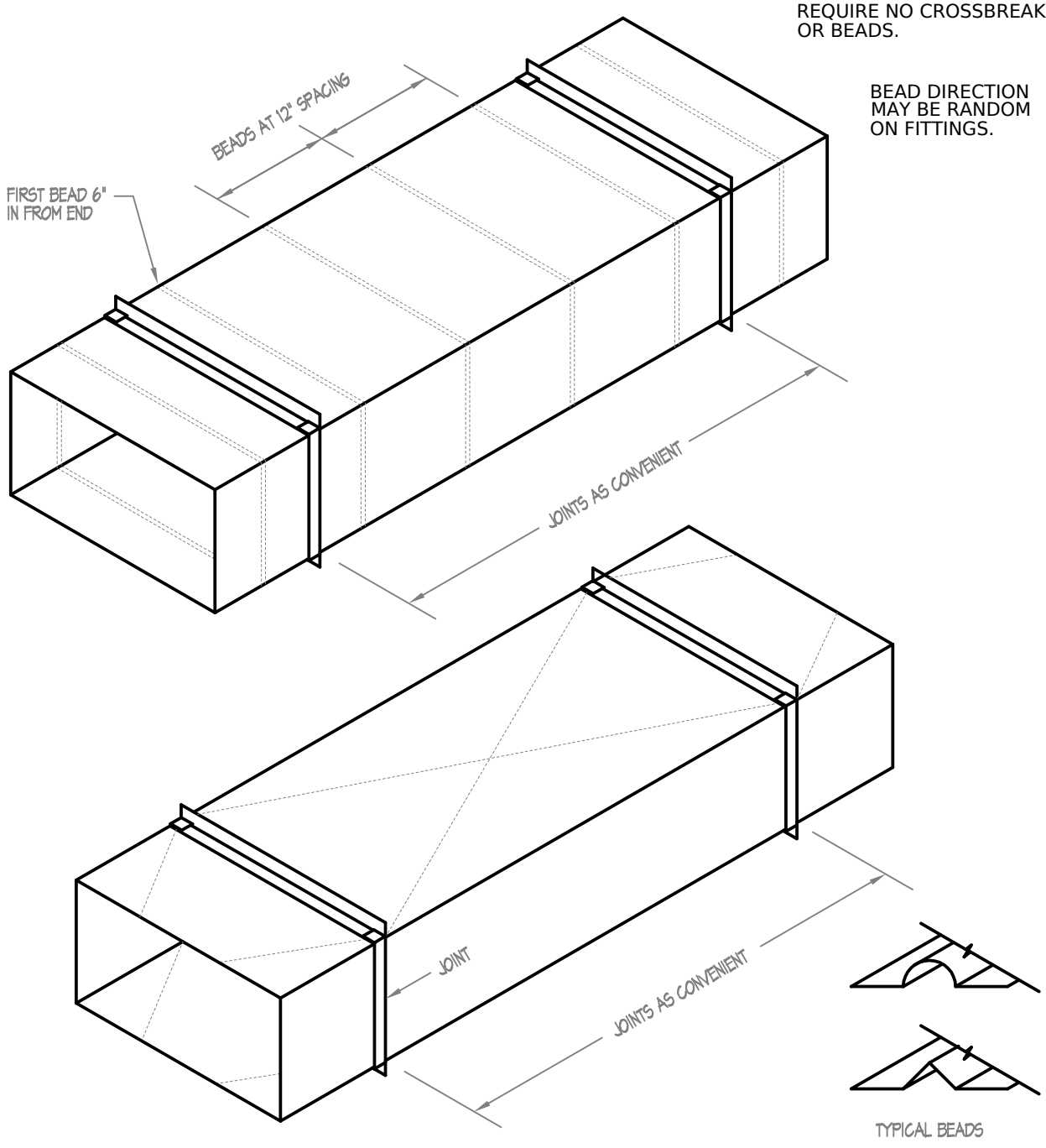
SHEET
3-4

NOTE:

DUCT SIZES 19" WIDE AND LARGER WHICH HAVE MORE THAN 10 SQUARE FEET OR UNBRACED PANEL SHALL BE BEADED OR CROSS BROKEN UNLESS DUCTS WILL HAVE INSULATION COVERING OR ACOUSTICAL LINER. THIS REQUIREMENT IS APPLICABLE TO 20 GAUGE OR LESS THICKNESS AND 3" W.G. OR LESS, IT IS UNNECESSARY TO BREAK OR BEAD ALL SIDES UNLESS EACH DUCT DIMENSION REQUIRES IT.

DUCTS FOR 4"W.G. OR MORE REQUIRE NO CROSSBREAKS OR BEADS.

BEAD DIRECTION MAY BE RANDOM ON FITTINGS.




NOTE:

NEITHER BEADS NOR CROSS BREAKS AFFECT REINFORCEMENT SPACING SCHEDULE.

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# CROSS BROKEN OR BEADED DUCTWORK

SHEET

3-5

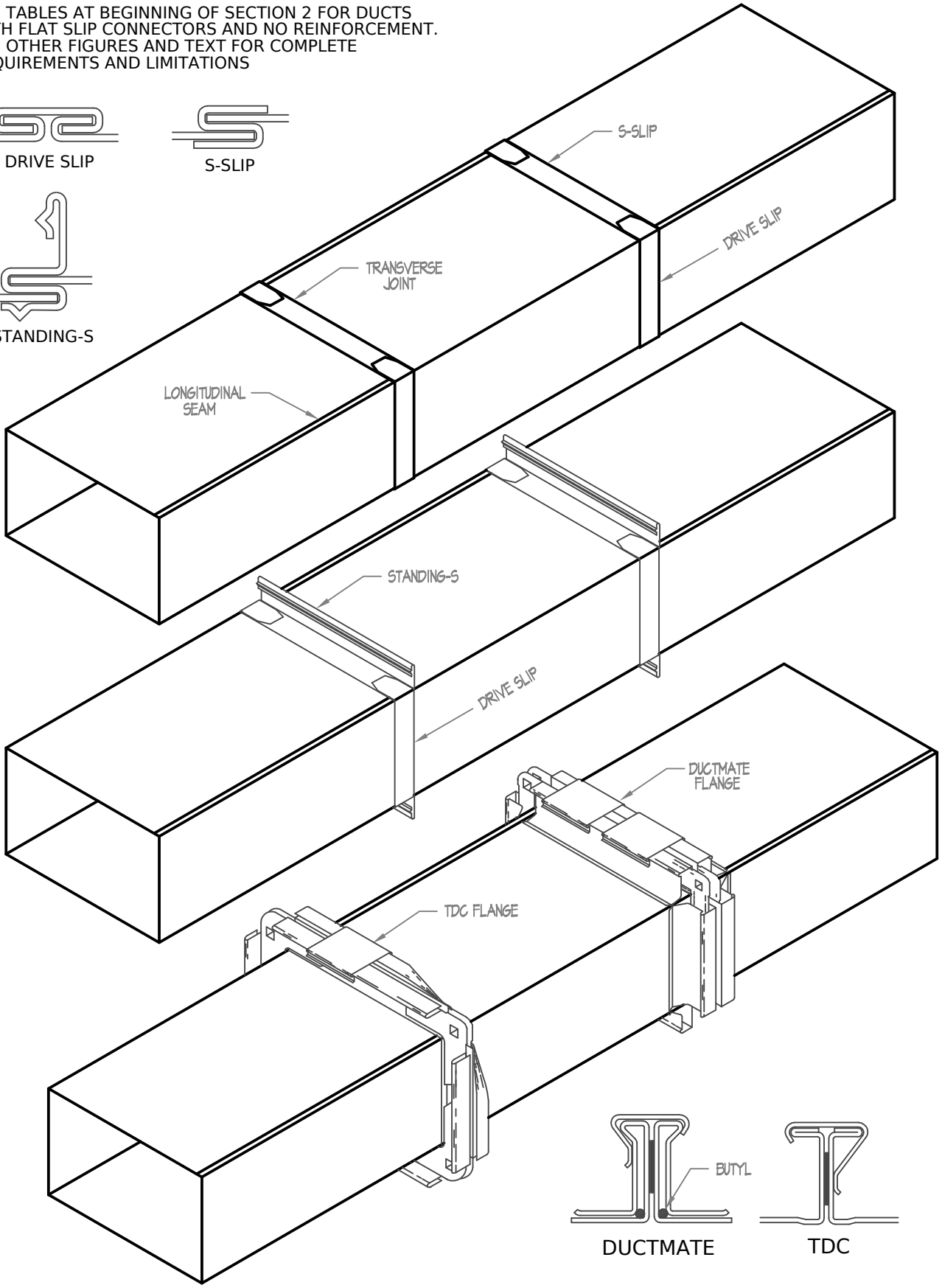
SEE TABLES AT BEGINNING OF SECTION 2 FOR DUCTS
WITH FLAT SLIP CONNECTORS AND NO REINFORCEMENT.
SEE OTHER FIGURES AND TEXT FOR COMPLETE
REQUIREMENTS AND LIMITATIONS

DRIVE SLIP



S-SLIP

STANDING-S







DUCTMATE



TDC

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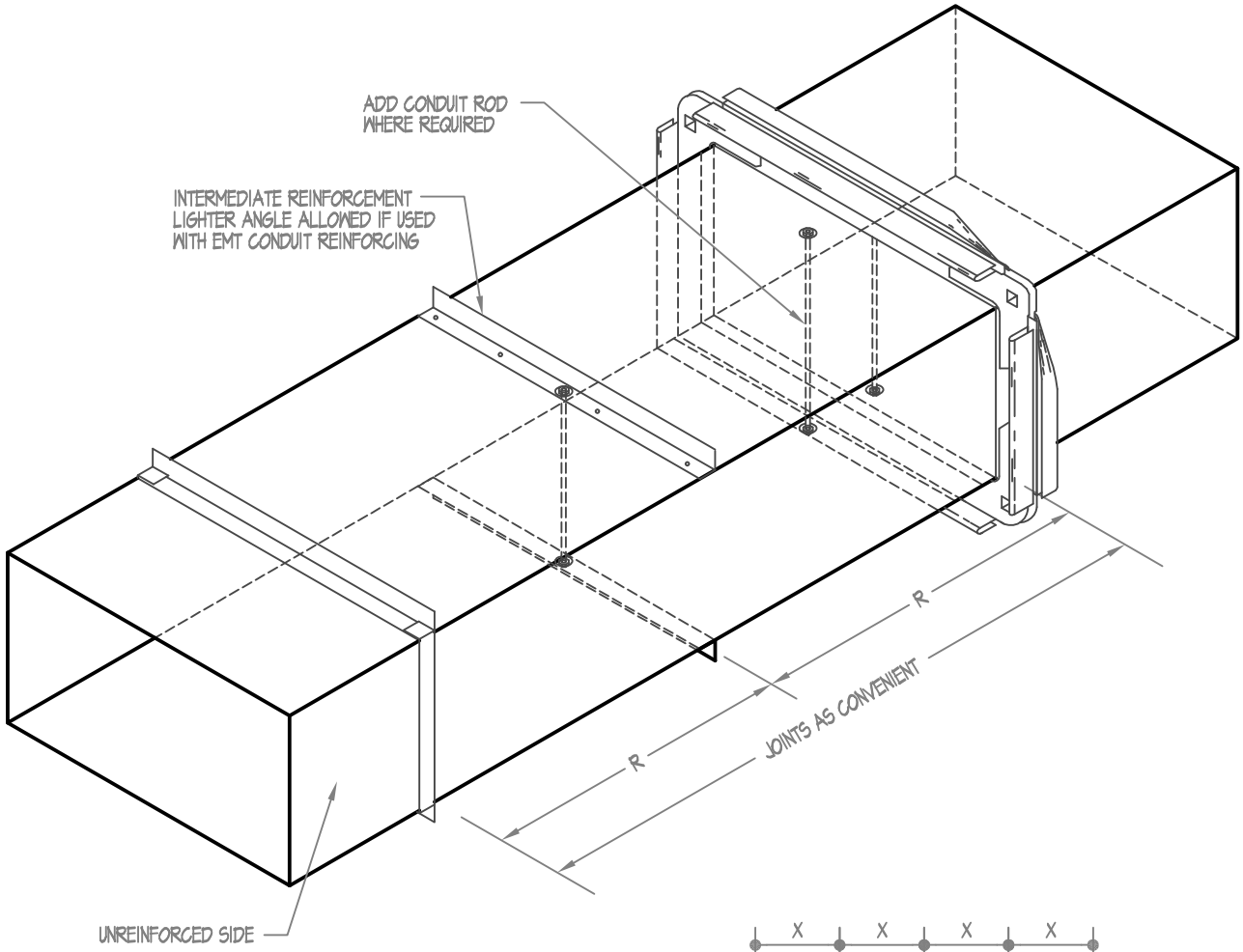
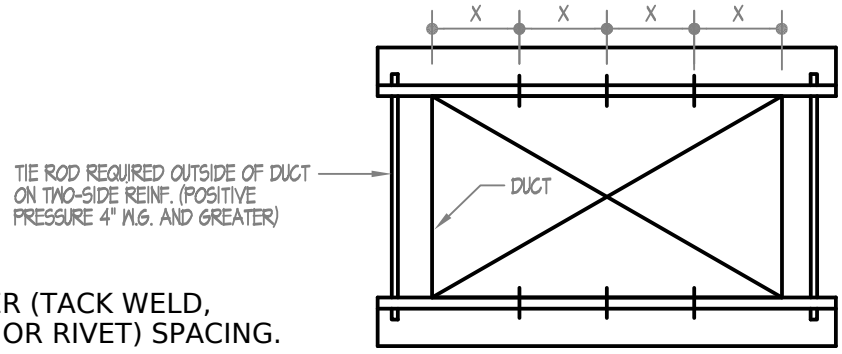
# UNREINFORCED RECTANGULAR DUCTWORK

SHEET
3-6

NOTES:

"R" IS AN ALLOWED REINFORCEMENT INTERVAL
TOP AND BOTTOM JOINTS MUST QUALIFY AS REINFORCEMENT




X = 12" MAXIMUM FASTENER (TACK WELD, *SPOTWELD, BOLT, SCREW, OR RIVET) SPACING.

FASTENER MUST BE WITHIN 2" OF SIDE OF DUCT WHEN END TIES ARE NOT REQUIRED. WHEN END TIES ARE USED, 2" INTERVAL MAY BE OMITTED.

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# DUCT REINFORCED ON TWO SIDES WITH ANGLE

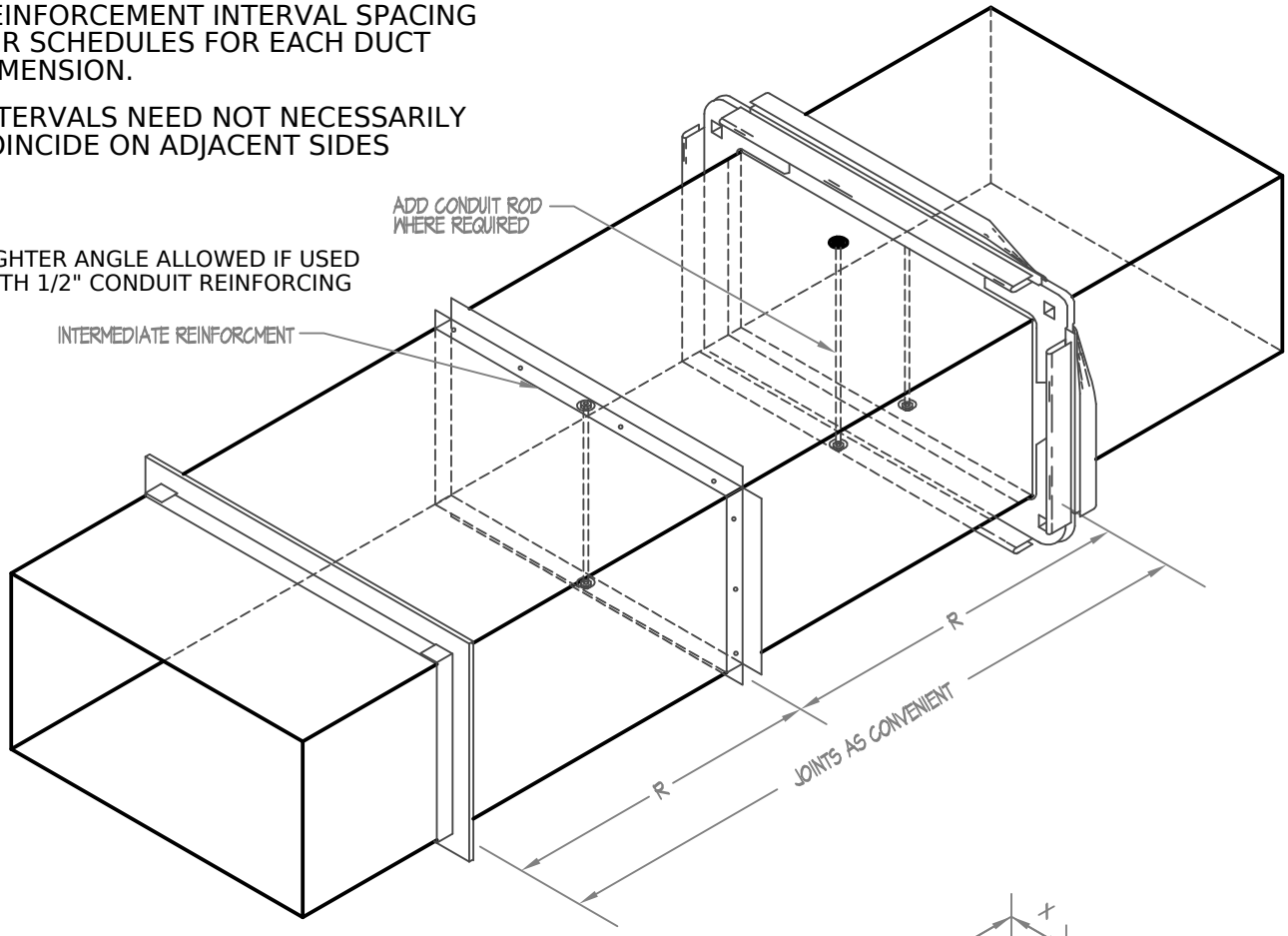
SHEET
3-7

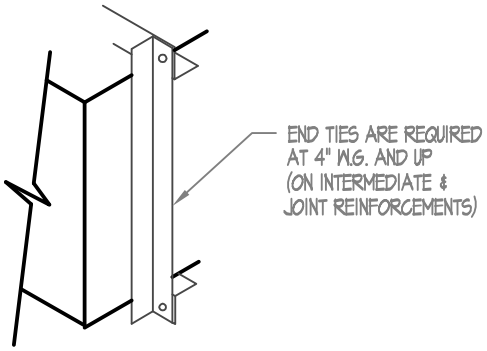
NOTES:

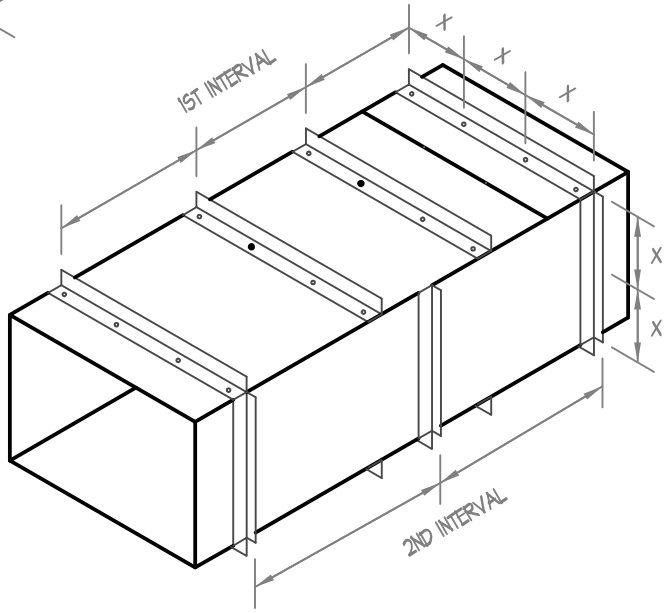
REINFORCEMENT INTERVAL SPACING PER SCHEDULES FOR EACH DUCT DIMENSION.

INTERVALS NEED NOT NECESSARILY COINCIDE ON ADJACENT SIDES

LIGHTER ANGLE ALLOWED IF USED WITH 1/2" CONDUIT REINFORCING




X = 12" MAXIMUM FASTENER (TACK WELD, *SPOTWELD, BOLT, SCREW, OR RIVET) SPACING.

FASTENER MUST BE WITHIN 2" OF SIDE OF DUCT WHEN REINFORCING IS NOT ADJACENT. WHEN REINFORCING IS ADJACENT, 2" INTERVAL MAY BE OMITTED. WHEN REINFORCING OCCURS AT THE SAME LOCATION ON ADJACENT SIDES OF DUCT, TIE THE ENDS WITH 5/16" BOLTS OR ADEQUATE WELDS. WHEN WELDING USE TWO PARALLEL WELDS.

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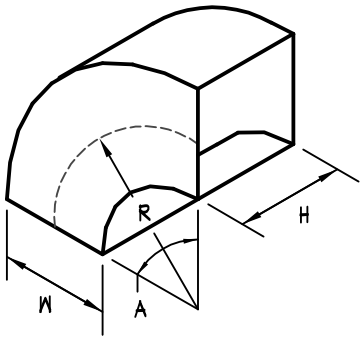
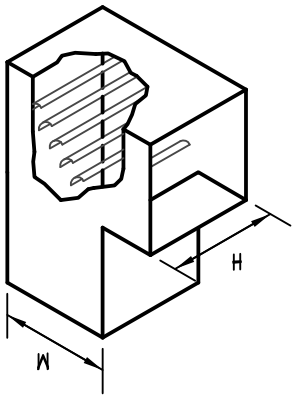
# DUCT REINFORCED ON ALL SIDES WITH ANGLE

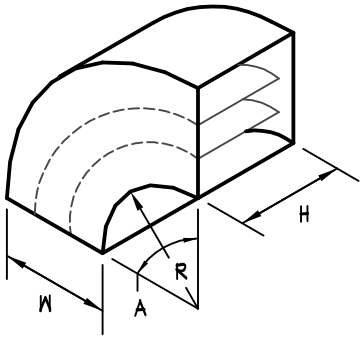
SHEET
3-8



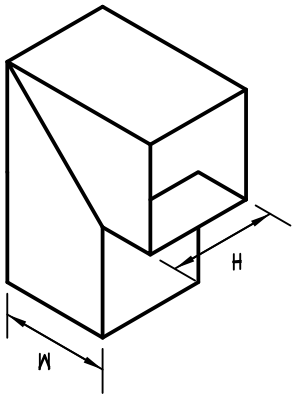

RADIUS ELBOW
(CENTERLINE RADIUS = 1 1/2xW = STD RADIUS)



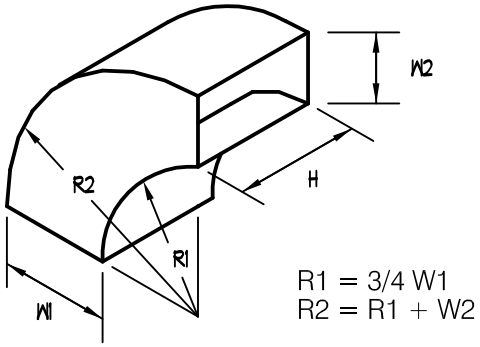

SQUARE THROAT ELBOW
WITH VANES
(SEE SECTION 7)




RADIUS ELBOW WITH VANES
(VANE SPACING PER SMACNA)
(SEE PAGE 3-10 AND SECTION 7)
*USE ONLY WHERE ABSOLUTELY REQ.

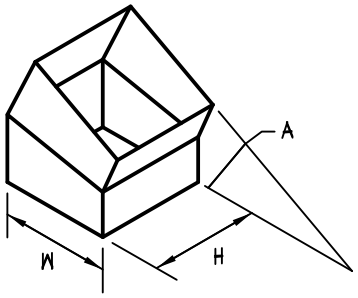



SQUARE THROAT ELBOW
WITHOUT VANES
(1000 FPM MAXIMUM VELOCITY)




R1 = 3/4 W1
R2 = R1 + W2

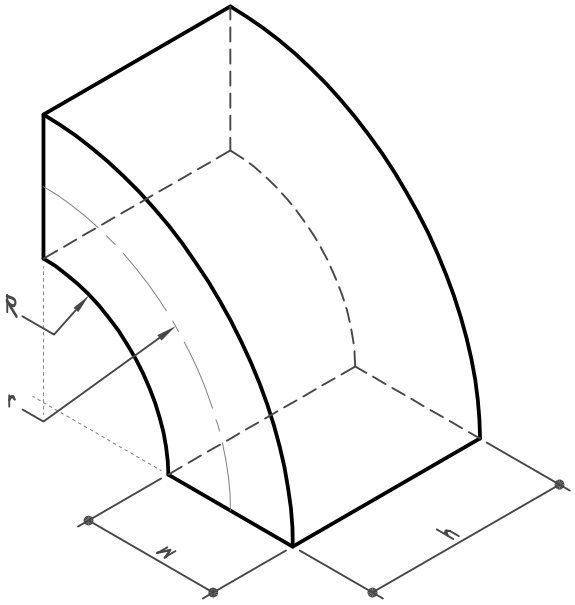
DUAL RADIUS ELBOW




MITERED ELBOW
(WHERE A ≤ 30°)

r = CENTERLINE RADIUS
R = INSIDE RADIUS
w = DUCT WIDTH
h = DUCT HEIGHT

COMPUTE: $\frac{r}{w}$




NUMBER OF VANES

WHEN:

$\frac{r}{w} \geq 1.50"$ ⟶ VANES NOT REQUIRED

$1.50" > \frac{r}{w} \geq 0.70"$ ⟶ 1 VANE REQUIRED

$0.70" > \frac{r}{w} \geq 0.60"$ ⟶ 2 VANES REQUIRED

$0.60" > \frac{r}{w} \geq 0.55"$ ⟶ 3 VANES REQUIRED

THIS SHEET IS ONLY USED IF RADIAL VANE ELBOWS ARE REQUIRED AND/OR PERMITTED.

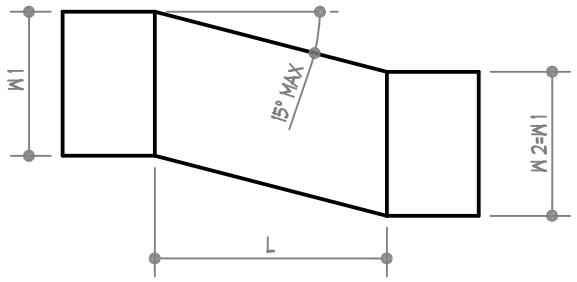
## NOTES:

IF r / w = 0.50" OR LESS USE A SQUARE THROAT ELBOW.
HOWEVER, INSIDE RADIUS R SHOULD BE 2" MINIMUM.

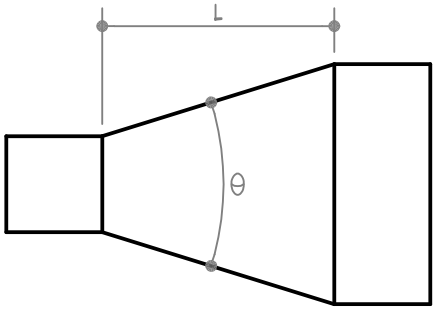
USE TABLE FROM PAGE A.41 IN "HVAC CONSTRUCTION STANDARDS METAL and FLEXIBLE" SECOND EDITION TO DETERMINE OPTIMAL SPACING FOR VANES.

PROVIDE "LISTING" WITH R (INSIDE RADIUS) AND THEN THE DISTANCE TO THE NEXT VANE (AND THEN TO THE NEXT IF NEEDED).

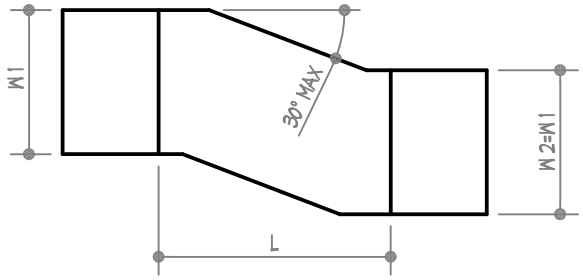
ANGLED OFFSETS, OGEE OFFSETS AND TRANSITIONS MAY HAVE UNEQUAL INLET AND OUTLET AREAS. TRANSITIONS MAY CONVERT DUCT PROFILES TO ANY COMBINATION FOR RECTANGULAR, ROUND OR FLAT OVAL SHAPES.



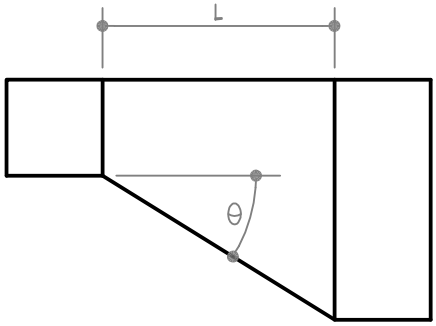

ANGLED



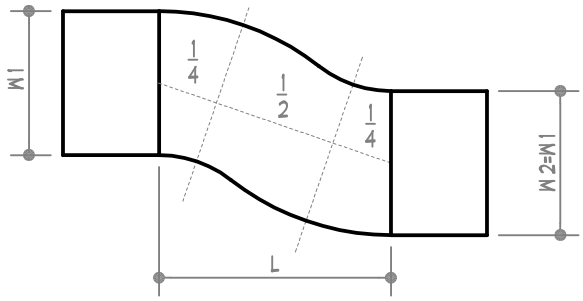

CONCENTRIC TRANSITION
θ MAX. 45° DIVERGING, 60° CONVERGING



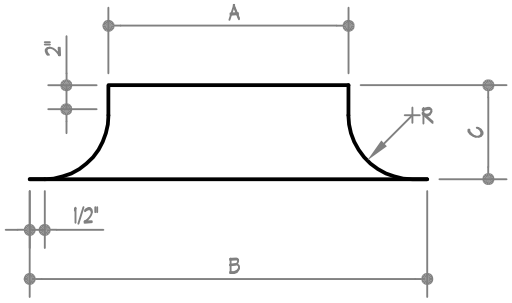

MITERED




ECCENTRIC TRANSITION
θ MAX. 30°
(EXCEPT 45° IS PERMITTED AT ROUND TO FLAT OVAL)




RADIUSSED
(OGEE)




STANDARD BELLMOUTH
(ON SHORT PATTERN BELL C=3", B=A+4)

BEAD, CROSSBREAK & REINFORCE FLAT SURFACES AS IN STRAIGHT DUCT.

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# OFFSETS AND TRANSITIONS RECTANGULAR DUCTWORK

SHEET
3-11

FIGURE "A" IS APPLICABLE FOR UP TO 20% AREA OBSTRUCTION WITH ROUND SHAPED MEMBER AND 10% WITH FLAT PROFILE. "y" IS THE DISTANCE FROM DUCT CENTER.

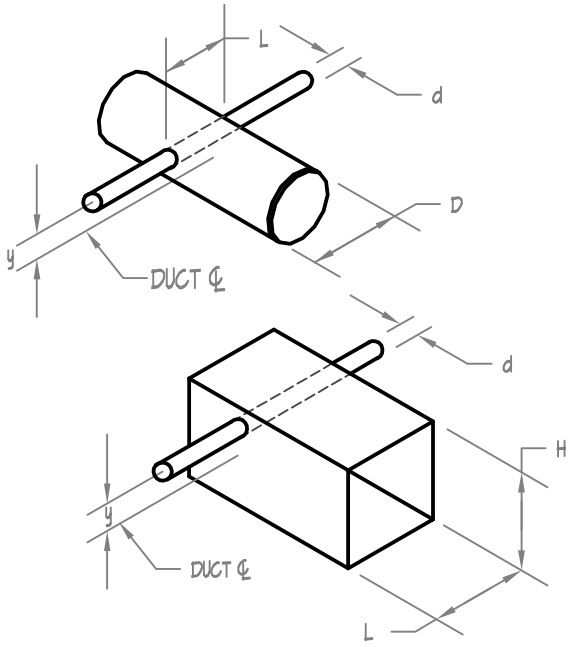



FIGURE A

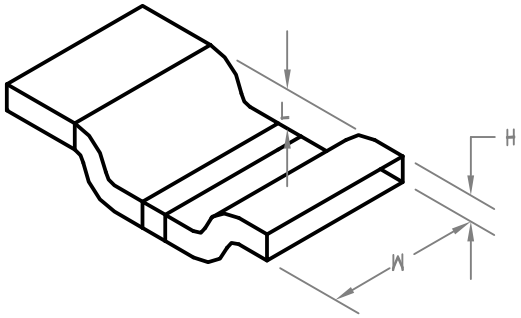
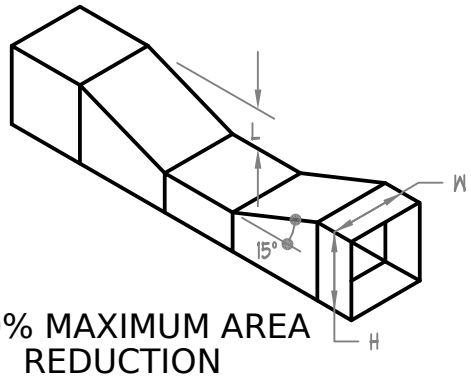
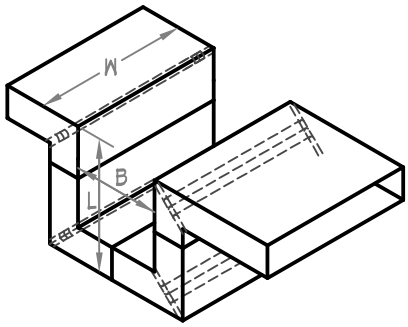


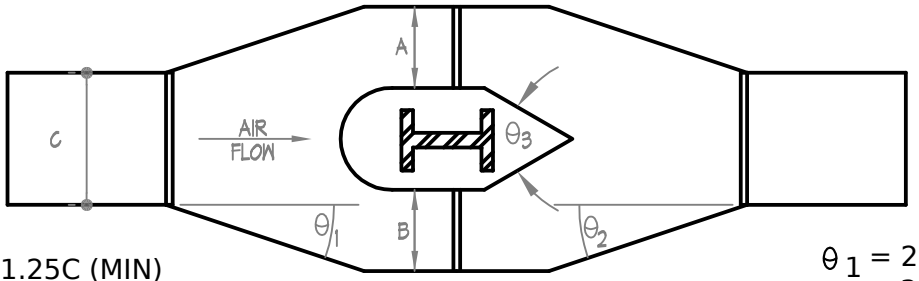

FIGURE B




20% MAXIMUM AREA REDUCTION




VANES MUST DIRECT FLOW PARALLEL TO DUCT WALL




A + B = 1.25C (MIN)
AT CONSTANT DEPTH

$\theta_1$ = 20° MAX.
$\theta_2$ = 30° MAX.
$\theta_3$ = 60° MAX.

USED WHEN OBSTRUCTION EXCEEDS 20% OF SECTION AREA AND OFFSETS AROUND ARE NOT POSSIBLE

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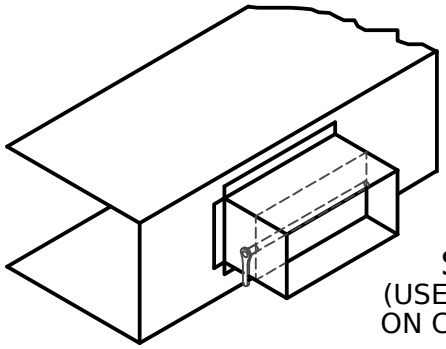
# OBSTRUCTIONS RECTANGULAR DUCTWORK

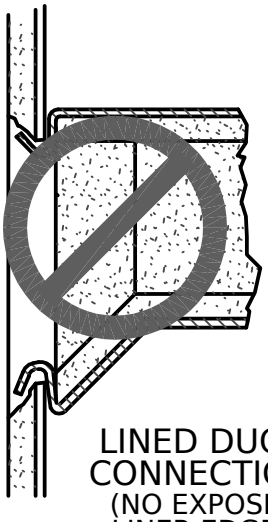
SHEET
3-12

OPTIONS:

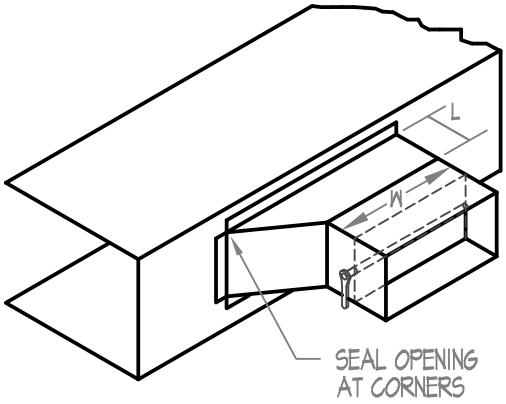
1) SCREWED BUTT-FLANGE CONNECTION
2) CLINCH-LOCK (HAMMER LOCK) CONNECTION
3) STEP DOWN CONNECTION (@ SOUND LINED DUCTS TAPS)
4) VOLUME DAMPERS AS REQUIRED



STRAIGHT TAP
(USE ONLY WHERE SHOWN ON CONTRACT DRAWINGS)

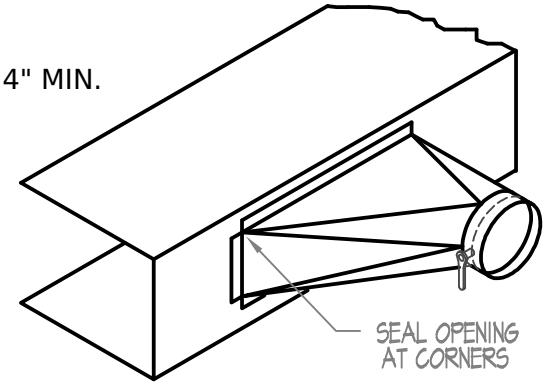


LINED DUCT CONNECTION
(NO EXPOSED LINER EDGES)

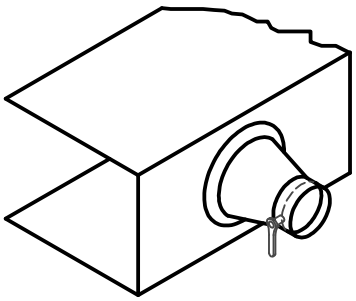



L= 1/4W, 4" MIN.

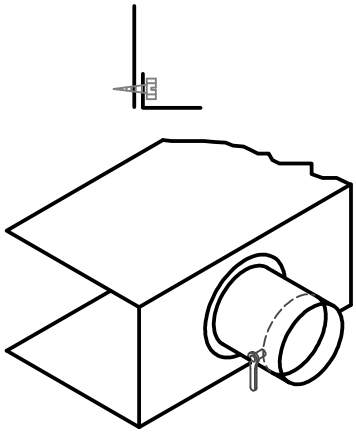
45° DEGREE ENTRY - A = 45°




45° DEGREE ENTRY

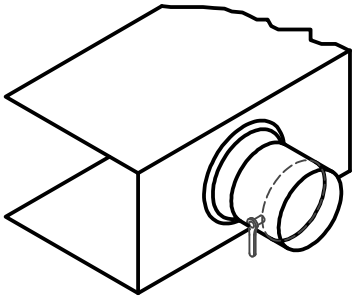


CONICAL
(FLANGED OR SPIN-IN)



FLANGED

PROFILE VARIES



SPIN IN

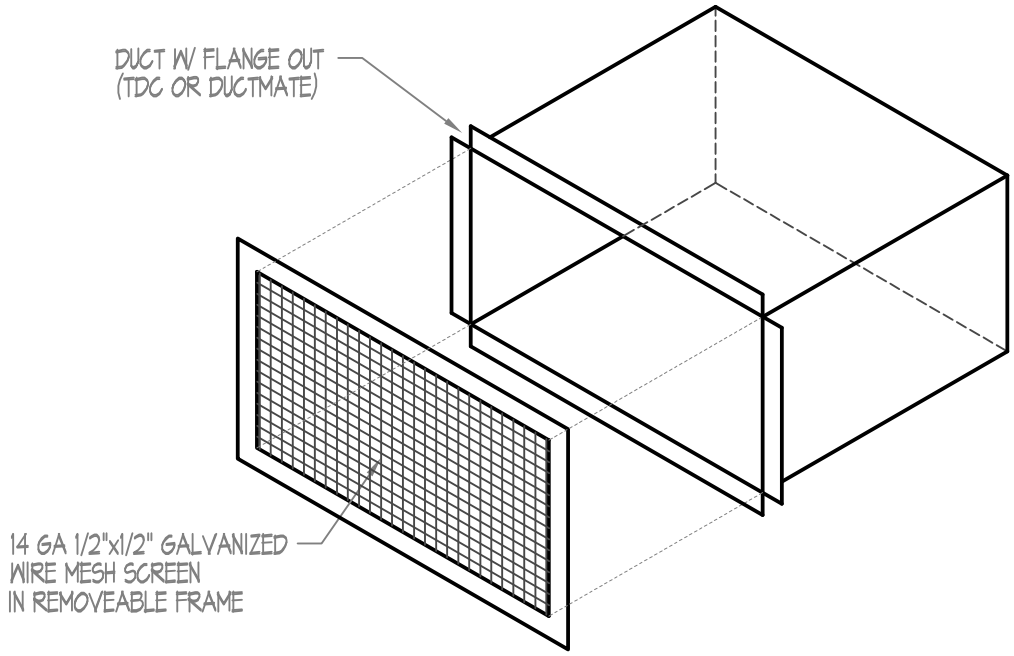
NOTES:

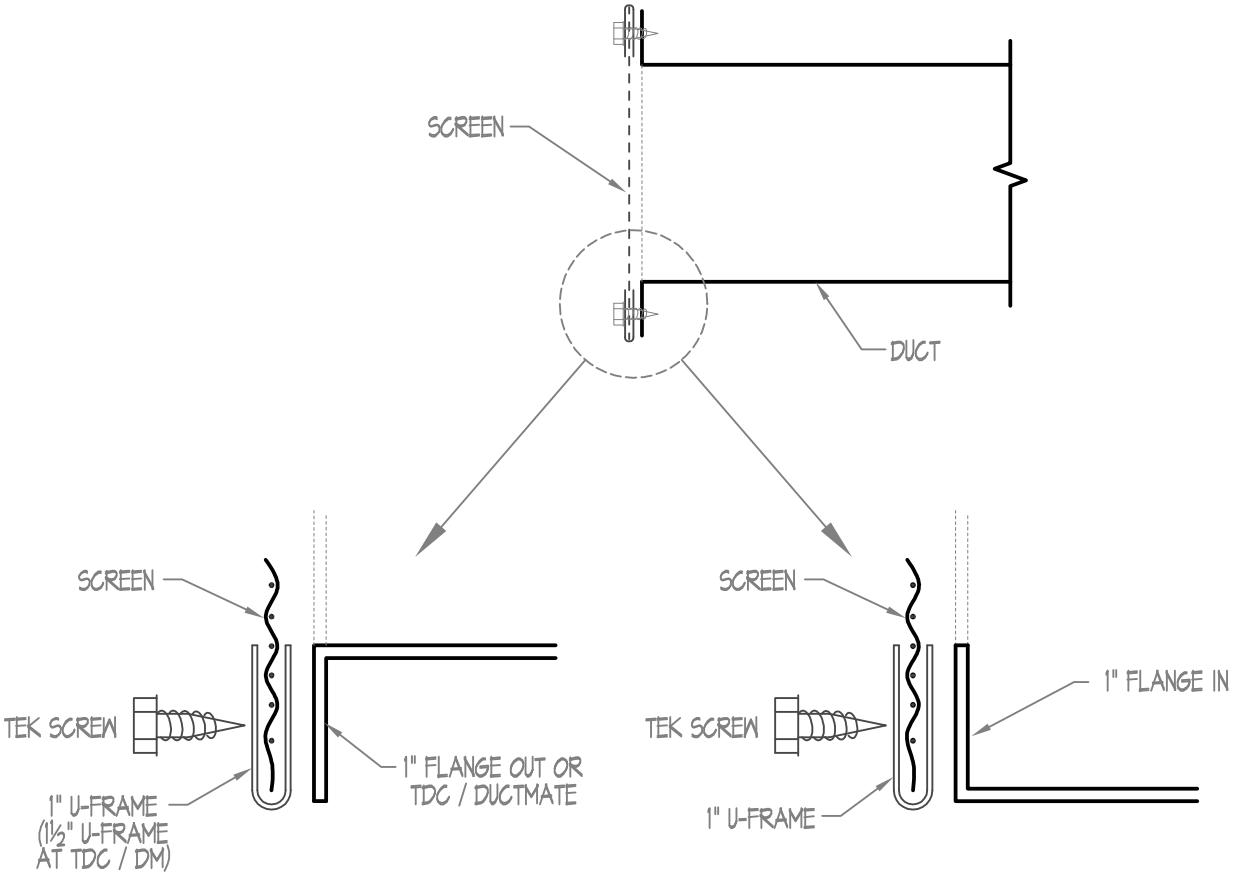
FIT CONNECTIONS TO AVOID VISIBLE OPENINGS. SECURE AND SEAL THEM SUITABLE FOR PRESSURE CLASS.

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

BRANCH CONNECTIONS
RECTANGULAR DUCTWORK

SHEET
3-13




AT FLANGE OUT

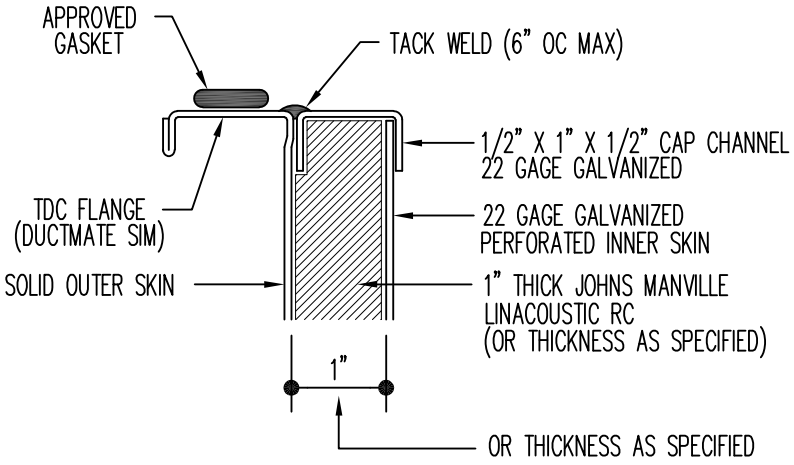
AT FLANGE IN

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

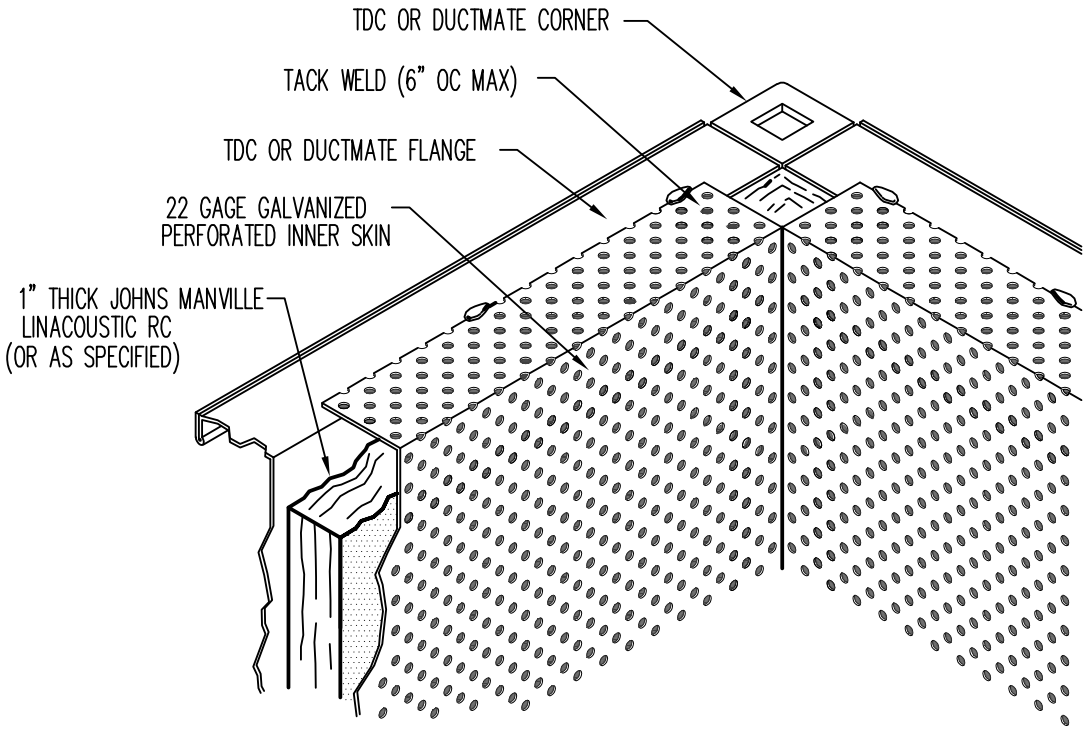
# SCREENED OPENINGS RECTANGULAR DUCTWORK

SHEET
3-14

REVISION DATE: 04-13-12




## OPTIONAL CAP CHANNEL




## CUTAWAY DRAWING SHOWING THE STANDARD TDC DESIGN OF THE OUTER SHELL AND INNER LINER

**(DUCTMATE CONNECTION SIMILAR)**

# SECTION 4

## ROUND AND OVAL DUCTWORK

### GENERAL NOTES FOR ROUND AND OVAL DUCTWORK

NOTES:

1) The following duct construction tables are in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005, inclusive of functional criteria (Chapter 11).

2) All galvanized sheet steel to be of ASTM 653 with G-90 galvanized coating.

per job specs

3) All stainless sheet steel to be type 304 of ASTM A-240 and A-480 with a 2B finish (unless otherwise noted).

4) When called for, reinforcing angle to be prime coated black iron where installed on galvanized duct, stainless steel where installed on stainless steel duct, and aluminum where installed on aluminum duct.

5) At contractor's option, in lieu of male couplers and Vanstone or companion flanges on non-welded round and flat oval duct, E-Z Flange connectors by Sheet Metal Connectors, Inc. or equivalent may be used (product data included at end of this section).

6) At contractor's option, Quick-Sleeve round duct connectors by Ductmate Industries may be used at round duct connections (product data included at end of this section).

# POSITIVE PRESSURE UNREINFORCED ROUND DUCTWORK GAGE SELECTION (GALVANIZED STEEL)

| POSITIVE PRESSURE TO 10" WG | | | |
|---|---|---|---|
| MAXIMUM DUCT DIAMETER IN INCHES | LONG. SEAM GAGE | SPIRAL SEAM GAGE | DUCT CONNECTION |
| TO 24 | 24 | 26 | MALE COUPLER |
| 25 TO 29 | 22 | 24 | MALE COUPLER |
| 30 TO 42 | 22 | 24 | E-Z FLANGE |
| 43 TO 60 | 20 | 22 | E-Z FLANGE |
| 61 TO 66 | 18 | 22 | E-Z FLANGE |
| 67 TO 96 | 18 | 20 | E-Z FLANGE |

THIS TABLE PER SMACNA HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE - THIRD EDITION (2005) TABLE 3-5

# NEGATIVE PRESSURE ROUND DUCT GAGE SELECTION (GALVANIZED STEEL)

| MAXIMUM DUCT DIAMETER (INCHES) | MAXIMUM 2" W.G. STATIC NEGATIVE | | MAXIMUM 4" W.G. STATIC NEGATIVE | | MAXIMUM 6" W.G. STATIC NEGATIVE | | MAXIMUM 10" W.G. STATIC NEGATIVE | |
|---|---|---|---|---|---|---|---|---|
| | LONG. SEAM (FITTING) GAGE | SPIRAL SEAM GAGE | LONG. SEAM (FITTING) GAGE | SPIRAL SEAM GAGE | LONG. SEAM (FITTING) GAGE | SPIRAL SEAM GAGE | LONG. SEAM (FITTING) GAGE | SPIRAL SEAM GAGE |
| TO 10 | 24 | 26 | 24 | 26 | 24 | 26 | 24 | 26 |
| 12 | 24 | 26 | 24 | 26 | 24 | 24 | 22 | 24 |
| 14 | 24 | 26 | 22 | 24 | 22 | 24 | 20 | 22 |
| 16 | 24 | 26 | 22 | 24 | 20 | 22 | 18 | 22 |
| 18 | 22 | 24 | 20 | 22 | 20 | 22 | 18 | 20 |
| 20 | 22 | 24 | 20 | 22 | 18 | 20 | 18 | 18 |
| 22 | 22 | 22 | 18 | 20 | 18 | 20 | 16 | 18 |
| 24 | 20 | 22 | 18 | 20 | 18 | 18 | 16 | 18 |
| 29 | 24 (A-10) | 26 (A-10) | 22 (A-10) | 26 (A-10) | 22 (A-10) | 24 (A-10) | 20 (A-10) | 22 (A-10) |
| 30 | 24 (A-10) | 26 (A-10) | 22 (A-10) | 26 (A-10) | 22 (A-10) | 24 (A-10) | 20 (A-10) | 22 (A-10) |
| 36 | 24 (A-10) | 26 (A-10) | 22 (A-10) | 24 (A-10) | 20 (A-10) | 22 (A-10) | 18 (B-10) | 22 (B-10) |
| 42 | 24 (A-10) | 26 (A-10) | 22 (A-10) | 24 (A-10) | 20 (B-10) | 22 (B-10) | 18 (B-10) | 20 (B-10) |
| 48 | 22 (A-10) | 26 (A-10) | 20 (B-10) | 22 (B-10) | 18 (B-10) | 22 (B-10) | 18 (C-10) | 20 (C-10) |
| 54 | 22 (A-10) | 24 (A-10) | 20 (B-10) | 22 (B-10) | 18 (C-10) | 20 (C-10) | 16 (C-10) | 18 (C-10) |
| 60 | 22 (B-10) | 24 (B-10) | 20 (B-10) | 22 (B-10) | 18 (C-10) | 20 (C-10) | 16 (E-10) | 18 (E-10) |
| 66 | 22 (B-10) | 24 (B-10) | 18 (C-10) | 22 (C-10) | 18 (D-10) | 20 (D-10) | 16 (E-10) | 18 (E-10) |
| 72 | 20 (B-10) | 24 (B-10) | 18 (C-10) | 20 (C10) | 18 (E-10) | 20 (E-10) | 16 (E-10) | 18 (E-10) |
| 78 | 20 (C-10) | 22 (C-10) | 18 (D-10) | 20 (D10) | 16 (E-10) | 18 (E-10) | 18 (E-5) | 18 (F-10) |
| 84 | 20 (C-10) | 22 (C-10) | 18 (E-10) | 20 (E10) | 16 (E-10) | 18 (E-10) | 16 (E-5) | 18 (E-6) |
| 90 | 20 (C-10) | N/A | 18 (E-10) | N/A | 16 (F-10) | N/A | 16 (E-5) | N/A |
| 96 | 20 (D-10) | N/A | 16 (E-10) | N/A | 16 (G-10) | N/A | 16 (F-5) | N/A |

MALE COUPLER — E-Z FLANGE — COMPANION FLANGE

THE ALPHABET LETTER IN THE TABLE MEANS THAT REINFORCING ANGLES OR THEIR EQUIVALENT MUST BE USED AT THE FOOT INTERVAL FOLLOWING THE LETTER. THE ANGLE SIZES ARE AS FOLLOWS:

A= 1 X 1 X 1/8"
B= 1-1/4 X 1-1/4 X 3/16"
C= 1-1/2 X 1-1/2 X 3/16"
D= 1-1/2 X 1-1/2 X 1/4"
E= 2 X 2 X 3/16"
F= 2 X 2 X 1/4"
G= 3 X 3 X 1/4"

IF COMPANION FLANGE JOINTS ARE USED AS REINFORCEMENTS, THEY ARE AS FOLLOWS:

UP TO 9" DIAMETER = 1 X 1 X 1/8"
10" TO 12" DIAMETER = 1-1/4 X 1-1/4 X 1/8"
13" TO 25" DIAMETER = 1-1/2 X 1-1/2 X 3/16"
26" TO 48" DIAMETER = 2 X 2 X 3/16"
49" TO 60" DIAMETER = 2-1/2 X 2-1/2 X 3/16"
61" TO 96" DIAMETER = 3 X 3 X 1/4

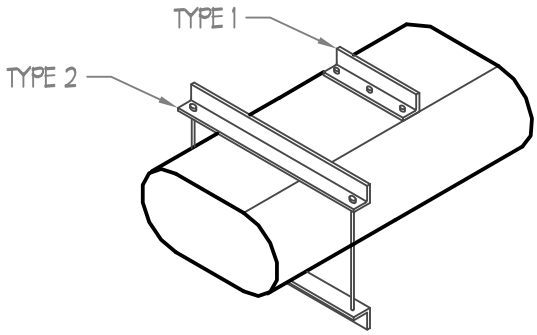
# POSITIVE PRESSURE FLAT OVAL DUCT GAGE SELECTION

(GALVANIZED STEEL)

| FLAT OVAL DUCT CONSTRUCTION<br>POSITIVE PRESSURE TO 10 IN. WG | | | |
|---|---|---|---|
| MAJOR DIMENSION DUCT WIDTH (INCHES) | LONG. SEAM DUCT GAGE | SPIRAL SEAM DUCT GAGE | FITTING GAGE |
| TO 24 | 20 | 24 | 20 |
| 25 TO 30 | 20 | 22 | 20 |
| 31 TO 36 | 20 | 22 | 20 |
| 37 TO 42 | 18 | 22 | 18 |
| 43 TO 48 | 18 | 22 | 18 |
| 49 TO 54 | 18 | 20 | 18 |
| 55 TO 60 | 18 | 20 | 18 |
| 61 TO 66 | 16 | 20 | 16 |
| 67 AND UP | 16 | 18 | 16 |

THIS TABLE PER SMACNA HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE - THIRD EDITION (2005) TABLE 3-15

REINFORCEMENT FOR FLAT SIDES OF OVAL DUCT SHALL BE OF THE SAME SIZE AND SPACING INTERVAL AS SPECIFIED FOR RECTANGULAR DUCT OR SHALL OTHERWISE BE PROVIDED TO LIMIT WALL DEFLECTION TO 3/4" AND REINFORCEMENT DEFLECTION TO 1/4".



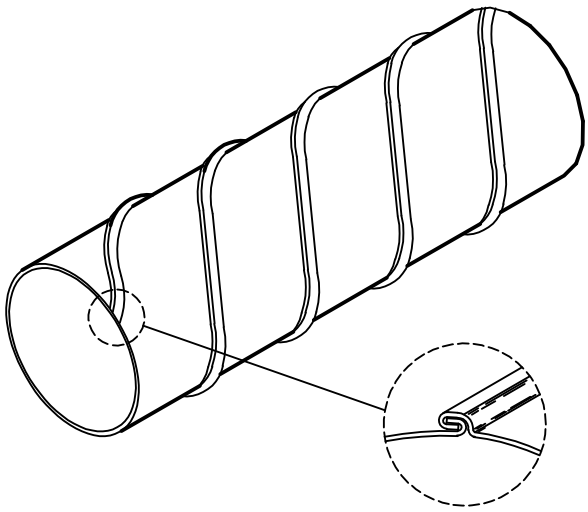

REINFORCEMENT LIMITS
TYPE 1 - UP TO 3"W.G.
TYPE 2 - 4"W.G. AND GREATER

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

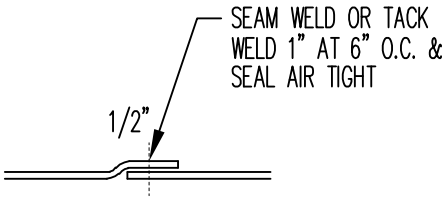
FLAT OVAL DUCT GAGE THICKNESS SELECTION

SHEET 4-3

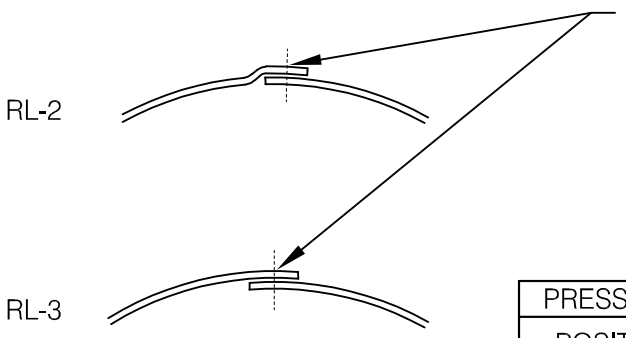
REVISION DATE: 07/10/08



SPIRAL SEAM
RL-1



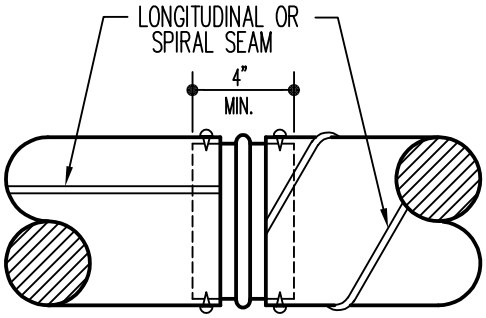

TRANSVERSE SEAMS




BUTT WELD
(OR LAPPED &
SEAM WELDED)

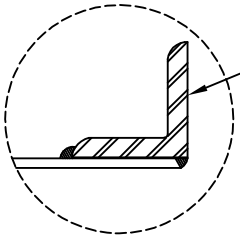
| PRESSURE CLASS | SEAM TYPE PERMITTED |
|---|---|
| POSITIVE | |
| TO + 10" W.G. | RL-1, 4, (2*, 3*) |
| TO + 4" W.G. | RL-1, 2, 3, 4, |
| TO + 2" W.G. | ALL |
| NEGATIVE | |
| TO - 10" W.G. | RL-1,4 (2*, 3*) |
| TO - 4" W.G. | RL-1, 2, 3, 4, |
| TO - 1" W.G. | ALL |

* ACCEPTABLE IF SPOTWELDED ON 1" INTERVALS
OR TACK WELDED ON 3" INTERVALS.

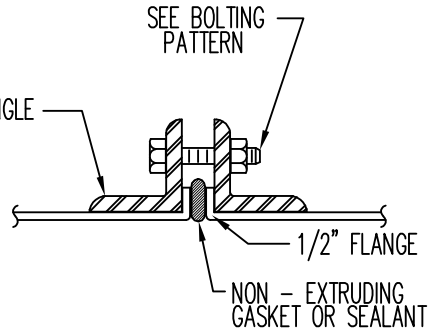



BEADED SLEEVE JOINT
RT-1

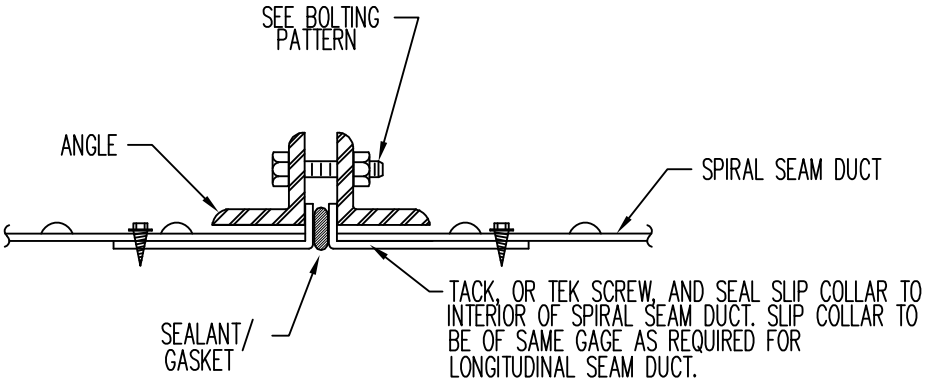
SLEEVE TO BE AT LEAST
DUCT GAGE




RT-2A COMPANION FLANGE
(TACK WELD OR MECH.
FASTEN @ 8" O.C.)




VANSTONE FLANGE
JOINT RT-2




VANSTONE FLANGE JOINT
( RT-2 ) AT SPIRAL SEAM DUCT

ON JOINTS RT 1, AND 6 SCREWS MUST BE USED AT UNIFORM INTERVALS 15" MAXIMUM ALONG THE CIRCUMFERENCE; THREE SCREWS MINIMUM ON 14" OR LESS DIAMETER.

LONGITUDINAL OR SPIRAL SEAM DUCT IS ACCEPTABLE FOR ALL JOINTS EXCEPT RT-6 (FOR LONGITUDINAL ONLY)

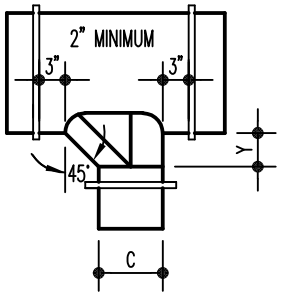
JOINT RT-1 TO BE USED UP TO 36" DIA. MAX. JOINT RT-2 TO BE USED ON DUCTS OVER 37" DIAMETER.

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

**TRANSVERSE JOINTS - ROUND DUCT ANGLE SIZE AND BOLTING REQUIREMENTS**

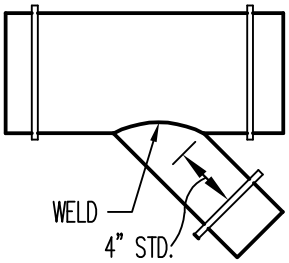
SHEET
**4-5**

REVISION DATE: 02/25/11

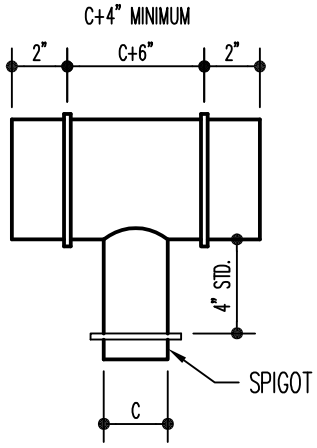



Y = 3" WHEN C=3-8"
6" WHEN C=9-16"
9" WHEN C=17-24"
12" WHEN C=25-UP

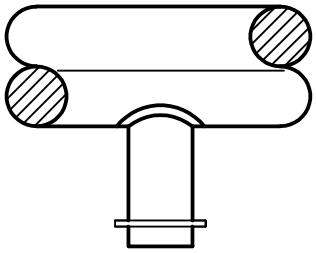
90° TEE WITH
OVAL TO ROUND TAP



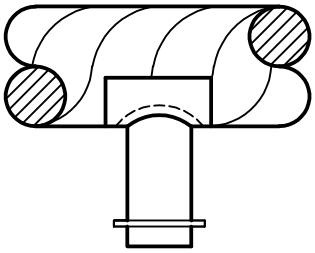

LATERAL FITTING



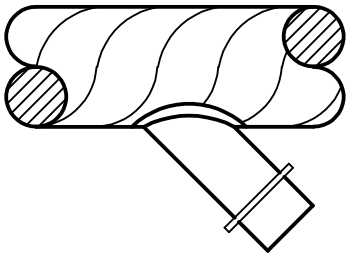

90° TEE FITTING



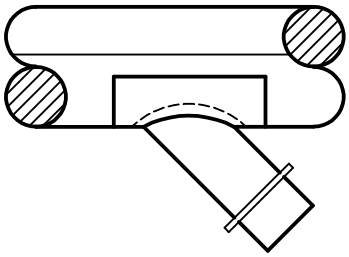
90° TAP



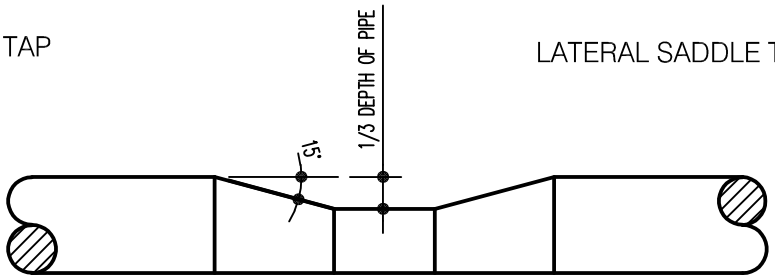
90° SADDLE TAP



LATERAL TAP



LATERAL SADDLE TAP




OBSTRUCTION FITTING

NOTES:

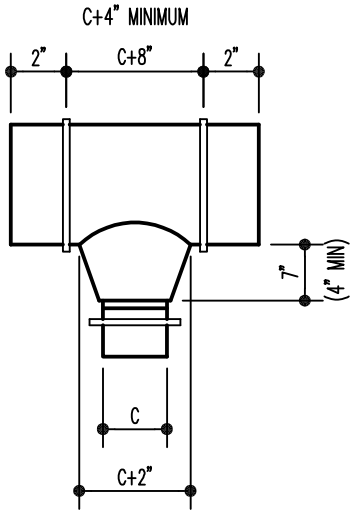
1. TAPS MAY HAVE SCREWS
2. STANDARD SPIGOT LENGTH IS 2" FOR UP TO 18"Ø, 4" OVER 18"Ø

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

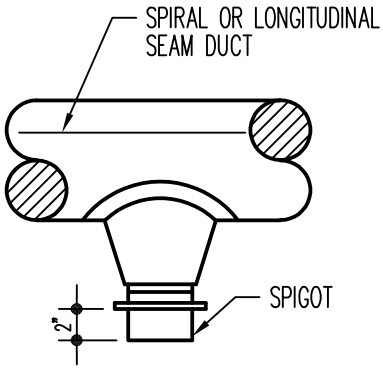
# TEES AND LATERALS ROUND DUCTWORK

SHEET
4-6

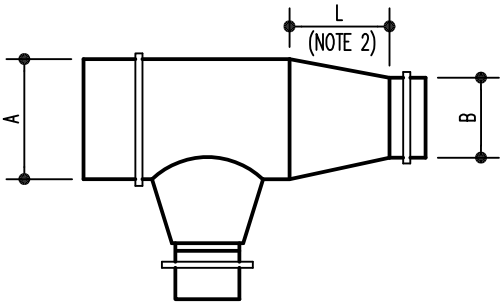
REVISION DATE: 11/28/17



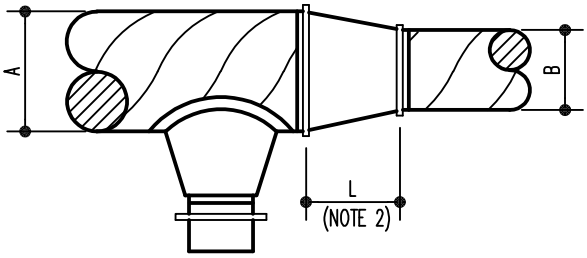

CONICAL TEE FITTING




CONICAL TAP

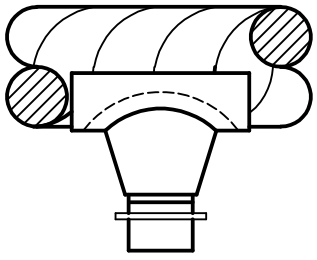



CONICAL TEE AND
REDUCER FITTING

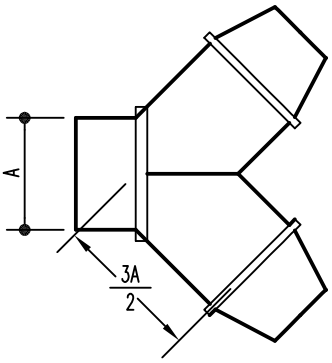



ALTERNATE ARRANGEMENT

NOTES:
1) TAPS MAY HAVE SCREWS
2) L =A-B (4" MIN.)



CONICAL SADDLE TAP



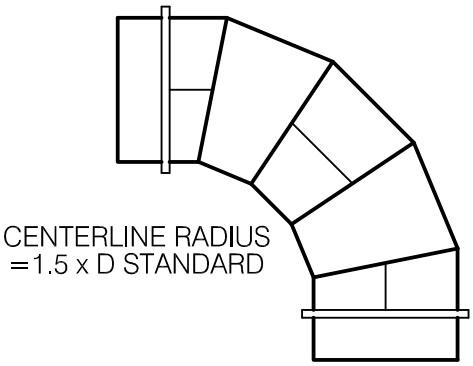

WYE BRANCH

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

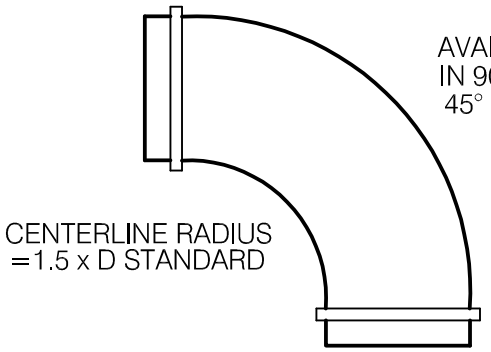
# CONICAL TEES, TAPERS & WYES

SHEET
4-7

REVISION DATE: 11/28/17

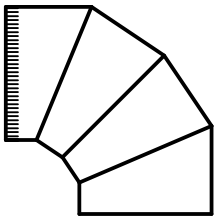



SEGMENTED
LONGITUDINAL SEAM

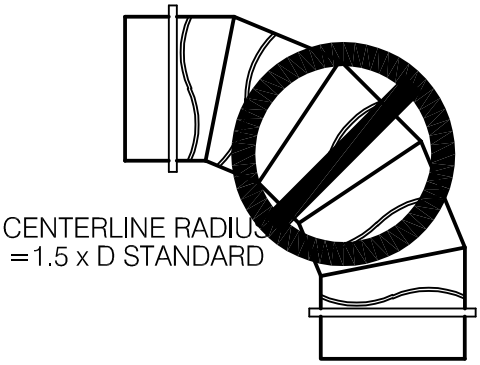



STAMPED < 15" DIA.

ALSO AVAILABLE IN HALF RADIUS
(USE ONLY WHERE SPACE DOESN'T
ALLOW FULL RADIUS ELBOWS)



ADJUSTABLE ELBOW




SEGMENTED SPIRAL SEAM

TABLE 3-1
MITERED ELBOWS

| DUCT VELOCITY | D/R RATIO CENTERLINE RADIUS TO DUCT DIAMETER | NUMBER OF MITERED PIECES | | |
|---|---|---|---|---|
| | | 90 DEG. | 60 DEG. | 45 DEG. |
| UP TO 1000 FPM | 0.6 | 3 | 2 | 2 |
| 1001 TO 1500 FPM | 1.0 | 4 | 3 | 2 |
| ABOVE 1500 FPM | 1.5 | 5 | 4 | 3 |

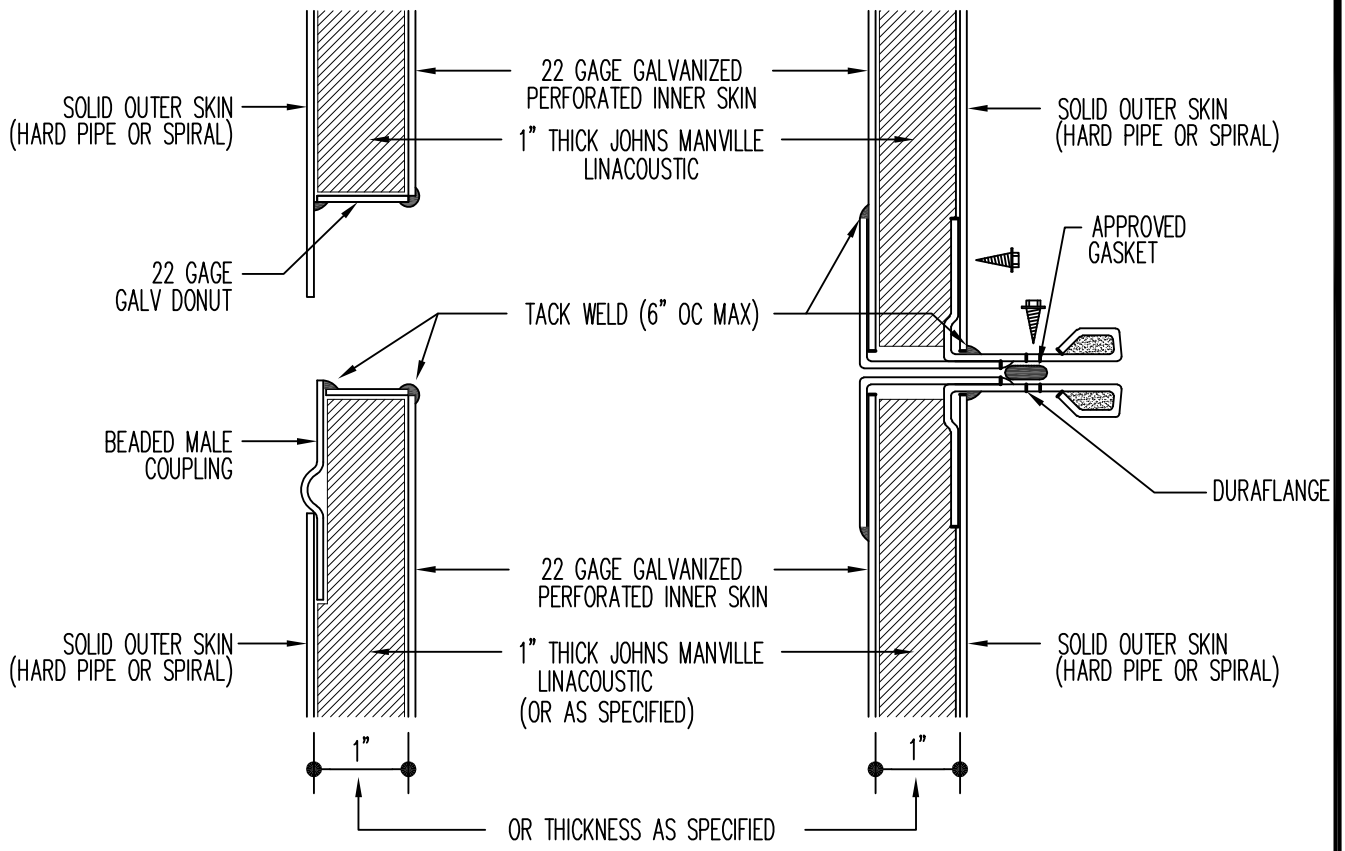
# COMPANION / VANSTONE ANGLE
# SIZE AND BOLTING PATTERN REQUIREMENTS

| RING DIAM. | ANGLE SIZE | QUAN. OF HOLES SIZE OF HOLES | BOLT HOLE CENTER |
|---|---|---|---|
| 6" | 1 1/4 x 1/8 | 6 @ 9/32 | 7 5/16" |
| 7" | 1 1/4 x 1/8 | 6 @ 3/8 | 8 7/16" |
| 8" | 1 1/4 x 1/8 | 6 @ 3/8 | 9 7/16" |
| 9" | 1 1/4 x 1/8 | 6 @ 3/8 | 10 5/8" |
| 10" | 1 1/4 x 1/8 | 6 @ 3/8 | 11 13/16" |
| 12" | 1 1/2 x 1/8 | 8 @ 7/16 | 14" |
| 14" | 1 1/2 x 1/8 | 8 @ 7/16 | 16" |
| 16" | 1 1/2 x 3/16 | 8 @ 7/16 | 18" |
| 18" | 1 1/2 x 3/16 | 8 @ 7/16 | 20" |
| 20" | 1 1/2 x 3/16 | 12 @ 7/16 | 21 3/4" |
| 22" | 1 1/2 x 3/16 | 12 @ 7/16 | 23 3/4" |
| 24" | 1 1/2 x 3/16 | 12 @ 7/16 | 25 7/8" |
| 26" | 2 x 2 x 3/16 | 16 @ 7/16 | 28 3/8" |
| 28" | 2 x 2 x 3/16 | 16 @ 7/16 | 30 3/8" |
| 30" | 2 x 2 x 3/16 | 16 @ 7/16 | 32 3/8" |

| RING DIAM. | ANGLE SIZE | QUAN. OF HOLES SIZE OF HOLES | BOLT HOLE CENTER |
|---|---|---|---|
| 32" | 2 x 2 x 3/16 | 16 @ 7/16 | 34 3/8" |
| 34" | 2 x 2 x 3/16 | 16 @ 7/16 | 36 3/8" |
| 36" | 2 x 2 x 3/16 | 16 @ 7/16 | 38 3/8" |
| 38" | 2 x 2 x 3/16 | 24 @ 7/16 | 40 3/8" |
| 40" | 2 x 2 x 3/16 | 24 @ 7/16 | 42 3/8" |
| 42" | 2 x 2 x 3/16 | 24 @ 7/16 | 44 3/8" |
| 44" | 2 x 2 x 3/16 | 24 @ 7/16 | 46 3/8" |
| 46" | 2 x 2 x 3/16 | 24 @ 7/16 | 48 3/8" |
| 48" | 2 x 2 x 3/16 | 24 @ 7/16 | 50 3/8" |
| 50" | 2 x 2 x 3/16 | 24 @ 7/16 | 52 3/8" |
| 52" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 55" |
| 54" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 57" |
| 56" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 59" |
| 58" | 2½ x 2½ x 3/16 | 32 @ 7/16 | 61" |
| 60" | 2½ x 2½ x 3/16 | 32 @ 7/16 | 63" |

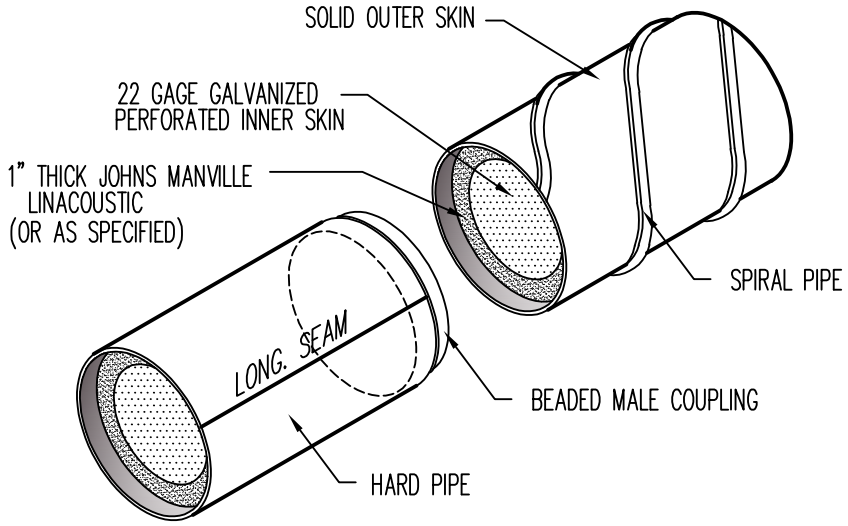
☒ ALL COMPANION / VANSTONE ANGLE RINGS TO BE BLACK IRON, SHOP PRIME COATED.

☐ ALL COMPANION / VANSTONE ANGLE RINGS TO BE HOT DIPPED GALVANIZED.




## CONNECTION AT COUPLER CONNECTION AT DURAFLANGE

(AT CONTRACTOR'S OPTION AND REVIEWERS APPROVAL, DURAFLANGE FOR DOUBLE WALL MAY BE USED)




VENT FAB INC.
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# ROUND DOUBLE WALL DUCT DETAILS

SHEET
4-10

REVISION DATE: 07/10/08

# SECTION 5

## WELDED DUCTWORK

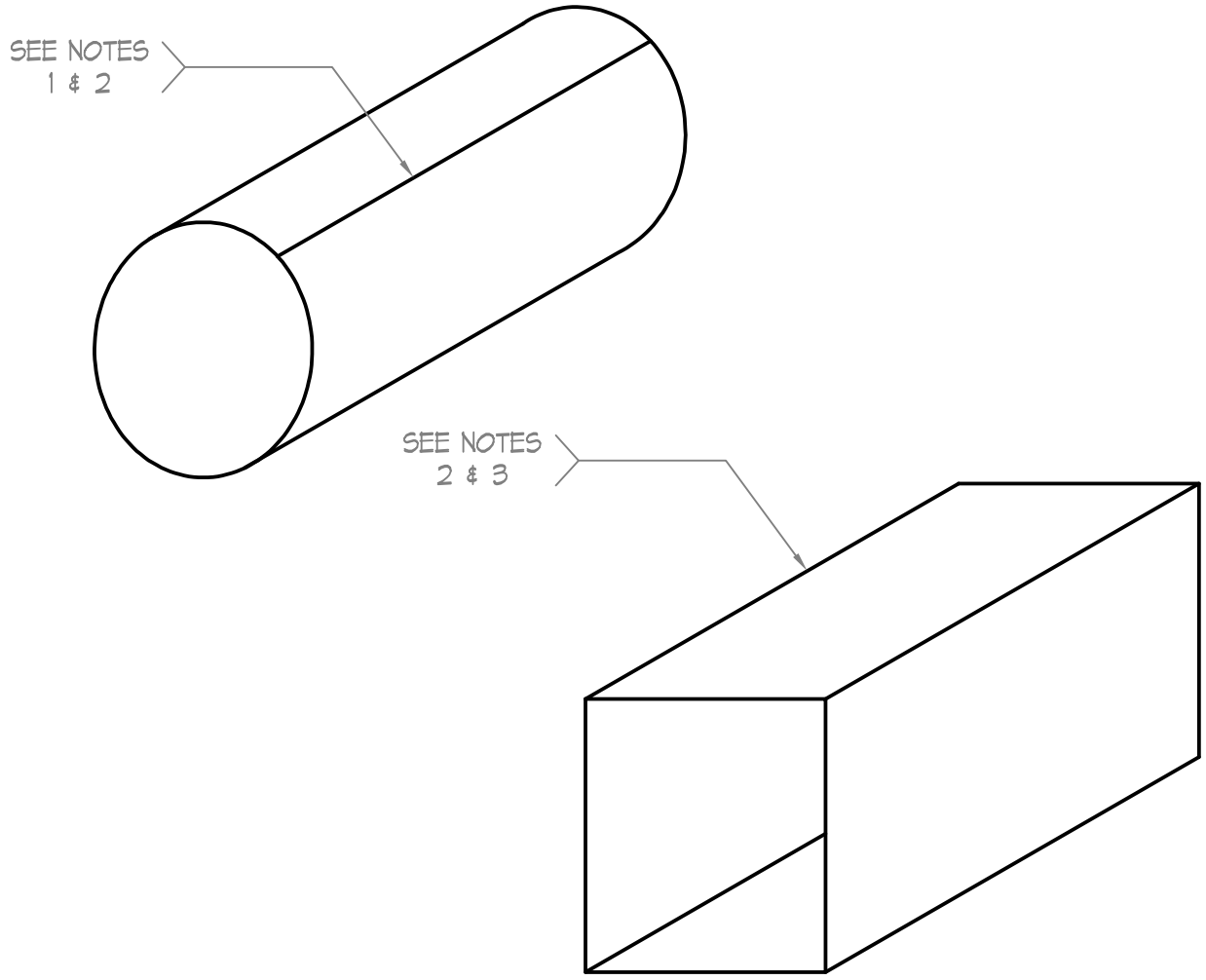
### GENERAL NOTES FOR WELDED DUCTWORK

NOTES:

1) The following details and tables are in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005.
2) All galvanized sheet steel to be of ASTM 653 with G-90 galvanized coating.
3) All stainless sheet steel to be type 304 of ASTM A-240 and A-480 with a 2B finish (unless otherwise noted).

per job specs

4) When called for, reinforcing angle to be prime coated black iron where installed on galvanized duct, and stainless steel where installed on stainless steel duct.




# NOTES:

1. APPLICABLE WELDS:

| | |
|---|---|
| SQUARE GROOVE | J GROOVE |
| V GROOVE | FLARE V GROOVE |
| BEVEL GROOVE | FLARE BEVEL GROOVE |
| | EDGE |

2. JOINT PENETRATION (GROOVE WELD IN A BUTT JOINT) OR MINIMUM EFFECTIVE THROAT (FILLET WELD) AS PER ACCEPTED INDUSTRY STANDARDS

3. APPLICABLE WELDS
   FILLET WELD IN OPEN CORNER JOINT
   GROOVE WELD IN CLOSED CORNER JOINT

VENT FAB INC.
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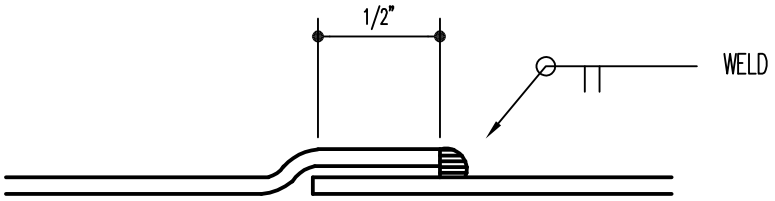
SHEETMETAL FABRICATORS

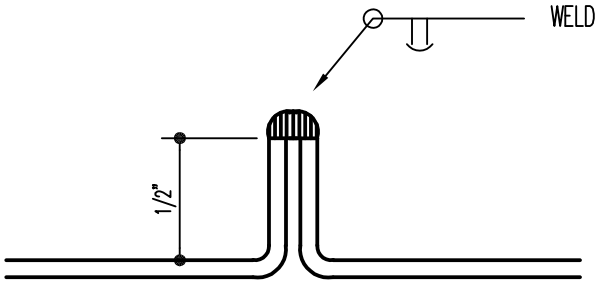
LONGITUDINAL SEAMS
RECTANGULAR AND ROUND

SHEET
5-1

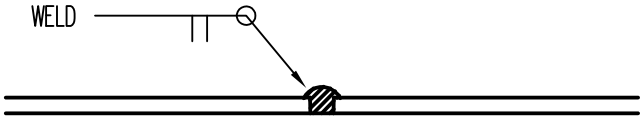
REVISION DATE: 04/29/09



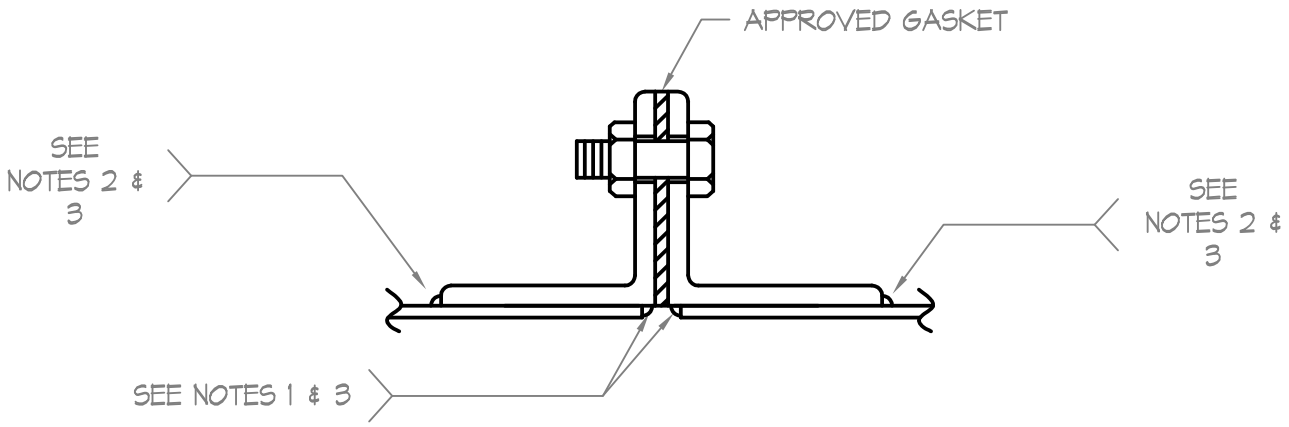

SWEDGE AND LAP WELD
(FIELD CONNECTIONS ON ROUND DUCT)



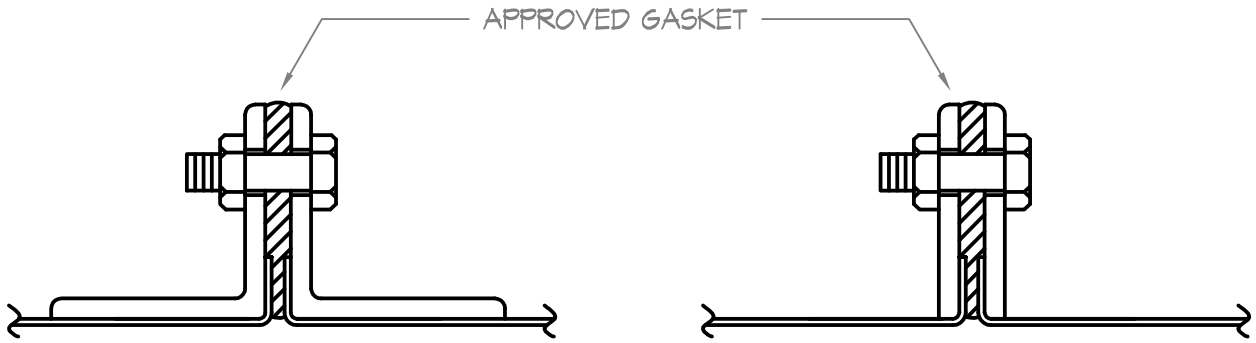

TURNED FLANGE WITH CAP WELD
(SHOP AND FIELD CONNECTIONS)




SHOP BUTT WELD
(SHOP CONNECTIONS ON ROUND)




## COMPANION FLANGE-JOINT



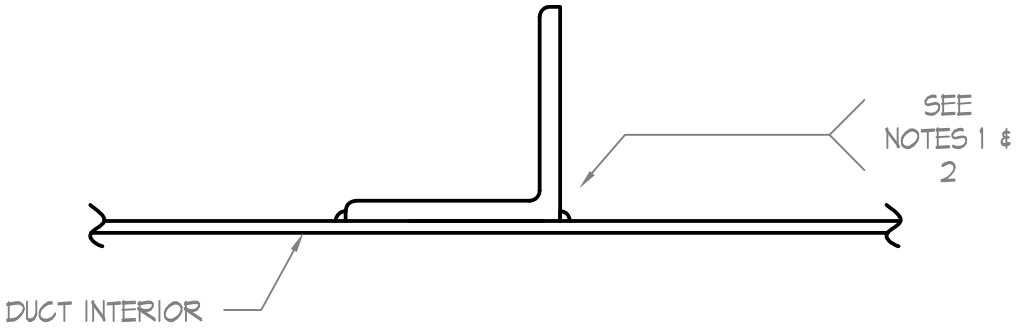

DETAIL 1
UNATTACHED ANGLES

DETAIL 2
UNATTACHED PLATE FLANGE

## VANSTONE FLANGE-JOINT

## NOTES:

1. A CONTINUOUS WELD IS REQUIRED ON THE DUCT INTERIOR SIDE OF COMPANION FLANGE ANGLE.
2. THE OUTSIDE OF COMPANION FLANGE ANGLE MAY BE STITCH WELDED LINED UP WITH THE BOLT HOLE PATTERN.
3. FILLET WELDS:
   THE MINIMUM THROAT SHALL BE AS SPECIFIED FOR THE APPLICATION BY ACCEPTED INDUSTRY STANDARDS.




# REINFORCING ANGLE (STIFFENER) ATTACHMENT

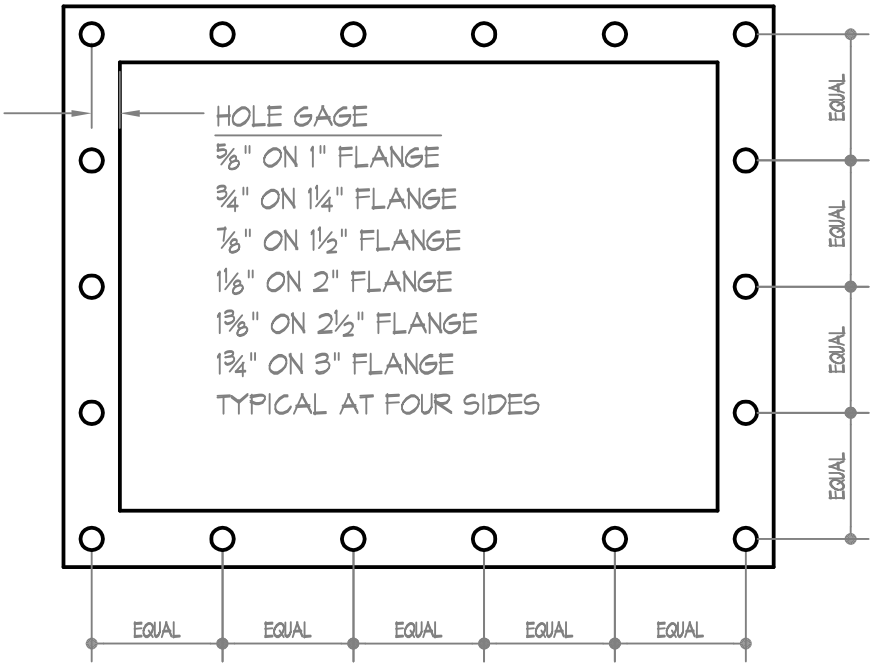
THIS DETAIL MAY APPLY TO EITHER ROUND
OR RECTANGULAR DUCT SECTIONS

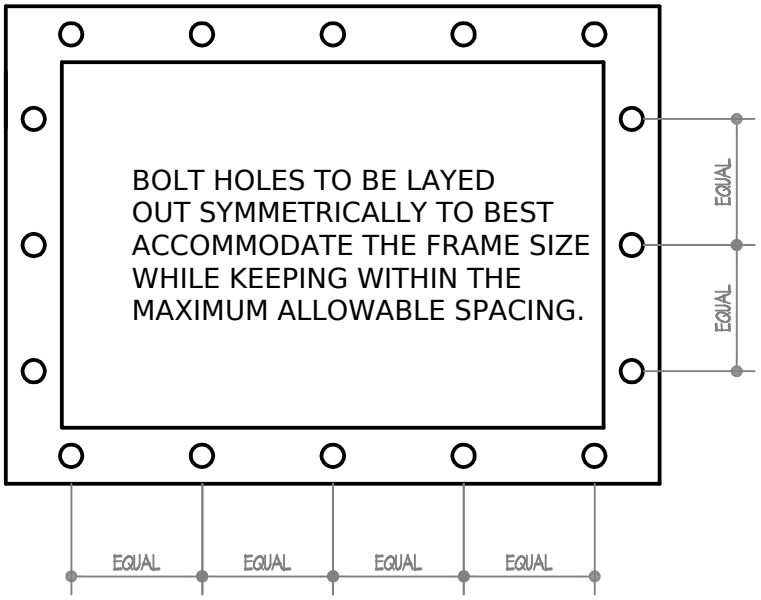
## NOTES:

1. STIFFENERS ARE TO BE STITCH WELDED ON ALTERNATING SIDES OF THE ANGLE.

2. FILLET WELDS:
   THE MINIMUM THROAT SHALL BE AS SPECIFIED FOR THE APPLICATION
   BY ACCEPTED INDUSTRY STANDARDS.

# RECTANGULAR COMPANION FLANGE ANGLE BOLTING PATTERN REQUIREMENTS




USE 3/8" BOLTS ON FLANGES UP TO 1 1/2"(7/16" HOLES)
USE 1/2" BOLTS ON ALL LARGER FLANGES (9/16" HOLES)
MAXIMUM SPACE BETWEEN BOLTS IS 6" ON FLANGE SIZES UNDER 2".
MAXIMUM SPACE BETWEEN BOLTS IS 8" ON FLANGE SIZES 2" AND OVER.

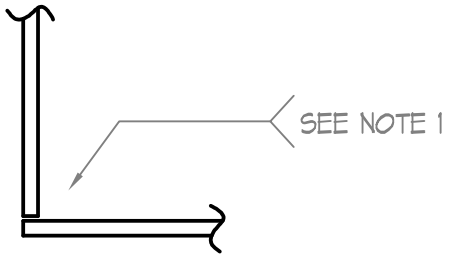
# COMPANION / VANSTONE ANGLE
# SIZE AND BOLTING PATTERN REQUIREMENTS

| RING DIAM. | ANGLE SIZE | QUAN. OF HOLES SIZE OF HOLES | BOLT HOLE CENTER |
|---|---|---|---|
| 6" | 1 1/4 x 1/8 | 6 @ 9/32 | 7 5/16" |
| 7" | 1 1/4 x 1/8 | 6 @ 3/8 | 8 7/16" |
| 8" | 1 1/4 x 1/8 | 6 @ 3/8 | 9 7/16" |
| 9" | 1 1/4 x 1/8 | 6 @ 3/8 | 10 5/8" |
| 10" | 1 1/4 x 1/8 | 6 @ 3/8 | 11 13/16" |
| 12" | 1 1/2 x 1/8 | 8 @ 7/16 | 14" |
| 14" | 1 1/2 x 1/8 | 8 @ 7/16 | 16" |
| 16" | 1 1/2 x 3/16 | 8 @ 7/16 | 18" |
| 18" | 1 1/2 x 3/16 | 8 @ 7/16 | 20" |
| 20" | 1 1/2 x 3/16 | 12 @ 7/16 | 21 3/4" |
| 22" | 1 1/2 x 3/16 | 12 @ 7/16 | 23 3/4" |
| 24" | 1 1/2 x 3/16 | 12 @ 7/16 | 25 7/8" |
| 26" | 2 x 2 x 3/16 | 16 @ 7/16 | 28 3/8" |
| 28" | 2 x 2 x 3/16 | 16 @ 7/16 | 30 3/8" |
| 30" | 2 x 2 x 3/16 | 16 @ 7/16 | 32 3/8" |

| RING DIAM. | ANGLE SIZE | QUAN. OF HOLES SIZE OF HOLES | BOLT HOLE CENTER |
|---|---|---|---|
| 32" | 2 x 2 x 3/16 | 16 @ 7/16 | 34 3/8" |
| 34" | 2 x 2 x 3/16 | 16 @ 7/16 | 36 3/8" |
| 36" | 2 x 2 x 3/16 | 16 @ 7/16 | 38 3/8" |
| 38" | 2 x 2 x 3/16 | 24 @ 7/16 | 40 3/8" |
| 40" | 2 x 2 x 3/16 | 24 @ 7/16 | 42 3/8" |
| 42" | 2 x 2 x 3/16 | 24 @ 7/16 | 44 3/8" |
| 44" | 2 x 2 x 3/16 | 24 @ 7/16 | 46 3/8" |
| 46" | 2 x 2 x 3/16 | 24 @ 7/16 | 48 3/8" |
| 48" | 2 x 2 x 3/16 | 24 @ 7/16 | 50 3/8" |
| 50" | 2 x 2 x 3/16 | 24 @ 7/16 | 52 3/8" |
| 52" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 55" |
| 54" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 57" |
| 56" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 59" |
| 58" | 2½ x 2½ x 3/16 | 32 @ 7/16 | 61" |
| 60" | 2½ x 2½ x 3/16 | 32 @ 7/16 | 63" |

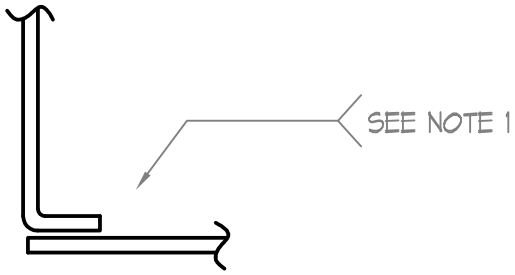
☒ ALL COMPANION / VANSTONE ANGLE RINGS TO BE BLACK IRON, SHOP PRIME COATED.

☐ ALL COMPANION / VANSTONE ANGLE RINGS TO BE HOT DIPPED GALVANIZED.




## WELDED TEE JOINT

THIS SEAM MAY APPLY TO EITHER ROUND OR RECTANGULAR DUCT SECTIONS. AND IS APPLICABLE TO DUCT GAUGES 14 AND HEAVIER.

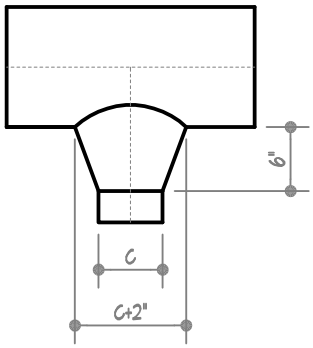



## WELDED SWEDGED LAP JOINT

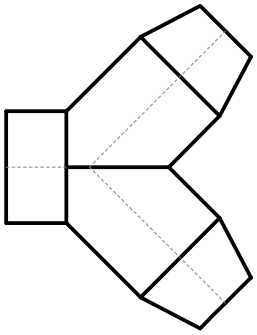
THIS SEAM MAY APPLY TO EITHER ROUND OR RECTANGULAR DUCT SECTIONS. AND IS APPLICABLE TO DUCT GAUGES 16 AND LIGHTER

## NOTES:

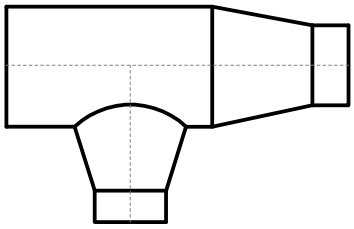
1. FILLET WELDS:
   THE MINIMUM THROAT SHALL BE AS SPECIFIED FOR THE APPLICATION BY ACCEPTED INDUSTRY STANDARDS.



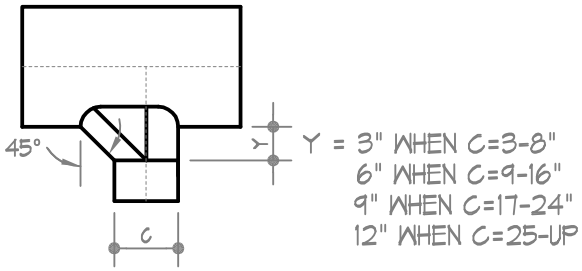

CONICAL TEE FITTING



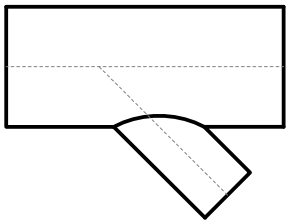
WYE BRANCH



CONICAL TEE AND
REDUCER FITTING




90° TEE WITH
OVAL TO ROUND TAP



LATERAL FITTING

NOTE:

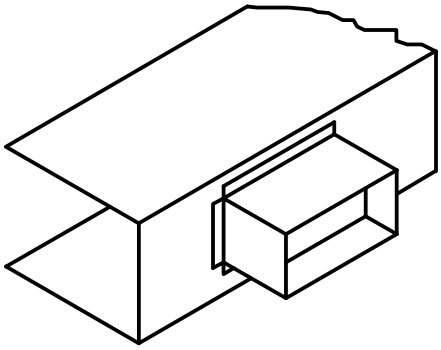
TO THE LARGEST EXTENT POSSIBLE AND PRACTICAL, DUCT CONFIGURATIONS SHALL BE AS INDICATED ON THE CONTRACT DRAWINGS.

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

TYPICAL ROUND TEES
AND LATERALS

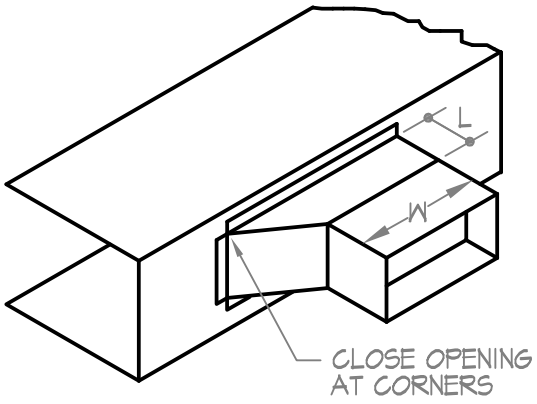
SHEET
5-8

REVISION DATE: 07/10/08



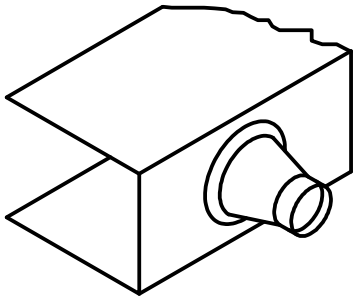
STRAIGHT TAP

(USE ONLY WHERE SHOWN ON CONTRACT DRAWINGS)

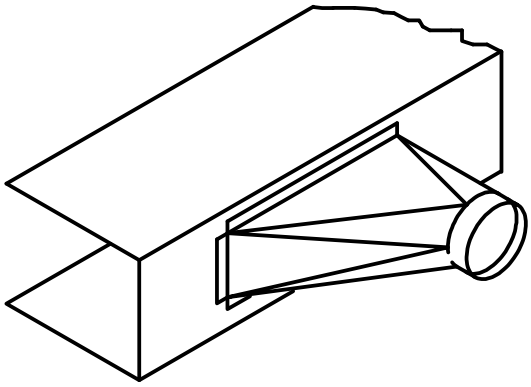



45° DEGREE ENTRY - A = 45°

L= 1/4 W, 4" MIN.



CONICAL TAP



45° DEGREE ENTRY

NOTE:

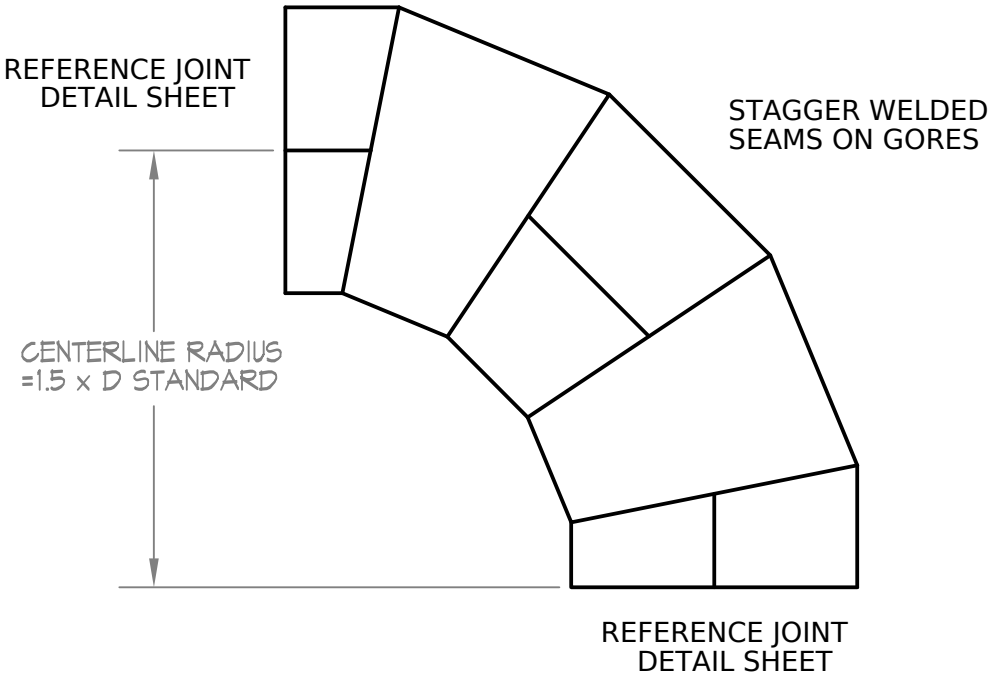
TO THE LARGEST EXTENT POSSIBLE AND PRACTICAL, DUCT CONFIGURATIONS SHALL BE AS INDICATED ON THE CONTRACT DRAWINGS.

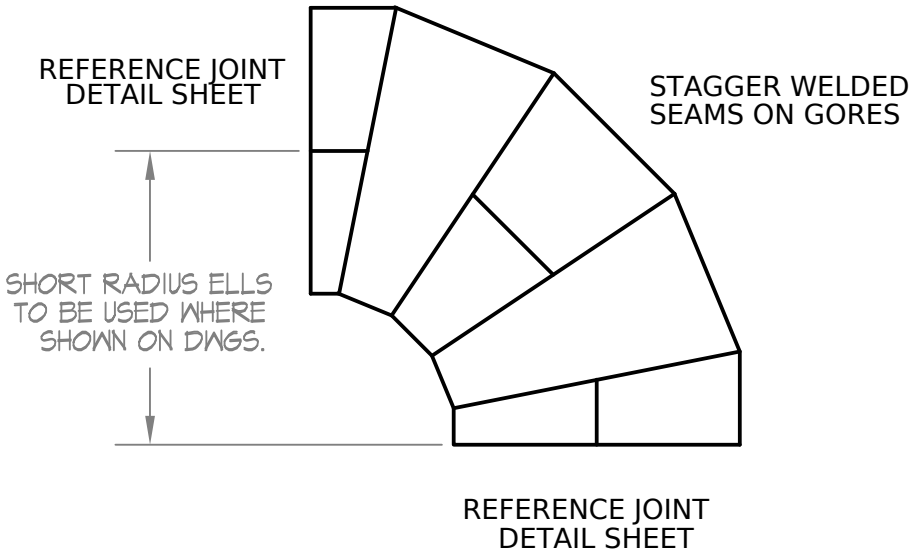
VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

TYPICAL RECTANGULAR TEES AND LATERALS

SHEET 5-9

REVISION DATE: 07/10/08




| ELBOW DIAMETER | ELBOW DEGREES | 30 | 45 | 60 | 90 |
|---|---|---|---|---|---|
| ALL DIAMETERS | NUMBER OF GORES | 2 | 3 | 4 | 5 |

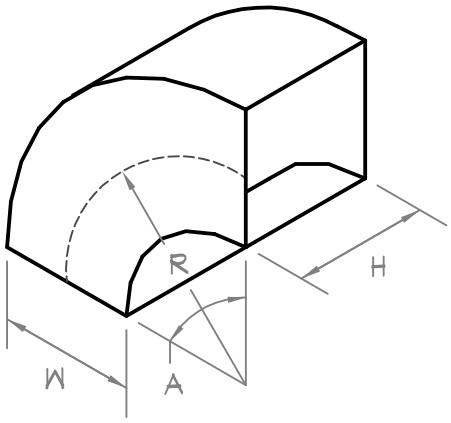
METAL GAUGE OF ELBOWS TO BE THE SAME AS LISTED FOR DUCT GAUGE.

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

# ROUND ELBOWS WELDED DUCTWORK

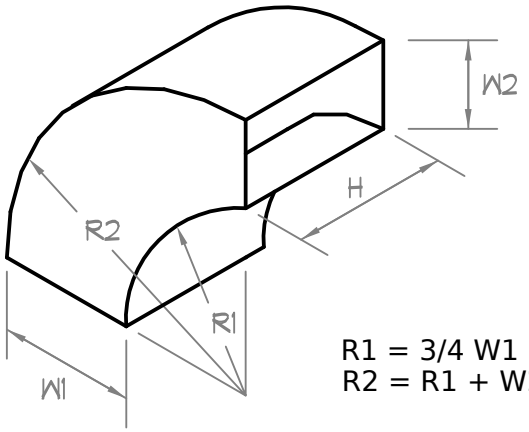
SHEET
5-10

REVISION DATE: 07/10/08




## RADIUS ELBOW

CENTERLINE RADIUS = 1 1/2xW = STANDARD
TIGHTER RADIUS MAY BE USED AS INDICATED
ON CONTRACT DRAWINGS.




R1 = 3/4 W1
R2 = R1 + W2

## TRANSITIONAL RADIUS ELBOW

TO BE USED AS INDICATED ON CONTRACT DRAWINGS

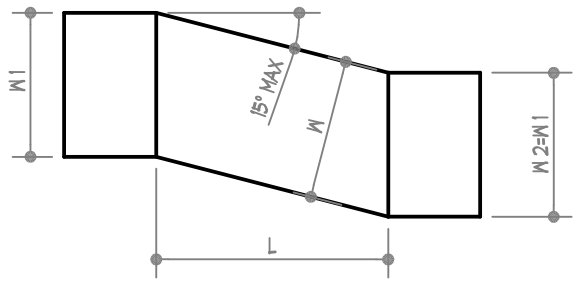
VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

RECTANGULAR ELBOWS
WELDED DUCTWORK

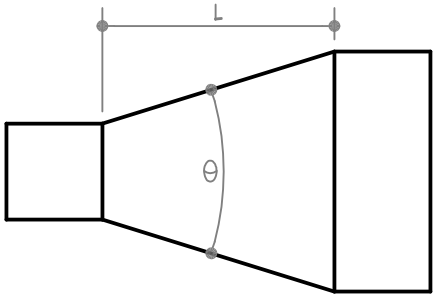
SHEET
5-11

REVISION DATE: 07/10/08

ANGLED OFFSETS, OGEE OFFSETS AND TRANSITIONS MAY HAVE UNEQUAL INLET AND OUTLET AREAS. TRANSITIONS MAY CONVERT DUCT PROFILES TO ANY COMBINATION FOR RECTANGULAR, ROUND OR FLAT OVAL SHAPES.

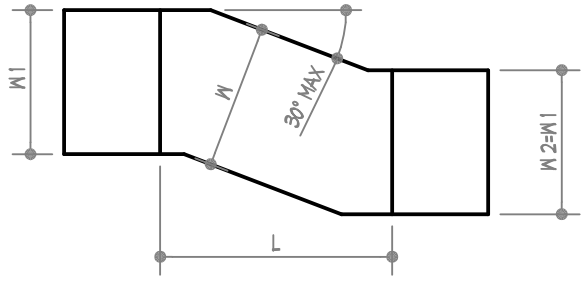



ANGLED

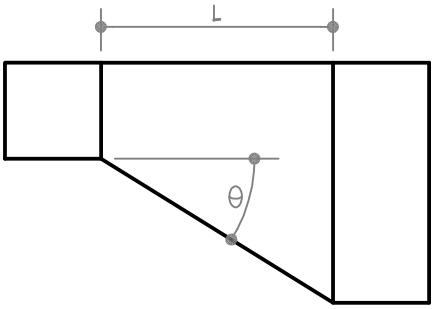



CONCENTRIC TRANSITION

θ MAX. 30° DIVERGING, 60° CONVERGING
(OR AS INDICATED ON CONTRACT DRAWINGS)

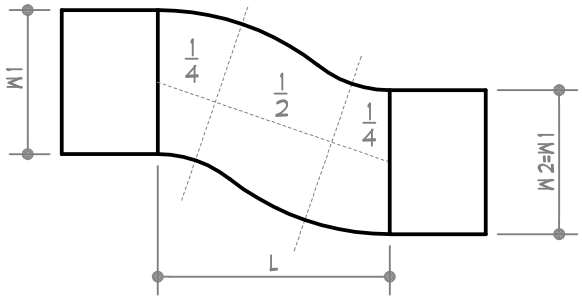



MITERED




ECCENTRIC TRANSITION

θ MAX. 30°
(OR AS INDICATED ON
CONTRACT DRAWINGS)




OGEE

NOTE:

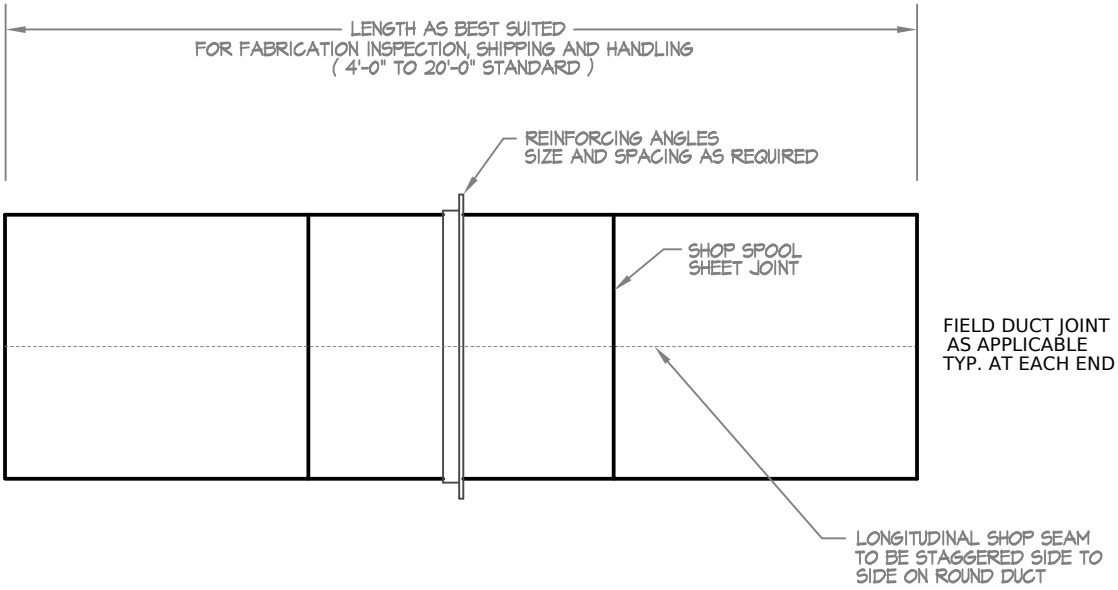
TO THE LARGEST EXTENT POSSIBLE AND PRACTICAL, DUCT CONFIGURATIONS SHALL BE AS INDICATED ON THE CONTRACT DRAWINGS.

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

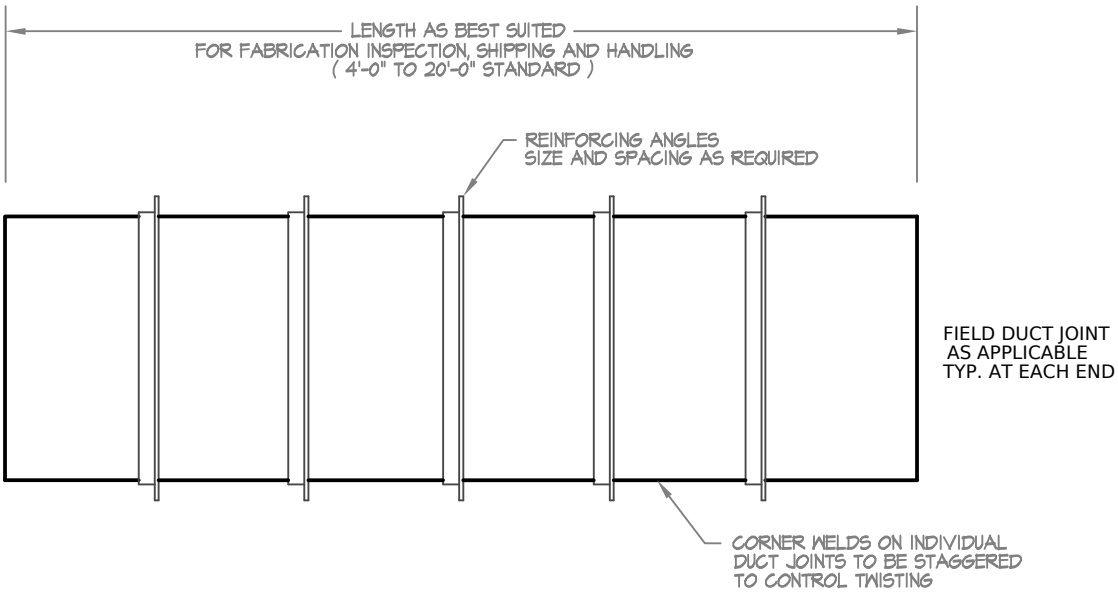
ROUND AND RECTANGULAR OFFSETS AND TRANSITIONS

SHEET
5-12

REVISION DATE: 07/10/08




## SHOP SPOOLED ROUND DUCT SECTION



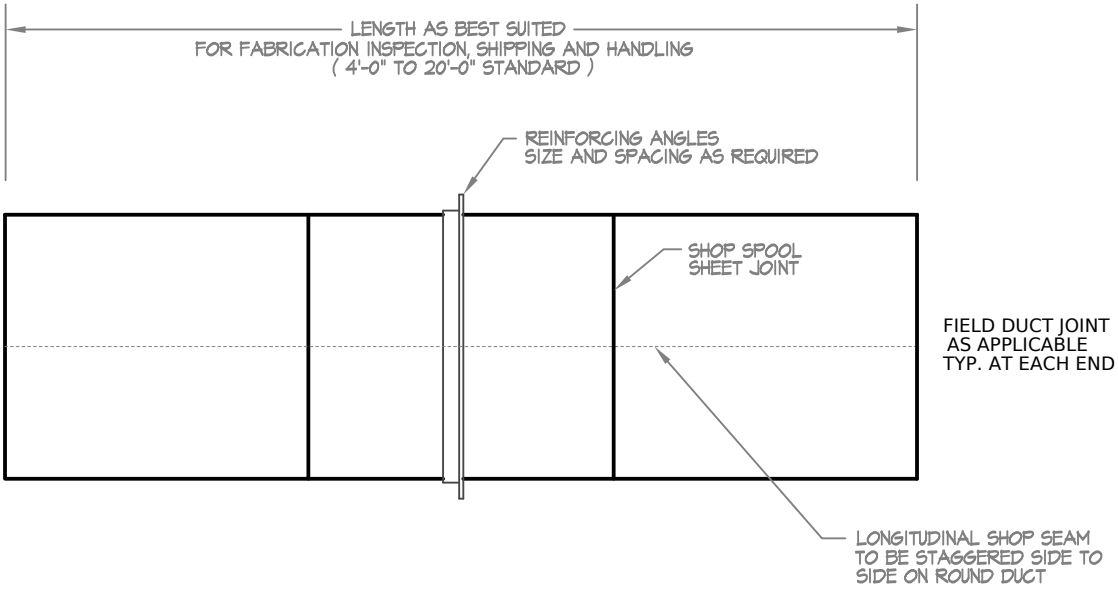

## SHOP SPOOLED RECTANGULAR DUCT SECTION

VENT FAB INC.
H. V. A. C.
SHEETMETAL FABRICATORS

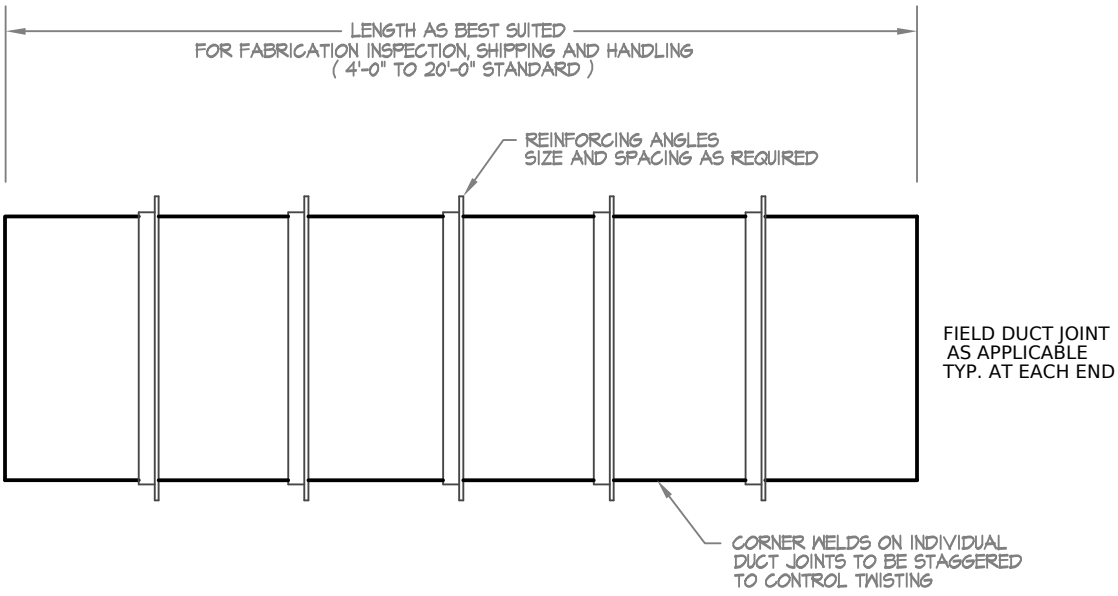
# TYPICAL SPOOL SECTIONS WELDED DUCTWORK

SHEET
5-13

REVISION DATE: 07/10/08




## SHOP SPOOLED ROUND DUCT SECTION




## SHOP SPOOLED RECTANGULAR DUCT SECTION

VENT FAB INC.
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# TYPICAL SPOOL SECTIONS WELDED DUCTWORK

SHEET
5-13

REVISION DATE: 07/10/08

# SECTION 6

## INDUSTRIAL DUCTWORK

### GENERAL NOTES FOR INDUSTRIAL DUCTWORK

NOTES:

1) The following duct construction tables are in strict compliance with SMACNA Rectangular Industrial Duct Construction Standards (2004 Second Edition) and SMACNA Round Industrial Duct Construction Standards (Second Edition - September 1999).

2) All galvanized steel to be of ASTM 653 with G-90 galvanized coating.

3) All stainless steel sheet to be of ASTM A-240 and A-480 with a 2B finish

4) When called for, reinforcing angle to be prime coated blac iron where installed on galvanized duct, and stainless steel where installed on stainless steel duct.

5) See Welded Duct Section 5 for duct construction details.

REVISION DATE: 07/10/08

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INDUSTRIAL DUCTWORK
RECTANGULAR TABLES

SHEET 6-1

# WELDED GALVANIZED OR STAINLESS STEEL RECTANGULAR DUCTWORK

| 4" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED RECTANGULAR INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | PANEL GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMEDIATE REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 18" | 16 | 48" OR 60" | 1½X1½X⅛ VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 1 X 1 X ⅛ | 10'-0" |
| 19"-36" | 16 | 48" OR 60" | 1½X1½X⅛ VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 1½X1½X⅛ | 6'-0" |
| 37"-48" | 16 | 48" OR 60" | 2X2X⅛ VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 2X2X⅛ | 6'-0" |

| 6" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED RECTANGULAR INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | PANEL GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMEDIATE REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 24" | 16 | 48" OR 60" | 1½X1½X⅛ VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 1 X 1 X ⅛ | 5'-0" |
| 25"-36" | 16 | 48" OR 60" | 1½X1½X⅛ VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 1½X1½X⅛ | 5'-0" |
| 37"-48" | 16 | 48" OR 60" | 2X2X⅛ VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 2X2X⅛ | 5'-0" |
| 49"-60" | 16 | 48" OR 60" | 2X2X3⁄16 VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 2X2X3⁄16 | 4'-0" |
| 61"-72" | 16 | 48" OR 60" | 2X2X3⁄16 VANSTONE | 1/2" WELD FLANGE | CORNER WELD | ANGLE FRAME | 2X2X3⁄16 | 2'-0" |

| 10" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED RECTANGULAR INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | PANEL GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMEDIATE REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 24" | 14 | 48" OR 60" | 1½X1½X⅛ COMPANION ANGLE | BUTT WELD | CORNER WELD | ANGLE FRAME | 1 X 1 X ⅛ | 2'-0" |
| 25"-36" | 14 | 48" OR 60" | 1½X1½X⅛ COMPANION ANGLE | BUTT WELD | CORNER WELD | ANGLE FRAME | 1½X1½X⅛ | 2'-0" |
| 37"-48" | 14 | 48" OR 60" | 2X2X⅛ COMPANION ANGLE | BUTT WELD | CORNER WELD | ANGLE FRAME | 2X2X⅛ | 2'-0" |
| 49"-60" | 14 | 48" OR 60" | 2X2X3⁄16 COMPANION ANGLE | BUTT WELD | CORNER WELD | ANGLE FRAME | 2X2X3⁄16 | 2'-0" |
| 61"-72" | 14 | 48" OR 60" | 2½X2½X3⁄16 COMPANION ANGLE | BUTT WELD | CORNER WELD | ANGLE FRAME | 2½X2½X3⁄16 | 2'-0" |

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INDUSTRIAL DUCTWORK
ROUND DUCT TABLES

SHEET 6-2

# WELDED GALVANIZED OR STAINLESS STEEL ROUND DUCTWORK

| 3" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED ROUND INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | LONG. SEAM GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMED. REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 10" | 18 | 48" OR 60" | 1¼X1¼X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |
| 11"-14" | 18 | 48" OR 60" | 1½X1½X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |

| 4" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED ROUND INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | LONG. SEAM GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMED. REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 10" | 18 | 48" OR 60" | 1¼X1¼X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |
| 11"-14" | 18 | 48" OR 60" | 1½X1½X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |

| 6" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED ROUND INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | LONG. SEAM GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMED. REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 10" | 18 | 48" OR 60" | 1¼X1¼X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |
| 11"-14" | 18 | 48" OR 60" | 1½X1½X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |
| 15"-16" | 18 | 48" OR 60" | 1½X1½X⅜ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |
| 17"-22" | 16 | 48" OR 60" | 1½X1½X⅜ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |

| 10" WG STATIC NEGATIVE | | SHOP STANDARDS WELDED ROUND INDUSTRIAL DUCT CONSTRUCTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DUCT LARGEST DIMENSION | LONG. SEAM GA | RAW COIL STOCK | FIELD JOINTS | SHOP JOINTS | LONGITUDINAL SEAM TYPE | INTERMED. REINFORCING | | |
| | | | | | | TYPE | MIN. SIZE | MAX.SPACING |
| | | | | | | | | |
| UP TO 10" | 18 | 48" OR 60" | 1¼X1¼X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |
| 11"-14" | 18 | 48" OR 60" | 1½X1½X⅛ VANSTONE | BUTT WELD | BUTT WELD | NONE REQUIRED | | |

# COMPANION / VANSTONE ANGLE SIZE AND BOLTING PATTERN REQUIREMENTS
## (PER SMACNA INDUSTRIAL DUCT STANDARDS)

| RING DIAM. | ANGLE SIZE | QUAN. OF HOLES SIZE OF HOLES | BOLT HOLE CENTER |
|---|---|---|---|
| 6" | 1 1/4 x 1/8 | 6 @ 9/32 | 7 5/16" |
| 7" | 1 1/4 x 1/8 | 6 @ 3/8 | 8 7/16" |
| 8" | 1 1/4 x 1/8 | 6 @ 3/8 | 9 7/16" |
| 9" | 1 1/4 x 1/8 | 6 @ 3/8 | 10 5/8" |
| 10" | 1 1/4 x 1/8 | 6 @ 3/8 | 11 13/16" |
| 12" | 1 1/2 x 1/8 | 8 @ 7/16 | 14" |
| 14" | 1 1/2 x 1/8 | 8 @ 7/16 | 16" |
| 16" | 1 1/2 x 3/16 | 8 @ 7/16 | 18" |
| 18" | 1 1/2 x 3/16 | 8 @ 7/16 | 20" |
| 20" | 1 1/2 x 3/16 | 12 @ 7/16 | 21 3/4" |
| 22" | 1 1/2 x 3/16 | 12 @ 7/16 | 23 3/4" |
| 24" | 1 1/2 x 3/16 | 12 @ 7/16 | 25 7/8" |
| 26" | 2 x 2 x 3/16 | 16 @ 7/16 | 28 3/8" |
| 28" | 2 x 2 x 3/16 | 16 @ 7/16 | 30 3/8" |
| 30" | 2 x 2 x 3/16 | 16 @ 7/16 | 32 3/8" |

| RING DIAM. | ANGLE SIZE | QUAN. OF HOLES SIZE OF HOLES | BOLT HOLE CENTER |
|---|---|---|---|
| 32" | 2 x 2 x 3/16 | 16 @ 7/16 | 34 3/8" |
| 34" | 2 x 2 x 3/16 | 16 @ 7/16 | 36 3/8" |
| 36" | 2 x 2 x 3/16 | 16 @ 7/16 | 38 3/8" |
| 38" | 2 x 2 x 3/16 | 24 @ 7/16 | 40 3/8" |
| 40" | 2 x 2 x 3/16 | 24 @ 7/16 | 42 3/8" |
| 42" | 2 x 2 x 3/16 | 24 @ 7/16 | 44 3/8" |
| 44" | 2 x 2 x 3/16 | 24 @ 7/16 | 46 3/8" |
| 46" | 2 x 2 x 3/16 | 24 @ 7/16 | 48 3/8" |
| 48" | 2 x 2 x 3/16 | 24 @ 7/16 | 50 3/8" |
| 50" | 2 x 2 x 3/16 | 24 @ 7/16 | 52 3/8" |
| 52" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 55" |
| 54" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 57" |
| 56" | 2½ x 2½ x 3/16 | 28 @ 7/16 | 59" |
| 58" | 2½ x 2½ x 3/16 | 32 @ 7/16 | 61" |
| 60" | 2½ x 2½ x 3/16 | 32 @ 7/16 | 63" |

☒ ALL COMPANION / VANSTONE ANGLE RINGS TO BE BLACK IRON, SHOP PRIME COATED.

☐ ALL COMPANION / VANSTONE ANGLE RINGS TO BE HOT DIPPED GALVANIZED.

# SECTION 7

## TURN VANES AND SPLITTER VANES

### GENERAL NOTES FOR TURN VANES AND SPLITTER VANES

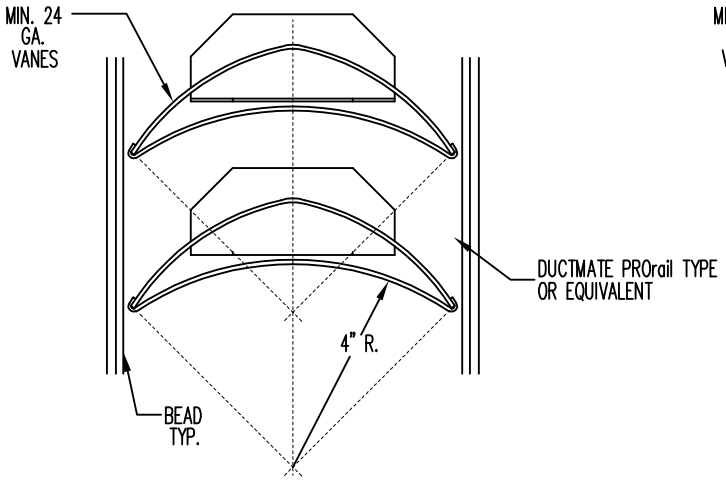
NOTES:

1) Turn vanes to be shop-fabricated per the following details. These details are in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005.

2) All galvanized sheet steel to be of ASTM 653 with G-90 galvanized coating.

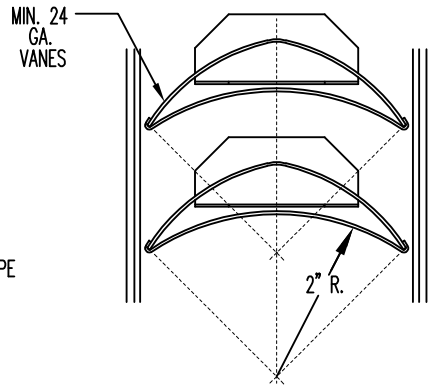
3) All stainless sheet steel to be type 304 of ASTM A-240 and A-480 with a 2B finish (unless otherwise noted).

4) Hat channel sound liner stand-offs to be installed wherever sound liner exceeds 1" thickness. Hat channel stand-offs are not required where sound liner is 1" thick or less.



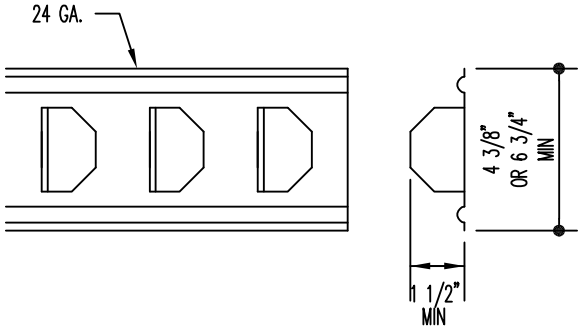

## 4" DOUBLE WALL VANE

USE ON DUCTS
OVER 10" WIDE



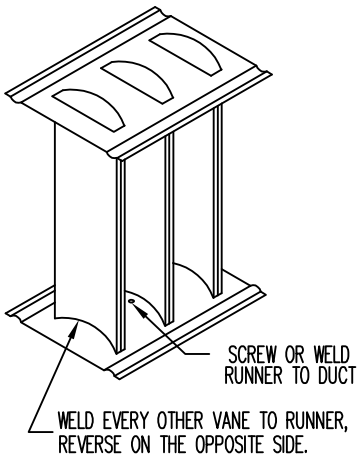

## 2" DOUBLE WALL VANE

USE ON DUCTS
10" WIDE AND UNDER




## "PRORAIL" RUNNER OR EQUIVALENT

FREE AREA BETWEEN DOUBLE WALL VANES APPROXIMATES ELBOW INLET AREA.

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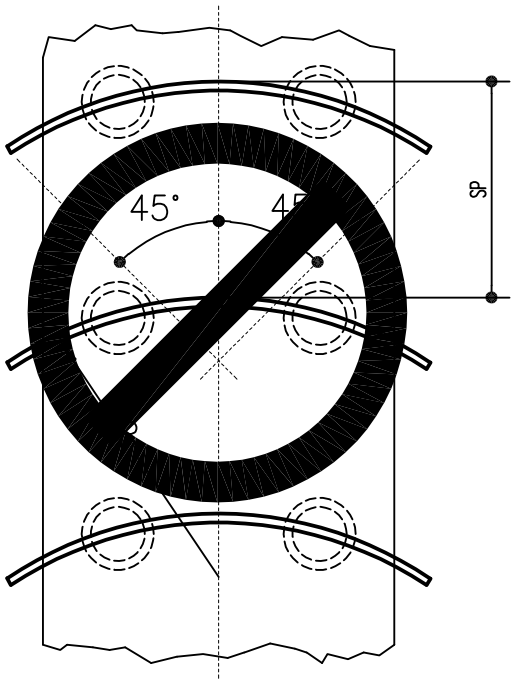
# VANE AND VANE RUNNERS (DOUBLE VANES)

SHEET
7-1

REVISION DATE: 11/06/17




SINGLE WALL TURN VANE

| SINGLE WALL VANE SCHEDULE | | | |
|---|---|---|---|
| | R | SP | GA |
| 10" & UNDER = SMALL | 2" | 1 1/2" | 24 |
| OVER 10"= LARGE | 4 1/2" | 3 1/4" | 22 |

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**VANE AND VANE RUNNERS (SINGLE VANES)**

SHEET
**7-2**

REVISION DATE: 11/06/17

# SECTION 8

## DUCT LINER AND INSULATION

### GENERAL NOTES FOR DUCT LINER AND INSULATION

NOTES:

1) Duct liner installation shall be in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005.

2) Duct liner for this project shall be installed only where indicated on contract drawings.

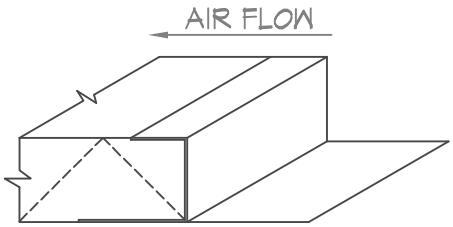
3) When liner is indicated on contract drawings, duct size indicated is inside clear dimensions. Metal duct must be oversized to compensate.

4) Duct liner for this project to be Johns Manville Permacote Linacoustic Standard/HP. Liner thickness to be as indicated on contract drawings.

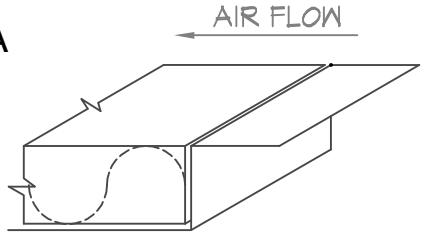
5) Duct liner adhesive shall be Design Polymerics DP 2501 or Foster 85-65.

INTERIOR PINS

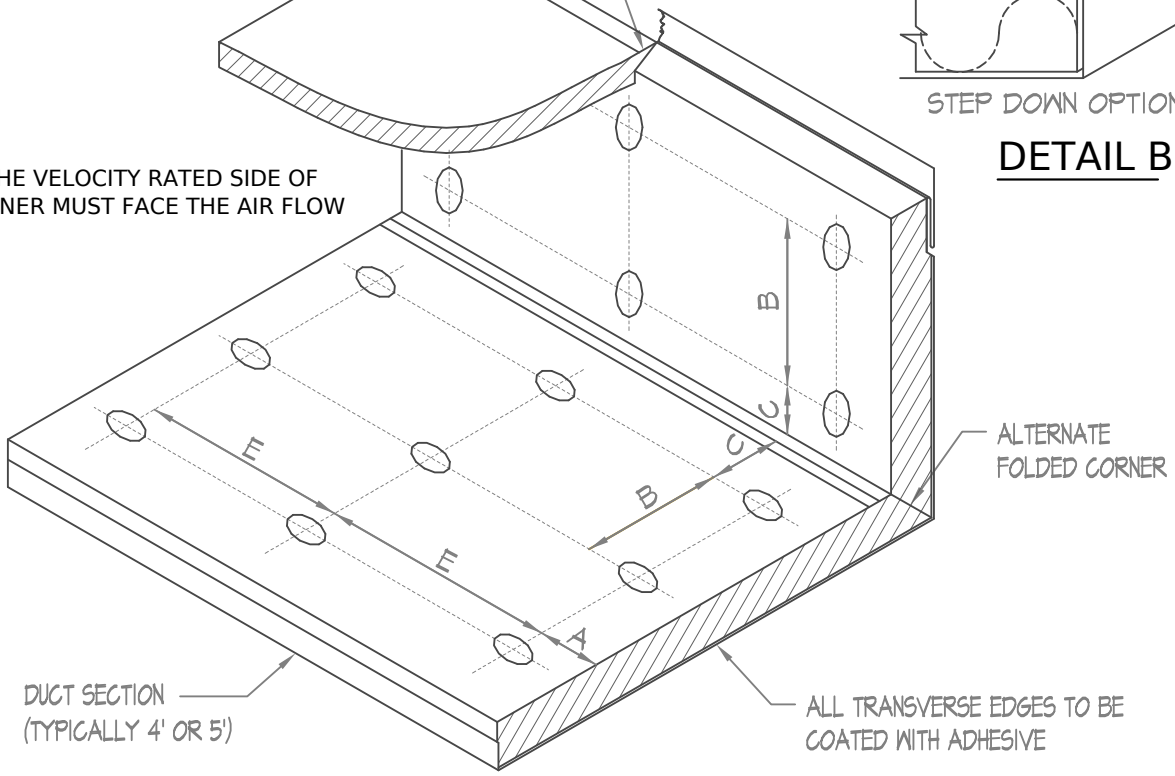
| NO. | WIDTH |
|---|---|
| 0 | 8" DN |
| 2 | 9"-16" |
| 3 | 17"-28" |
| 4 | 29" 40" |
| 5 | 41"-52" |
| 6 | 53"-64" |
| 7 | 65"-76" |
| 8 | 77"-88" |
| 9 | 89"-100" |




DETAIL A




DETAIL B




LINER ADHERED TO THE DUCT WITH 90% MIN. AREA COVERAGE OF ADHESIVE

MAXIMUM SPACING FOR FASTENERS
ACTUAL INTERVALS ARE APPROXIMATE

| VELOCITY* | DIMENSIONS | | | |
|---|---|---|---|---|
| | A | B | C | E |
| 0-2500 FPM | 3" | 12" | 4" | 18" |

* UNLESS A LOWER LEVEL IS SET BY MANUFACTURER OR LISTING AGENCY

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# FLEXIBLE DUCT LINER INSTALLATION

SHEET
8-1

REVISION DATE: 07/10/08

# SECTION 9

## MANUAL VOLUME DAMPER

### GENERAL NOTES FOR MANUAL VOLUME DAMPER AND HARDWARE

NOTES:

1) Manual volume dampers are to be shop fabricated by Superior Air Handling in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005.

2) All galvanized sheet steel to be of ASTM 653 with G-90 galvanized coating.

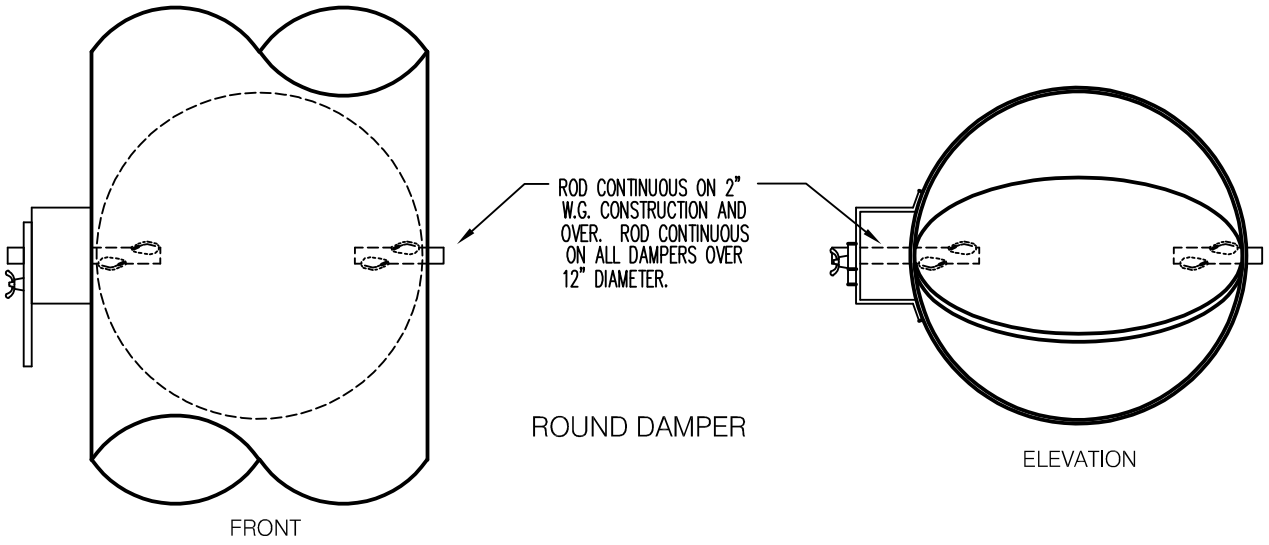
3) All stainless sheet steel to be of ASTM A-240 and A-480 with a 2B finish (unless otherwise noted).

4) All volume dampers are to be clearly shown on shop drawings. Provide volume dampers at all branches to GRDs.

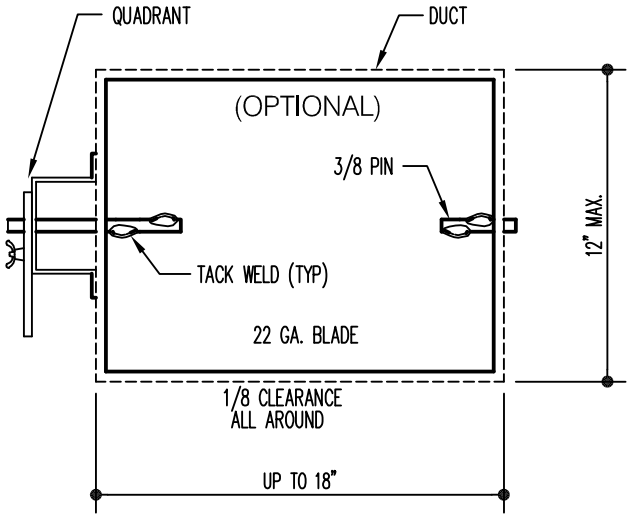
5) Insulation stand-offs to be supplied where installed on wrapped duct. Stand-offs are not required on sound-lined duct, or duct that is not wrapped.

6) When direct-acting quadrants are installed, position quadrant on side of duct best suited for application. For indirect-acting quadrants (concealed regulators at ceiling), install with rods out the bottom of duct whenever possible to eliminate the need for angle gear.

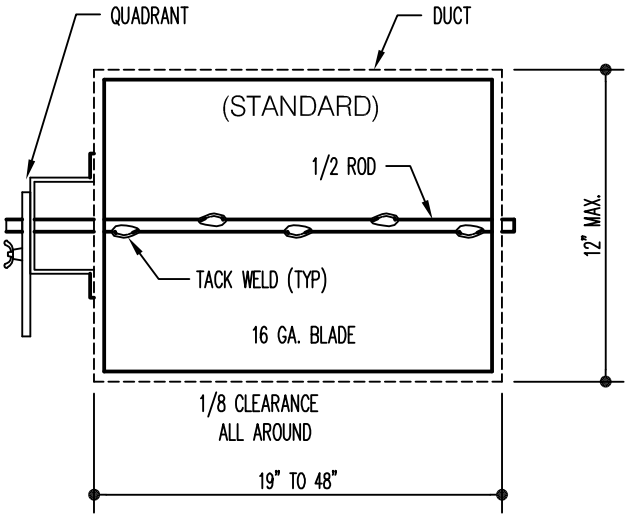
7) Care shall be exercised in the installation of manual volume dampers to assure th blades are free to open and close without interference from other components of duct system.




ROUND DAMPER




SINGLE BLADE RECTANGULAR DAMPER UP TO 18" WIDE (OR DIA)

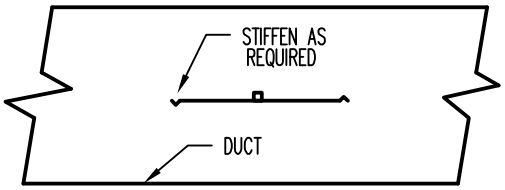



SINGLE BLADE RECTANGULAR DAMPER GREATER THAN 18"WIDE (OR DIA)

NOTES:

USE CLOSED-END BEARINGS ON ALL SINGLE BLADE DAMPERS.

INSULATION STAND-OFF REQ'D FOR REGULATORS INSTALLED ON ALL EXTERNALLY WRAPPED DUCT.




SIDE ELEVATION

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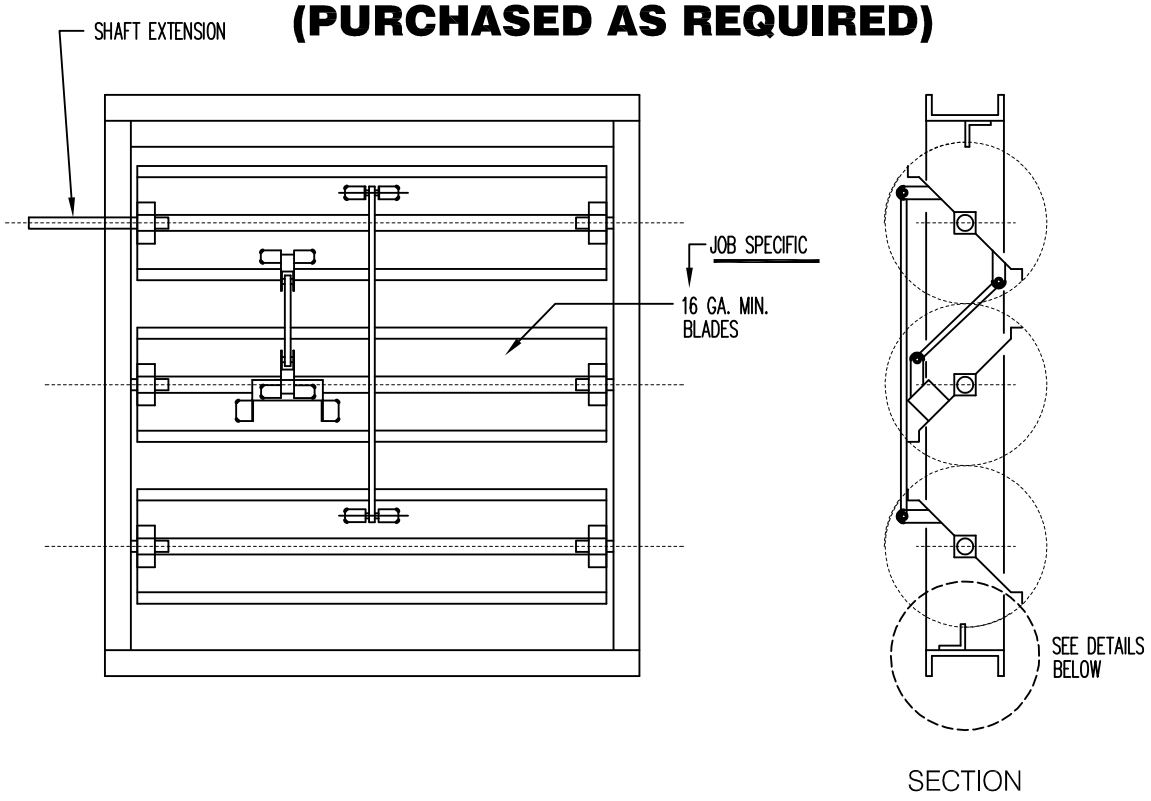
# SINGLE BLADE VOLUME DAMPERS

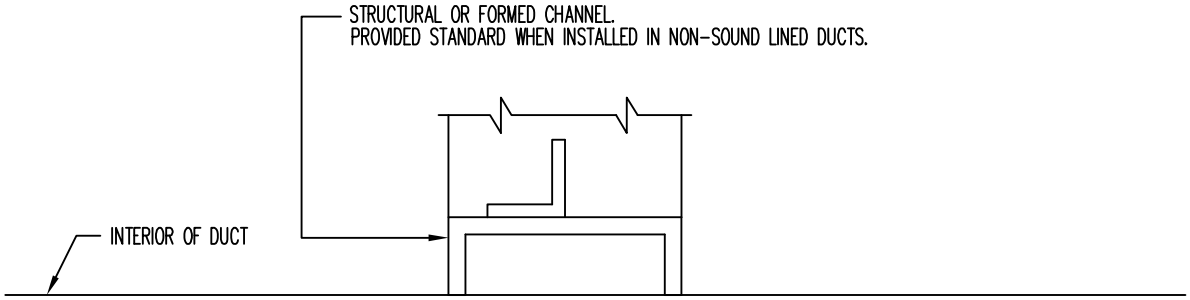
SHEET
9-1

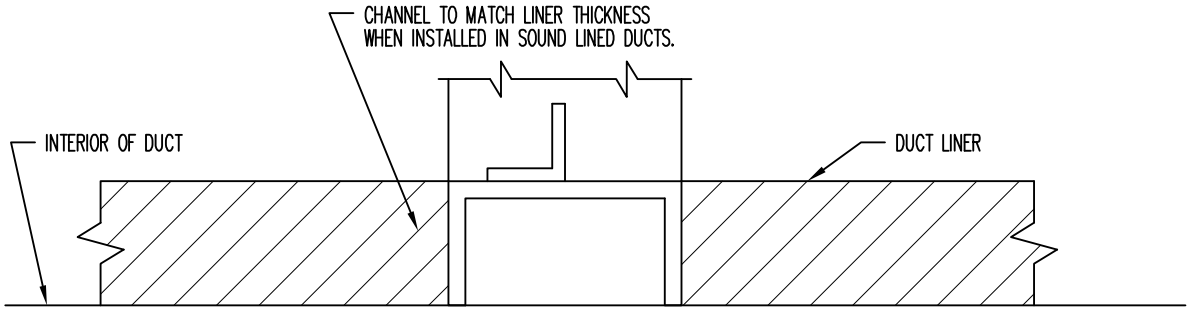
REVISION DATE: 08/11/10

# (PURCHASED AS REQUIRED)




SECTION

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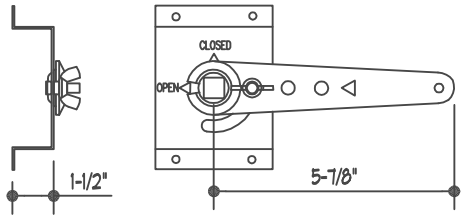
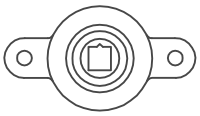
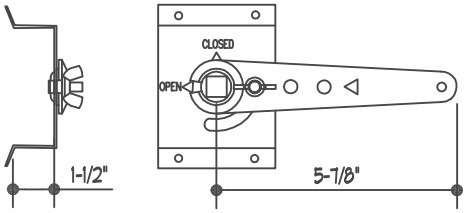
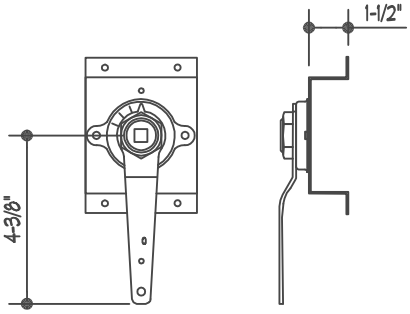
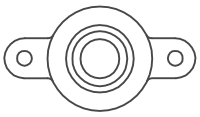
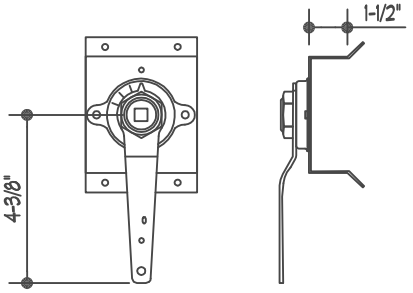
## MULTI-BLADE VOLUME DAMPERS

SHEET
9-2

REVISION DATE: 07/10/08

| | CAT. NO. | SIZE | FEATURES AND REMARKS |
|---|---|---|---|
|  | DURO-DYNE ESO-38-150 | 3/8" | FOR STATIC PRESSURES 2-INCH AND LESS<br>STANDOFF WITH ECONOMY HANDLE (SQUARE DUCT) |
| | DURO-DYNE ESO-12-150 | 1/2" | |
|  | DURO-DYNE SB-138 | 3/8" | FOR STATIC PRESSURES 2-INCH AND LESS<br>OPEN ENDED END BEARING |
| | DURO-DYNE SB-112 | 1/2" | |
|  | DURO-DYNE ESO-38R-150 | 3/8" | FOR STATIC PRESSURES 2-INCH AND LESS<br>STANDOFF WITH ECONOMY HANDLE (ROUND DUCT) |
| | DURO-DYNE ESO-12R-150 | 1/2" | |
|  | DURO-DYNE SRST1-1/2-388 w/SRHS-388 | 3/8" | FOR STATIC PRESSURES ABOVE 2-INCH<br>STANDOFF WITH ECONOMY HANDLE (SQUARE DUCT) |
| | DURO-DYNE SRST1-1/2-128 w/SRHS-128 | 1/2" | |
|  | DURO-DYNE SB-338 | 3/8" | FOR STATIC PRESSURES ABOVE 2-INCH<br>CLOSED ENDED END BEARING |
| | DURO-DYNE SB-312 | 1/2" | |
|  | DURO-DYNE SRST1-1/2R-388 w/SRHS-388 | 3/8" | FOR STATIC PRESSURES ABOVE 2-INCH<br>STANDOFF WITH ECONOMY HANDLE (ROUND DUCT) |
| | DURO-DYNE SRST1-1/2R-128 w/SRHS-128 | 1/2" | |

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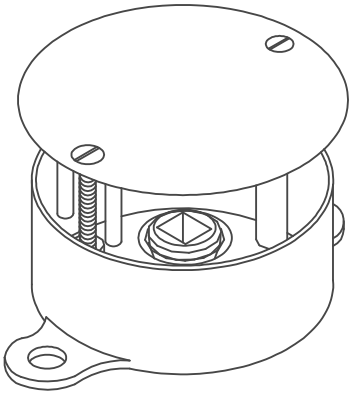
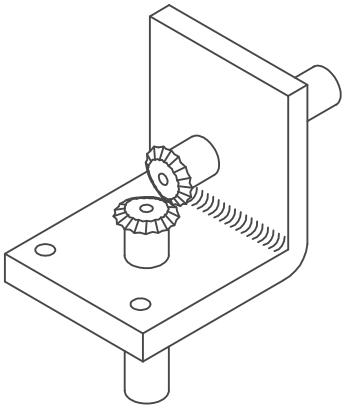
# VOLUME DAMPER HARDWARE

SHEET
9-3

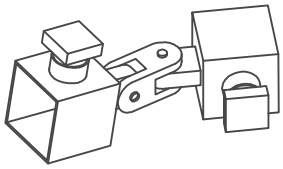
REVISION DATE: 06-25-14



CONCEALED DAMPER REGULATOR



MITER GEAR ASSEMBLY



UNIVERSAL JOINT

VENT FAB INC.
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SHEETMETAL FABRICATORS

CONCEALED REGULATOR HARDWARE

SHEET
9-4

REVISION DATE: 1/28/10

# SECTION 10

## FLEXIBLE DUCT CONNECTIONS

### GENERAL NOTES FOR FLEXIBLE DUCT CONNECTIONS

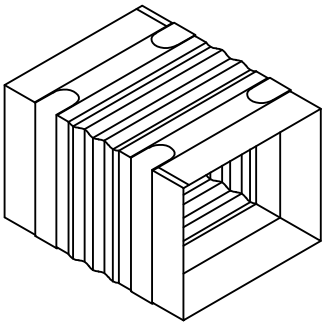
NOTES:

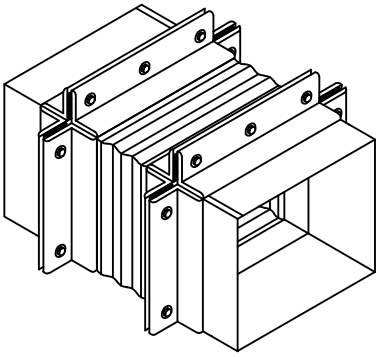
1) Flexible duct connections shall be of the metal edge variety with approximately 3" material width, as supplied by Durodyne for industrial/commercial applications.

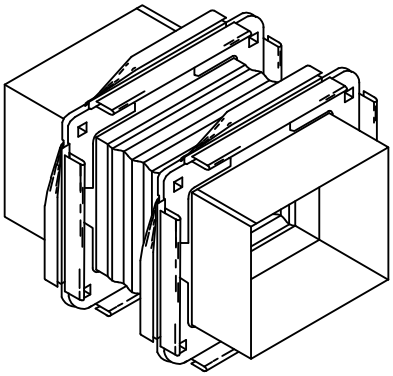
2) Materials for indoor applications to be Neoprene, as supplied by Durodyne.

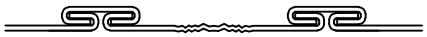
3) Materials for outdoor applications to be Durolon, as supplied by Durodyne.

4) Flexible connections to be installed with 1" slack.

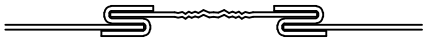








DRIVE SLIP CONNECTION

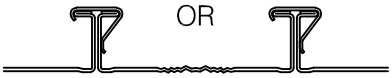


S - SLIP CONNECTION

1/2" VANSTONE CONNECTION

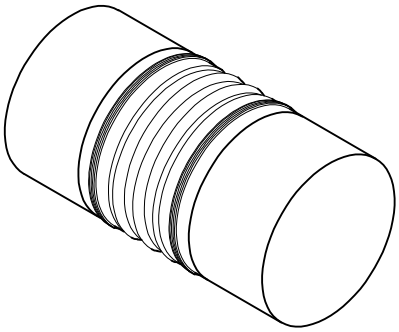
DUCTMATE CONNECTION

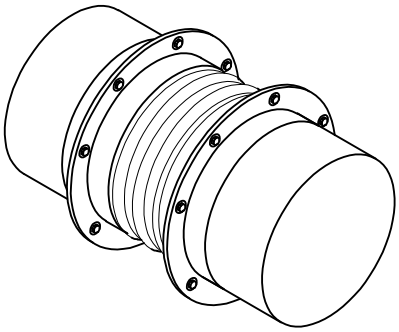
OR

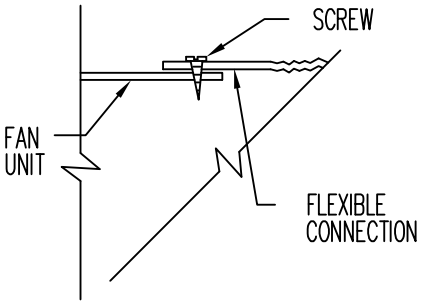


TDC CONNECTION

## RECTANGULAR

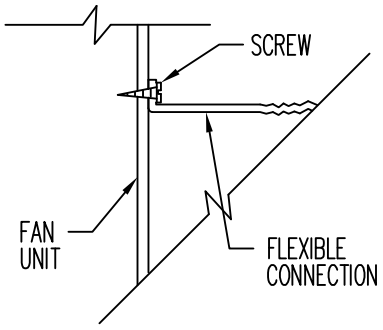







NYLON STRAPS
OR
STAINLESS STEEL
WORM GEAR
DRAWBANDS

1/2" VANSTONE CONNECTION




FLANGE OR ?
@ FAN OR EQUIPMENT

## ROUND

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# FLEXIBLE CONNECTIONS

SHEET
10-1

REVISION DATE: 11/26/08

# SECTION 11

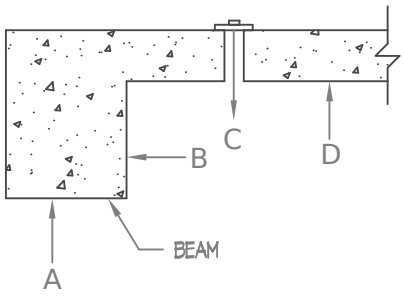
## DUCT HANGERS AND SUPPORTS

### GENERAL NOTES FOR DUCT HANGERS AND SUPPORTS

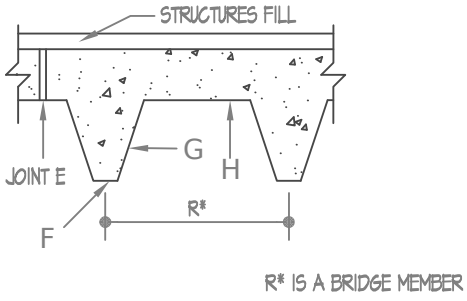
NOTES:

1) The following sheets and tables are in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005, inclusive of functional criteria (Chapter 11).
2) All galvanized sheet steel to be of ASTM 653 with G-90 galvanized coating.
3) All stainless sheet steel to be of ASTM A-240 and A-480 with a 2B finish (unless otherwise noted).
4) Ductmate specialized duct support channel may be substituted for angle iron trapeze supports.

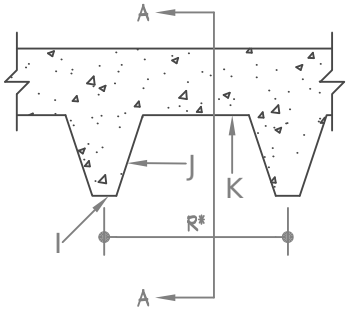
ALPHABET LETTER ONLY INDICATES AN ALTERNATIVE LOCATION OR SITUATION THAT MAY BE PERMITTED OR RESTRICTED BY DESIGN DOCUMENTS.



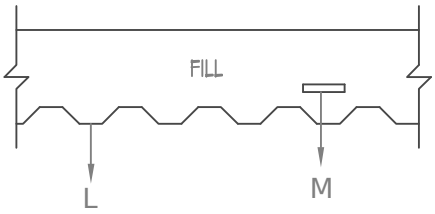

CONCRETE SLAB



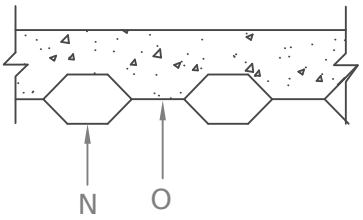

PRE CAST JOIST

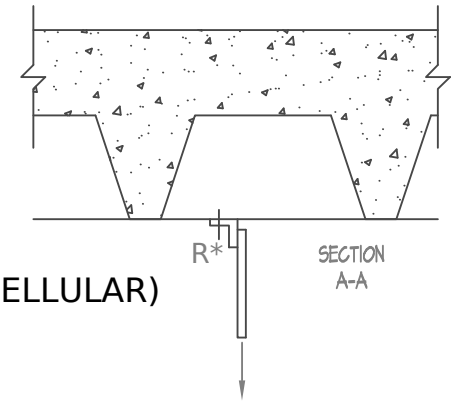



WAFFLE (PAN)

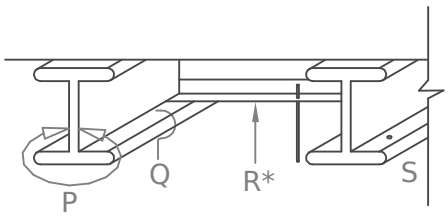



METAL DECK

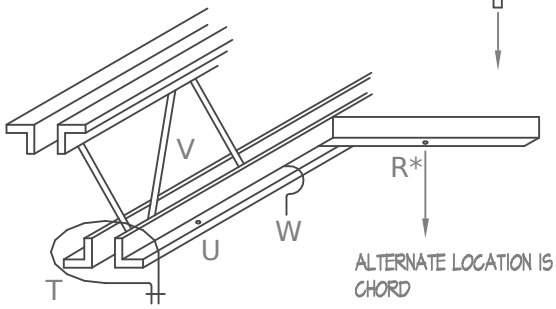



METAL DECK (CELLULAR)




STEEL BEAMS




OPEN WEB JOIST

## CONVENTIONAL HANGER METHODS AND DEVICES

CONCRETE INSERTS, SINGLE
CONCRETE INSERTS, SLOTTED
POWDER ACTUATED FASTENERS
"C" CLAMPS
WELDED STUDS
FRICTION CLAMPS
STRAP
ROD, THREADED, UNTHREADED
BRIDGE
BEAM CLAMP, HALF FLANGE BEAM
CLAMP, FULL FLANGE
EYE BOLT (OR ROD)
DRILLED HOLE AND BOLT
STANCHION
SELF TAPPING SCREWS PLUS STRAPS
DROP IN EXPANSION ANCHORS
KNEE BRACKET FROM WALL
LAG SCREW EXPANSION ANCHOR
NAILED PIN FASTENERS
RIVETS
SWAY BRACING
"FISH" PLATE OR WASHER AND ROD
HOOK OR LOOP
VIBRATION ISOLATOR

NOTES:
INSTALLER TO SELECT HANGERS BASED ON TYPE OF STRUCTURE AND SUSPENSION, AS WELL AS ANY LIMITATIONS AS SET FORTH IN PROJECT SPECIFICATIONS. DO NOT EXCEED ALLOWABLE OR SPECIFIED LOAD LIMITS.
ALLOWABLE LOAD ON UPPER ATTACHMENT IS 1/4 OF FAILURE LOAD.

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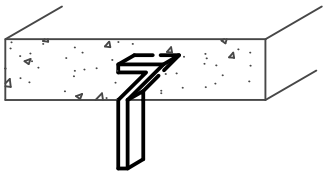
# HANGER ATTACHMENTS TO STRUCTURE

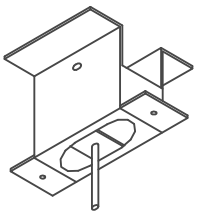
SHEET
11-1

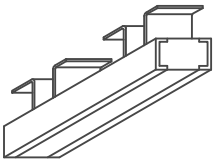
REVISION DATE: 07/10/08

UNLESS OTHERWISE APPROVED ALLOWABLE LOAD ON UPPER ATTACHMENT IS 1/4 OF FAILURE LOAD.

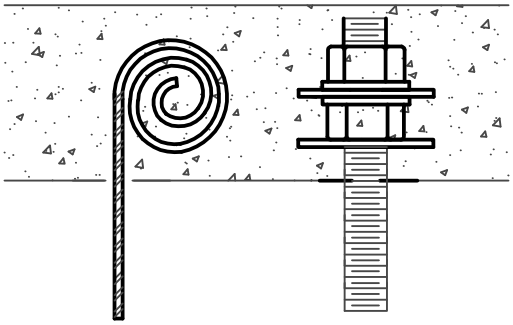


FLAT BAR
CONCRETE INSERT

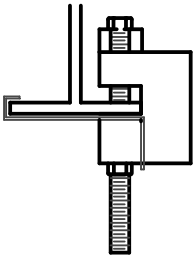




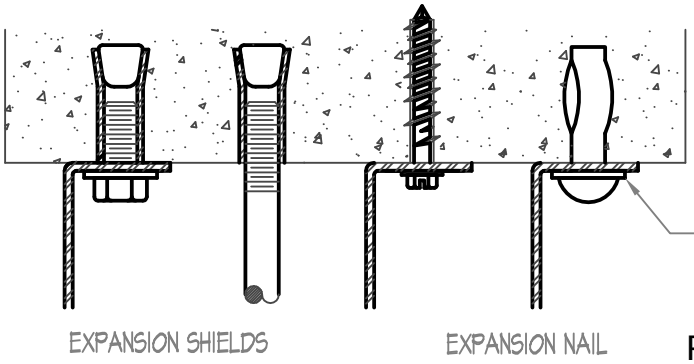
MANUFACTURED
CONCRETE INSERTS



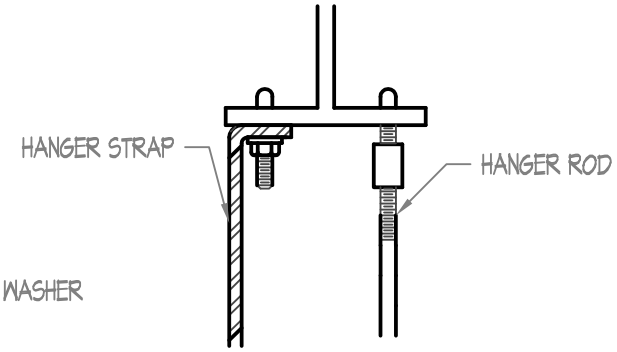
HANGER STRAP ROD INSERT
INSERT



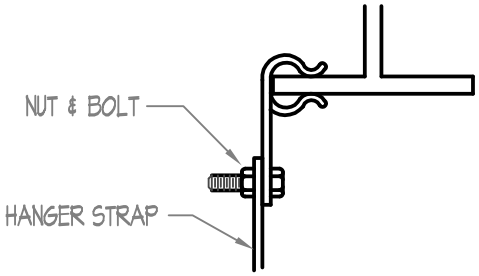
C-CLAMP W/RETAINING CLIP
C-CLAMP W/LOCK NUT (OPTIONAL)



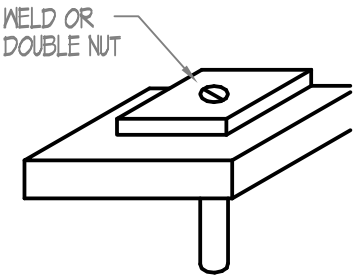

DRILLED CONCRETE ANCHORS




POWER ACTUATED STUDS INTO STEEL
(STRUCTURE OR DECK)




FRICTION CLAMPS




BEARING PLATE

* IMPORTANT! PREVENT BENDING OF STRAP AT 90° BEND UNDER LOAD.

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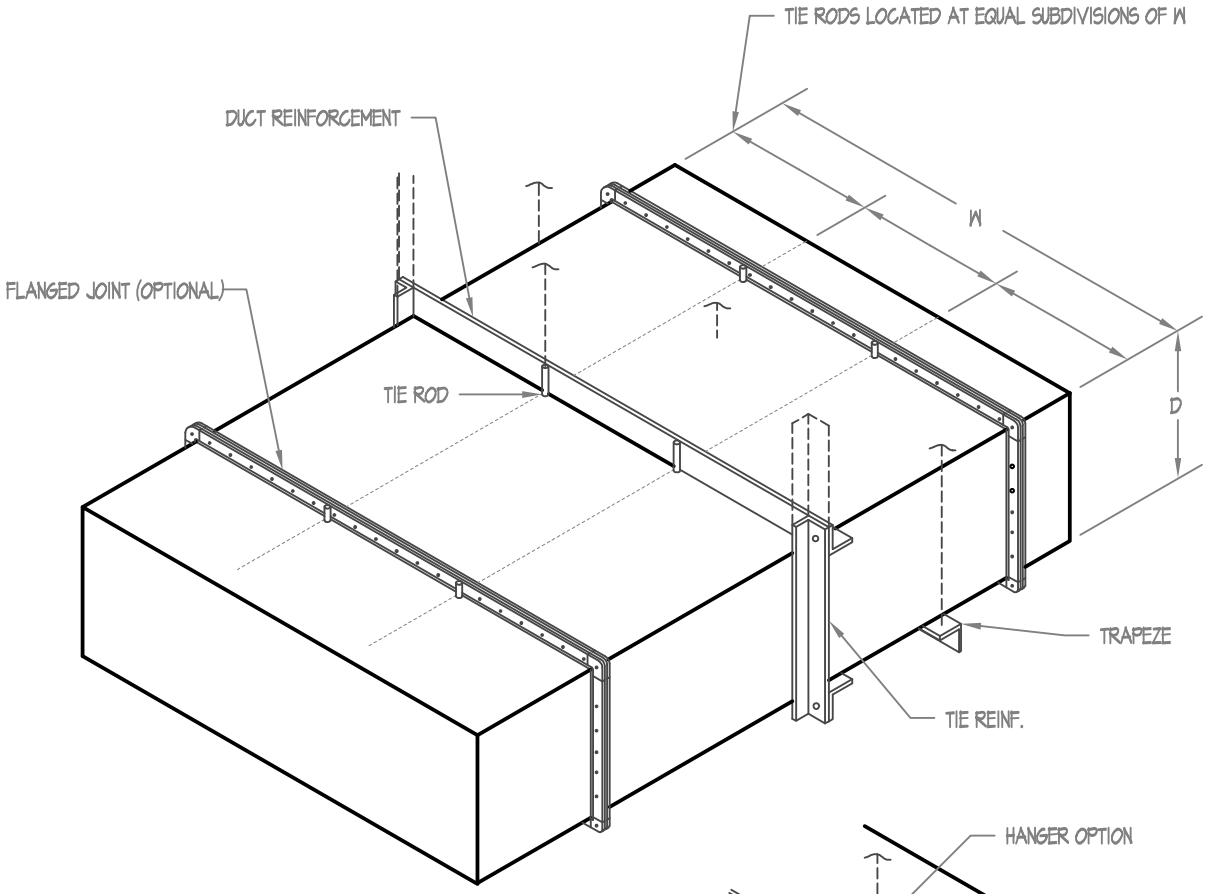
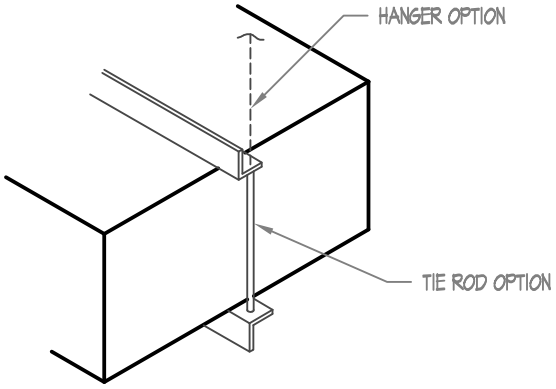
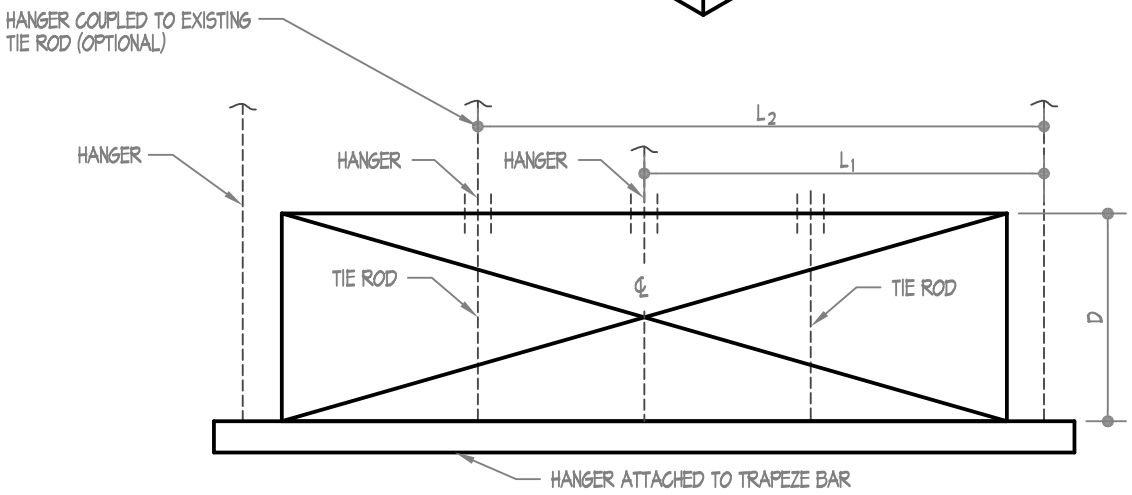
# UPPER ATTACHMENT DEVICES

SHEET
11-2

REVISION DATE: 02/16/11




$L_2 + D$ OR $L_1 + D$ DEFINES P/2 FOR TABLE SHOWN ON 11-5

VENT FAB INC.
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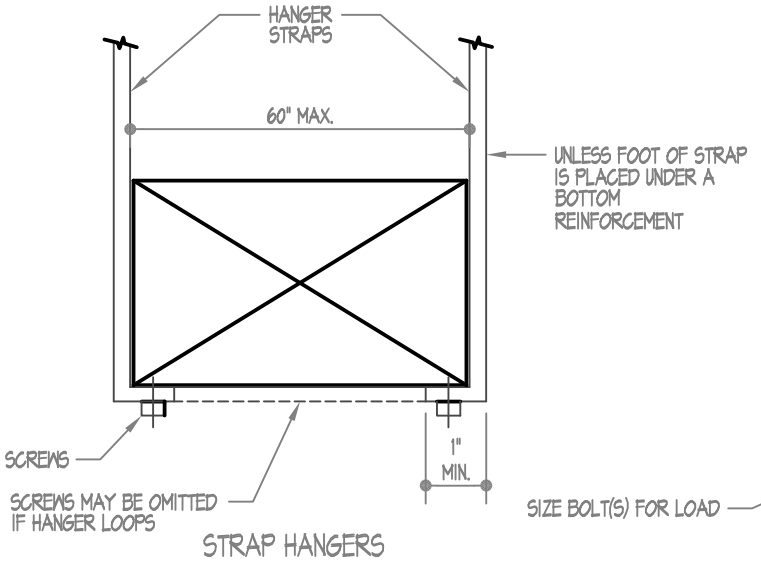
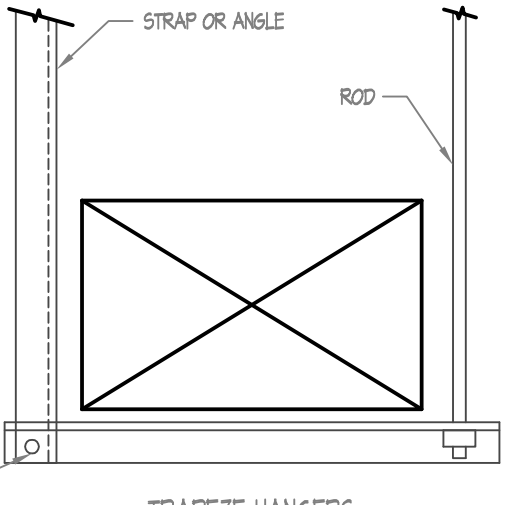
# LARGE DUCT SUPPORT

SHEET
11-3

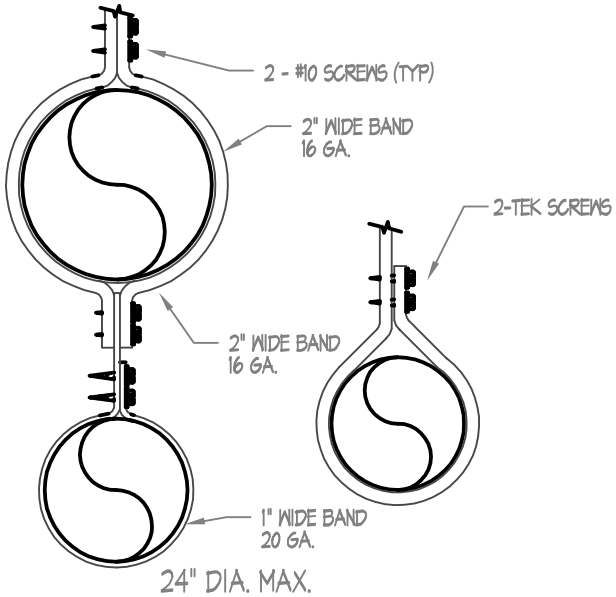
REVISION DATE: 08/11/10



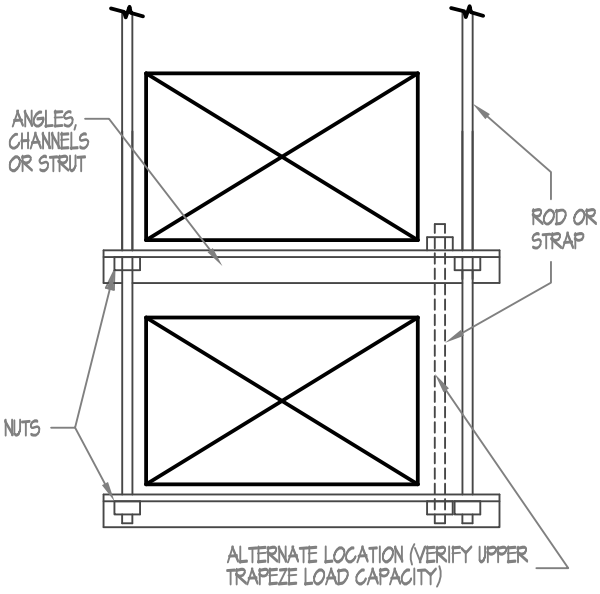

STRAP HANGERS

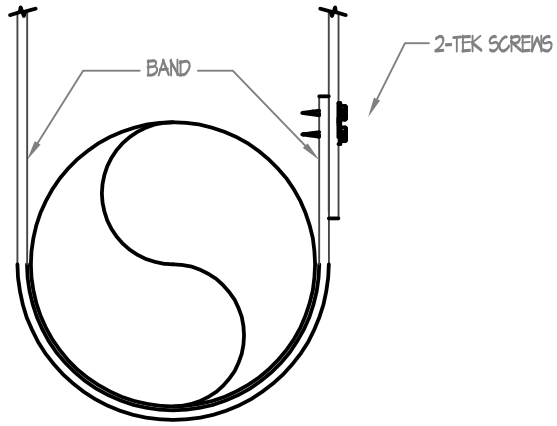



TRAPEZE HANGERS

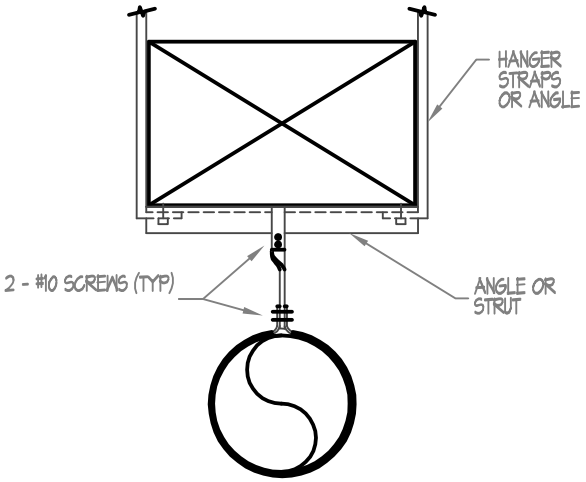



24" DIA. MAX.
HANGERS MUST NOT DEFORM DUCT SHAPE




OVER 24" DIA. MAX.
HANGERS MUST NOT DEFORM DUCT SHAPE




REINFORCEMENT MAY BE USED FOR ATTACHMENT IF IT QUALIFIES FOR BOTH DUTIES

DO NOT EXCEED ALLOWABLE LOAD LIMITS.

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# LOWER HANGER ATTACHMENTS

SHEET
11-4

REVISION DATE: 08/11/10

# RECTANGULAR DUCT HANGERS ( > 60" = TRAPEZE)

| MAXIMUM HALF OF DUCT PERIMETER | PAIR AT 10 FT. SPACING | | PAIR AT 8 FT. SPACING | | PAIR AT 5 FT. SPACING | | PAIR AT 4 FT. SPACING | |
|---|---|---|---|---|---|---|---|---|
| | STRAP | ROD | STRAP | ROD | STRAP | ROD | STRAP | ROD |
| $\frac{P}{2}$ = 30" | 1"x22 GA. | 10 GA. | 1"x22 GA. | 10 GA. | 1"x22 GA. | 12 GA. | 1"x22 GA. | 12 GA. |
| $\frac{P}{2}$ = 72" | 1"x18 GA. | 3/8" | 1"x20 GA. | 1/4" | 1"x22 GA. | 1/4" | 1"x22 GA. | 1/4" |
| $\frac{P}{2}$ = 96" | 1"x16 GA. | 3/8" | 1"x18 GA. | 3/8" | 1"x20 GA. | 3/8" | 1"x22 GA. | 1/4" |
| $\frac{P}{2}$ = 120" | 1 1/2" x 16 GA. | 1/2" | 1"x16 GA. | 3/8" | 1"x18 GA. | 3/8" | 1"x20 GA. | 1/4" |
| $\frac{P}{2}$ = 168" | 1 1/2" x 16 GA. | 1/2" | 1 1/2" x 16 GA. | 1/2" | 1"x16 GA. | 3/8" | 1"x18 GA. | 3/8" |
| $\frac{P}{2}$ = 192" | NOT GIVEN | 1/2" | 1 1/2" x 16 GA. | 1/2" | 1"x16 GA. | 3/8" | 1"x16 GA. | 3/8" |
| $\frac{P}{2}$ = 193" UP | SPECIAL ANALYSIS REQUIRED | | | | | | | |

| WHEN STRAPS ARE LAP JOINED USE THESE MINIMUM FASTENERS: | SINGLE HANGER MAXIMUM ALLOWABLE LOAD | |
|---|---|---|
| | STRAP | ROD (DIA.) |
| 1"X18, 20, 22 GA. - TWO #10 OR ONE 1/4" BOLT<br><br>1"X16 GA. - TWO 1/4" DIA.<br>1"X16 GA. - TWO 3/8" DIA.<br>PLACE FASTENERS IN SERIES, NOT SIDE BY SIDE. | 1"X22 GA. - 260 lbs<br>1"X20 GA. - 320 lbs<br>1"X18 GA. - 420 lbs<br>1"X16 GA. - 700 lbs<br>1 1/2"X16 GA - 1100 lbs | 1/4" - 270 lbs<br>3/8" - 680 lbs<br>1/2" - 1250 lbs<br>5/8" - 2000 lbs<br>3/4" - 3000 lbs |

NOTES:

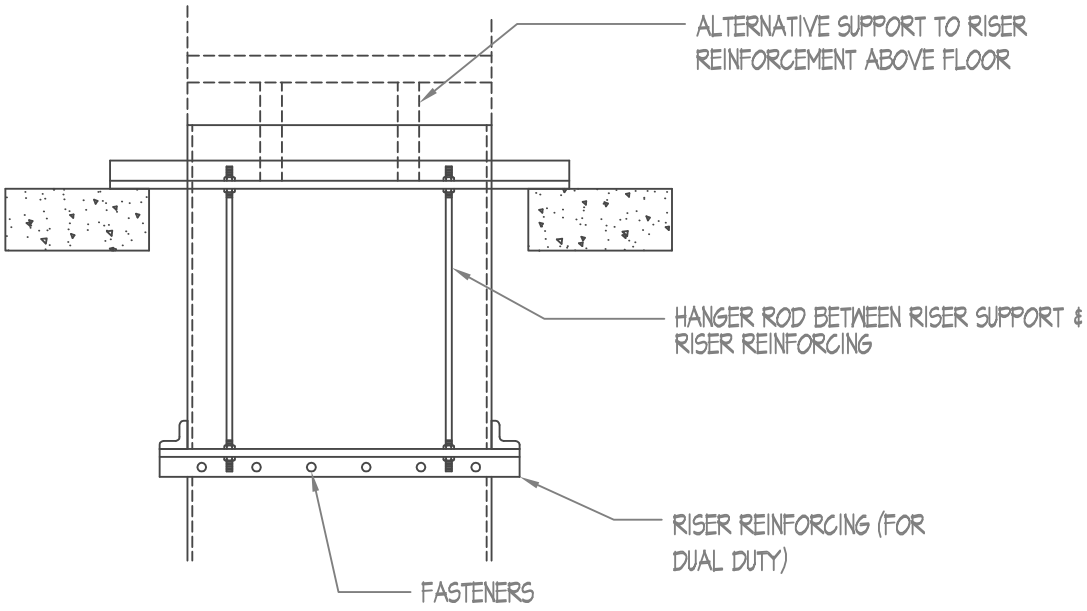
1) DIMENSIONS OTHER THAN GAUGE ARE IN INCHES.
2) TABLES ALLOW FOR WEIGHT OF DUCT, 1 LB./SQ.FT. INSULATION, NORMAL REINFORCEMENT, AND TRAPEZE WEIGHT. NO EXTERNAL LOADS HAVE BEEN ALLOWED FOR.
3) FOR CUSTOM DESIGN OF HANGERS, DESIGNERS MAY CONSULT SMACNA'S RECTANGULAR INDUSTRIAL DUCT STANDARDS, THE AISI COLD FORMED STEEL DESIGN MANUAL & THE AISC STEEL CONST. MANUAL.
4) STRAPS ARE GALVANIZED STEEL, OTHER MATERIALS ARE BLACK IRON, PRIME COATED.
5) ALLOWABLE LOADS FOR P/2 ASSUME THAT DUCTS ARE 16 GA. MAX., EXCEPT THAT WHEN MAX. DUCT DIMENSION (W) IS OVER 60" THEN P/2 MAX. IS 1.25W.
6) 12, 10 OR 8 GA. WIRE IS BLACK ANNEALED STEEL, BRIGHT BASIC STEEL, OR GALVANIZED STEEL.

# MINIMUM HANGER SIZES FOR ROUND DUCT

| DUCT DIAMETER | MAXIMUM SPACING | ROD SIZE | STRAP SIZE | SELECTION | |
|---|---|---|---|---|---|
| | | | | ROD | STRAP |
| 10" AND UNDER | 12'-0" | 1/4" | 1" X 22 ga. | | X |
| 11" - 18" | 12'-0" | 1/4" | 1" X 22 ga. | | X |
| 19" - 24" | 12'-0" | 1/4" | 1" X 22 ga. | | X |
| 25" - 36" | 12'-0" | 3/8" | 1" X 20 ga. | | X |
| 37" - 50" | 12'-0" | 2 @ 3/8" | 2 @ 1" X 20 ga. | X | |
| 51" - 60" | 12'-0" | 2 @ 3/8" | 2 @ 1" X 18 ga. | X | |
| 61" - 84" | 12'-0" | 2 @ 3/8" | 2 @ 1" X 16 ga. | X | |

NOTES:

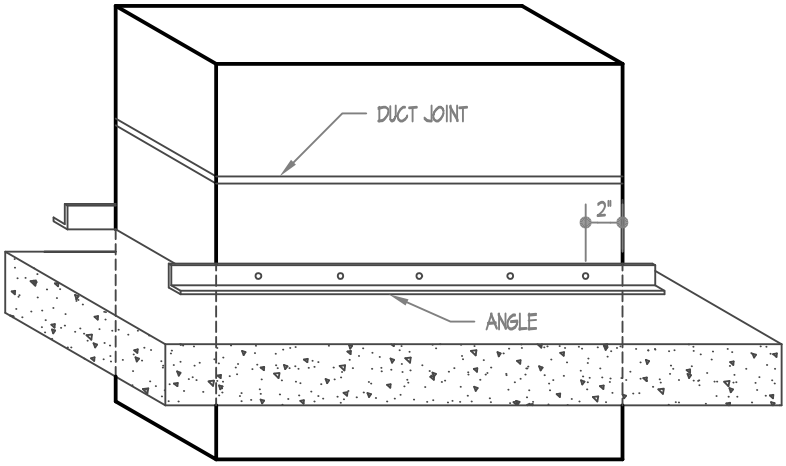
1) STRAPS ARE GALVANIZED STEEL. RODS ARE UN-COATED OR GALVANIZED STEEL.
2) SEE LOWER SUPPORT ATTACHMENTS SHEET.
3) SEE UPPER SUPPORT ATTACHMENTS SHEETS.
4) TABLE ALLOWS FOR CONVENTIONAL WALL THICKNESS AND JOINT SYSTEMS PLUS ONE POUND PER SQUARE FOOT OF INSULATION WEIGHT. IF HEAVIER DUCTS ARE TO BE INSTALLED ADJUST HANGER SIZES TO BE WITHIN ACCEPTABLE LOAD LIMITS.
5) DESIGNERS: FOR INDUSTRIAL GRADE SUPPORTS INCLUDING SADDLES, SINGLE POINT TRAPEZE LOADS, LONGER SPANS AND FLANGED JOINT LOADS SEE SMACNA'S INDUSTRIAL DUCT CONSTRUCTION STANDARDS.




*MINIMUM NUMBER OF FASTENERS ON EACH OF TWO SUPPORT BARS

| LARGEST DUCT DIM | MINIMUM NUMBER OF FASTENERS |
|---|---|
| 16" AND DOWN | 2 |
| 17" - 24" | 3 |
| OVER 24" | LARGEST DUCT DIM. DIVIDED BY 8 |

LOCATE A FASTENER WITHIN 2" OF THE DUCT EDGES.
LOCATE OTHERS AT EVENLY SPACED INTERVALS. SEE TABLE 4-4 ON PAGE 4-7.




SUGGESTED SIZING FOR SUPPORT OF 12 FT. OF DUCT

| DUCT SIZE | ANGLE |
|---|---|
| 36"X18" | 1-1/2" X 1-1/2" X 1/8" |
| 48"X24" | 1-1/2" X 1-1/2" X 1/8" |
| 60"X30" | 1-1/2" X 1-1/2" X 3/16" |
| 60"X60" | 1-1/2" X 1-1/2" X 1/4" OR 2" X 2" X 1/8 |

OVER 60" - INCREASE ANGLE SIZE AS REQUIRED FOR SPACE & DUCT SIZE

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# RISER SUPPORTS FROM FLOOR - RECTANGULAR

SHEET
11-7

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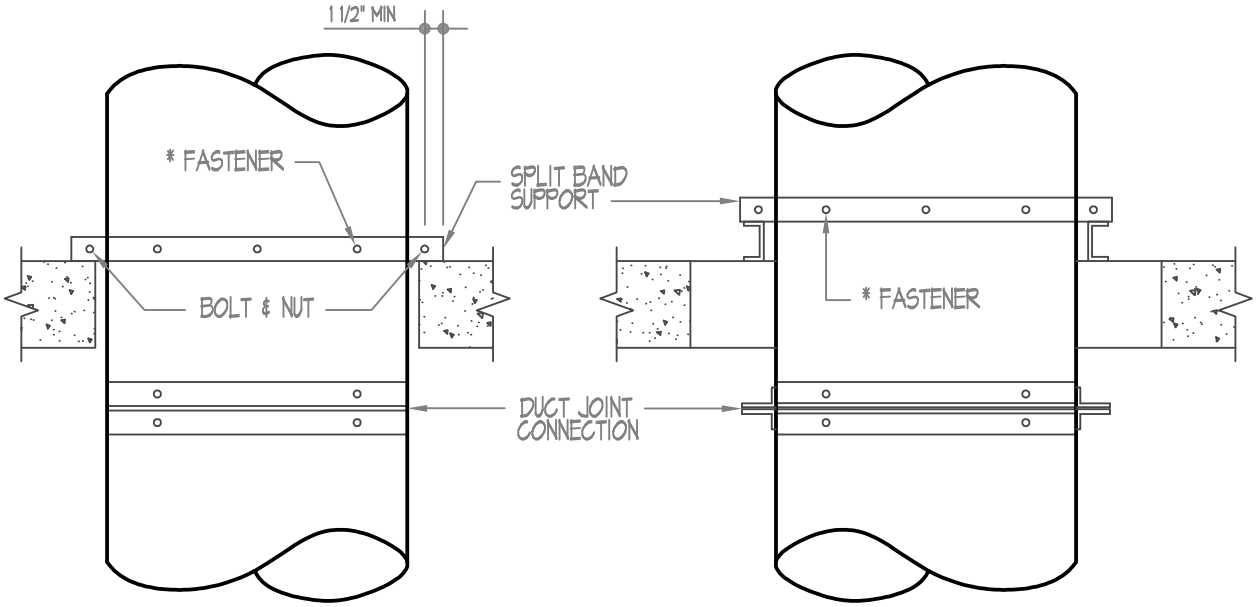
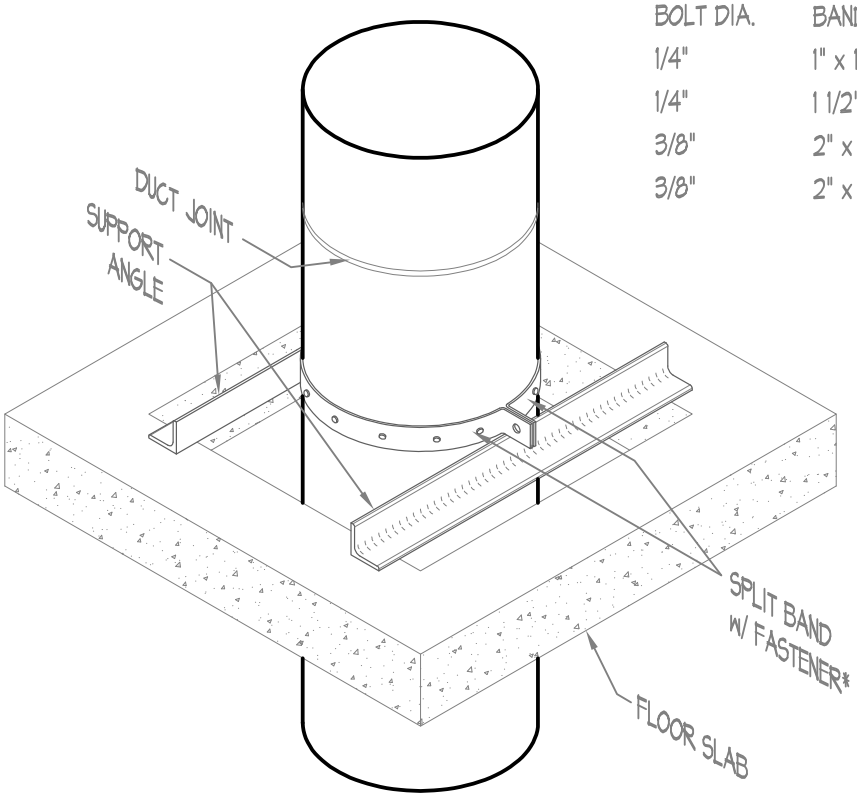



SPLIT BAND SUPPORT DIRECTLY ON FLOOR SLAB

SPLIT BAND SUPPORT BY SUPPLEMENTAL ANGLE OR CHANNEL SPANNING THE SLAB OPENING. USE AISC STEEL HANDBOOK FORMULA FOR SIZING BEAMS WITH TWO CONCENTRATED LOADS.

SUGGESTED SIZING FOR SPLIT BAND SUPPORT FOR 12 FT OF DUCT

| BOLT DIA. | BAND SIZE | DUCT DIA. |
|---|---|---|
| 1/4" | 1" x 16 GA | UP TO 12" DIA 20 GA |
| 1/4" | 1 1/2" x 16 GA | 13" TO 24" DIA 20 GA |
| 3/8" | 2" x 16 GA | 25" TO 36" DIA 20 GA |
| 3/8" | 2" x 10 GA | 37" TO 60" DIA 18 GA |




* MINIMUM OF TWO FASTENERS IN EACH HALF OF BAND. OTHERWISE SPACE THEM AT 8" AND SO THAT THE LOAD SATISFIES TABLE 4-4.

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# RISER SUPPORTS FROM FLOOR - ROUND

SHEET
11-8

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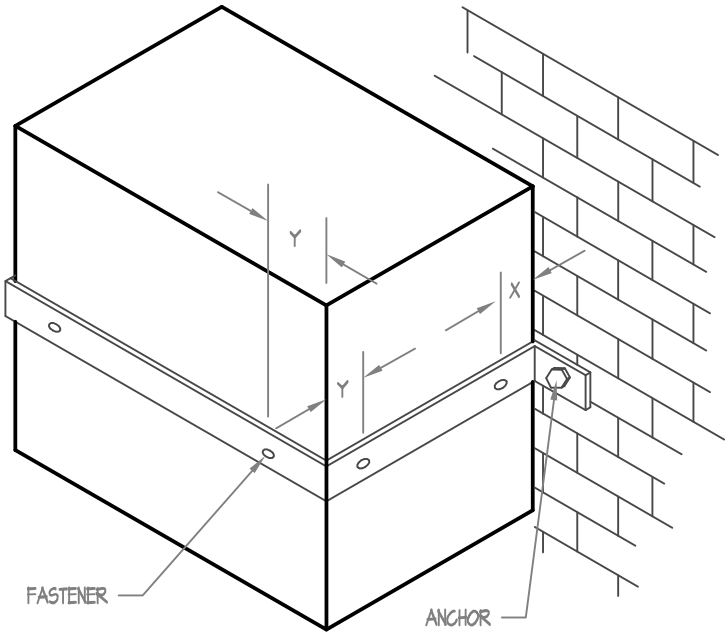
# SUGGESTED SIZING

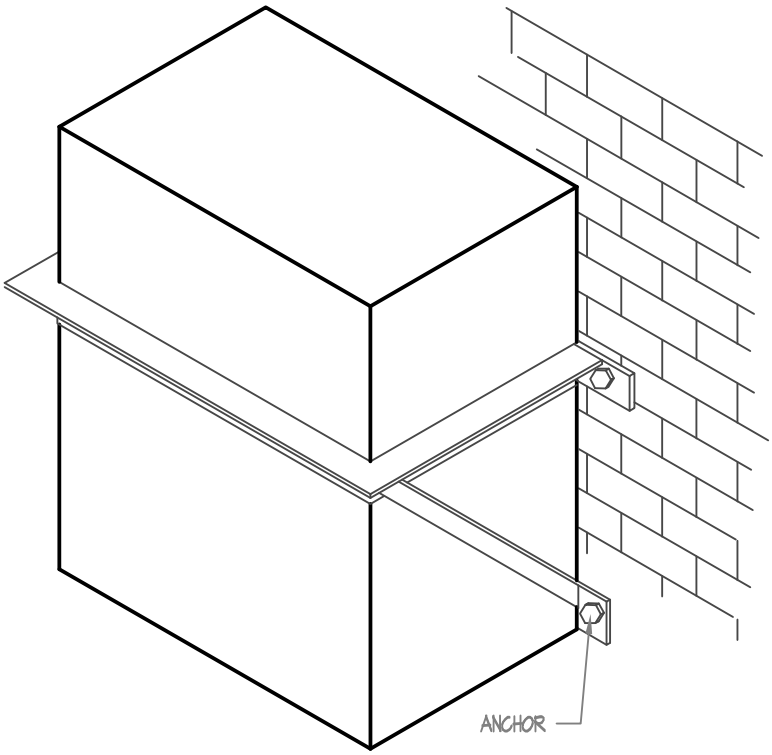
| DUCT SIZE | BAND |
|---|---|
| 18"X12" | 1 1/2"X16 GA. |
| 24"X20" | 1"X1/8" |

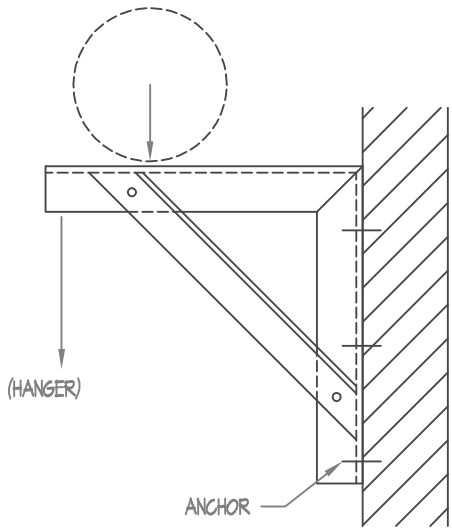



## TABLE 4-4

| DUCT GAGE | ALLOWABLE LOAD PER FASTENER* |
|---|---|
| 28,26 | 25 lb |
| 24,22,20 | 35 lb |
| 18,16 | 50 lb |

*WELD, BOLT OR NO. 8 SCREW (MIN.), DEVIATION PERMITTED BY OTHER ANALYSIS. X = 1", Y = 2"; ADD OTHERS TO ACCOMMODATE LOAD. MINIMUM OF 3 ON 24" WIDTH AND UP. ADD ALONG SIDES NEAREST ANCHORS.




SUGGESTED SIZING

| DUCT SIZE | BAND |
|---|---|
| 30"X12" | 1"X1"X1/8" |
| 36"X18" | 1"X1"X1/8" |
| 42"X24" | 1 1/4"X1 1/4"X1/8" |
| 48"X30" | 1 1/4"X1 1/4"X1/8" |

NOTES:
1. BRACKETS ARE SIZED FOR 12 FEET OF DUCT, MAXIMUM.
2. LOCATE DUCTS AGAINST WALL OR MAXIMUM OF 2" AWAY FROM WALL.
3. EACH WALL ANCHOR SHALL SATISFY THE FOLLOWING CRITERIA UNLESS OTHER ANALYSIS IS MADE: A. TENSILE LOAD = 3/8 X DUCT WEIGHT; SAFETY FACTOR OF 4.
   B. SHEAR LOAD X 1/2 X DUCT WEIGHT; SAFETY FACTOR OF 4.

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# DUCT SUPPORTS FROM WALLS

SHEET
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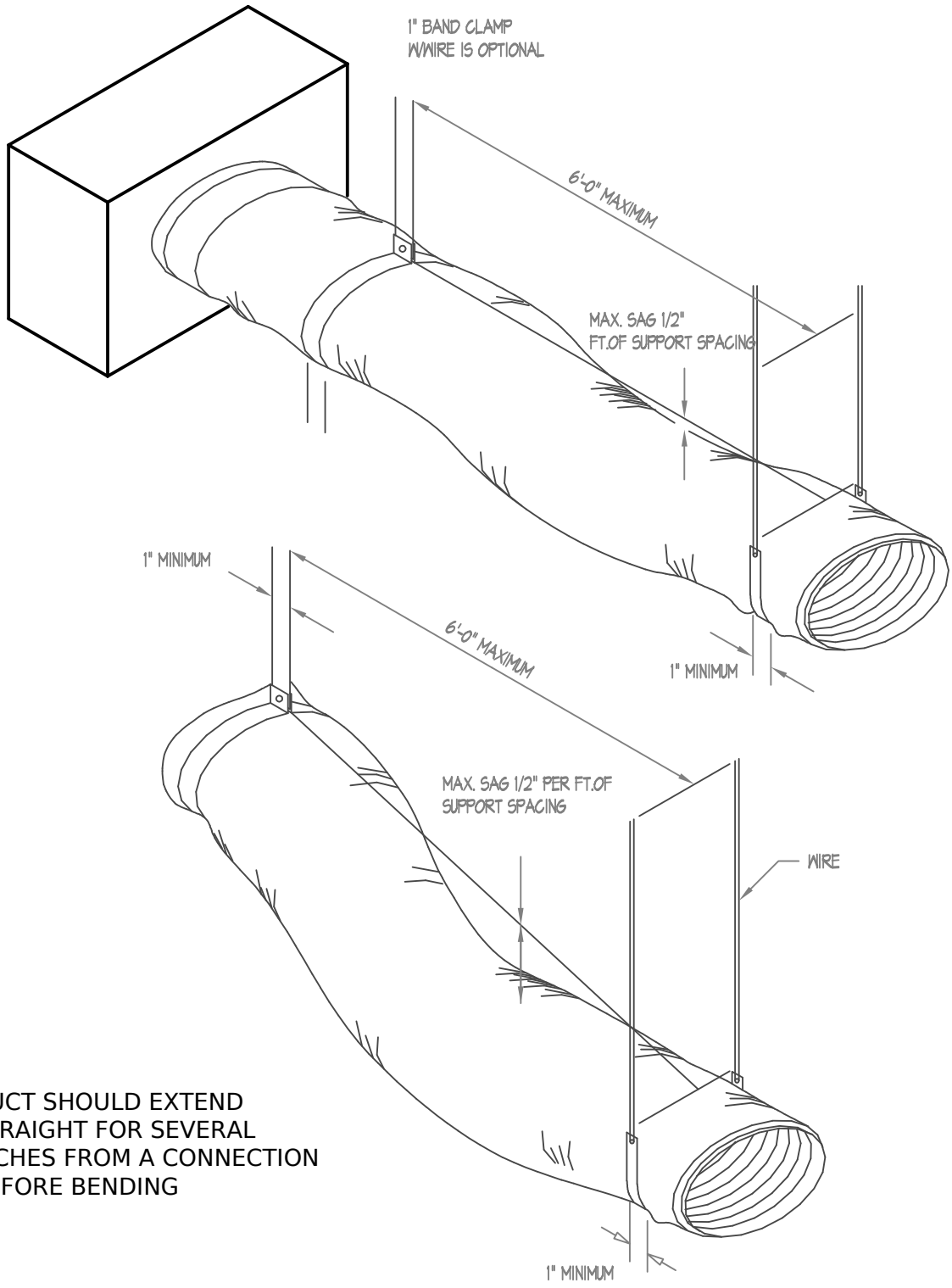


DUCT SHOULD EXTEND
STRAIGHT FOR SEVERAL
INCHES FROM A CONNECTION
BEFORE BENDING

SUPPORT SYSTEM MUST NOT DAMAGE DUCT OR CAUSE OUT OF ROUND SHAPE

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# FLEXIBLE DUCT SUPPORTS

SHEET
11-10

REVISION DATE: 07/10/08

# SECTION 12

## DUCT AND CEILING ACCESS DOORS

### GENERAL NOTES FOR DUCT AND CEILING ACCESS DOORS

NOTES:

1) All duct access doors shall be shown on shop drawings.

2) All duct access doors shall be field installed, unless otherwise noted.

3) Duct access doors shall be provided for access to: valves, controllers, fire dampers, fire/smoke dampers and humidifier dispersion tubes.

4) Duct access doors for rectangular duct shall be sized for largest square size door that will fit on duct up to 24" x 24". Minimum door size to be 12" x 12". Smaller door sizes may be used on duct sizes smaller than 12" x 12" for visual inspection only.

5) Low pressure access doors on rectangular duct to be square-framed access doors as manufactured by DUCTMATE Industries. Hinge type not allowed.

6) Low pressure access doors on round duct to be "Ductmate Sandwich" style as manufactured by DUCTMATE Industries. Provide largest door size that will fit on round duct per submittals.

7) Medium pressure (3" and 4" s.p.) access doors for round and rectangular duct to be "Ductmate Sandwich" style as manufactured by DUCTMATE Industries. Provide largest door size that will fit on round duct per Submittals.

8) Access doors required to access HVAC equipment through walls and inaccessible ceilings shall be MILCOR style M.

# SECTION 13

## FLEXIBLE DUCTWORK

### GENERAL NOTES FOR FLEXIBLE DUCTWORK

NOTES:

1) Flexible ductwork for low pressure, positive and negative, up to 2" s.p, shall be Thermaflex model G-KM, with 1-1/2" thick, 3/4 lbs density insulation.

2) Flexible ductwork for positive pressure greater that 2" s.p. shall be Thermaflex model M-KC, with 1-1/2" thick, 3/4" lbs density insulation.

3) Maximum flexible duct length is seven (7) feet with only one 90-degree bend.

4) Connect each end of flexible duct with stainless steel screw-operated drawband.

# SECTION 14

## SINGLE WALL PLENUM PANELS

### GENERAL NOTES FOR SINGLE WALL PLENUM PANELS

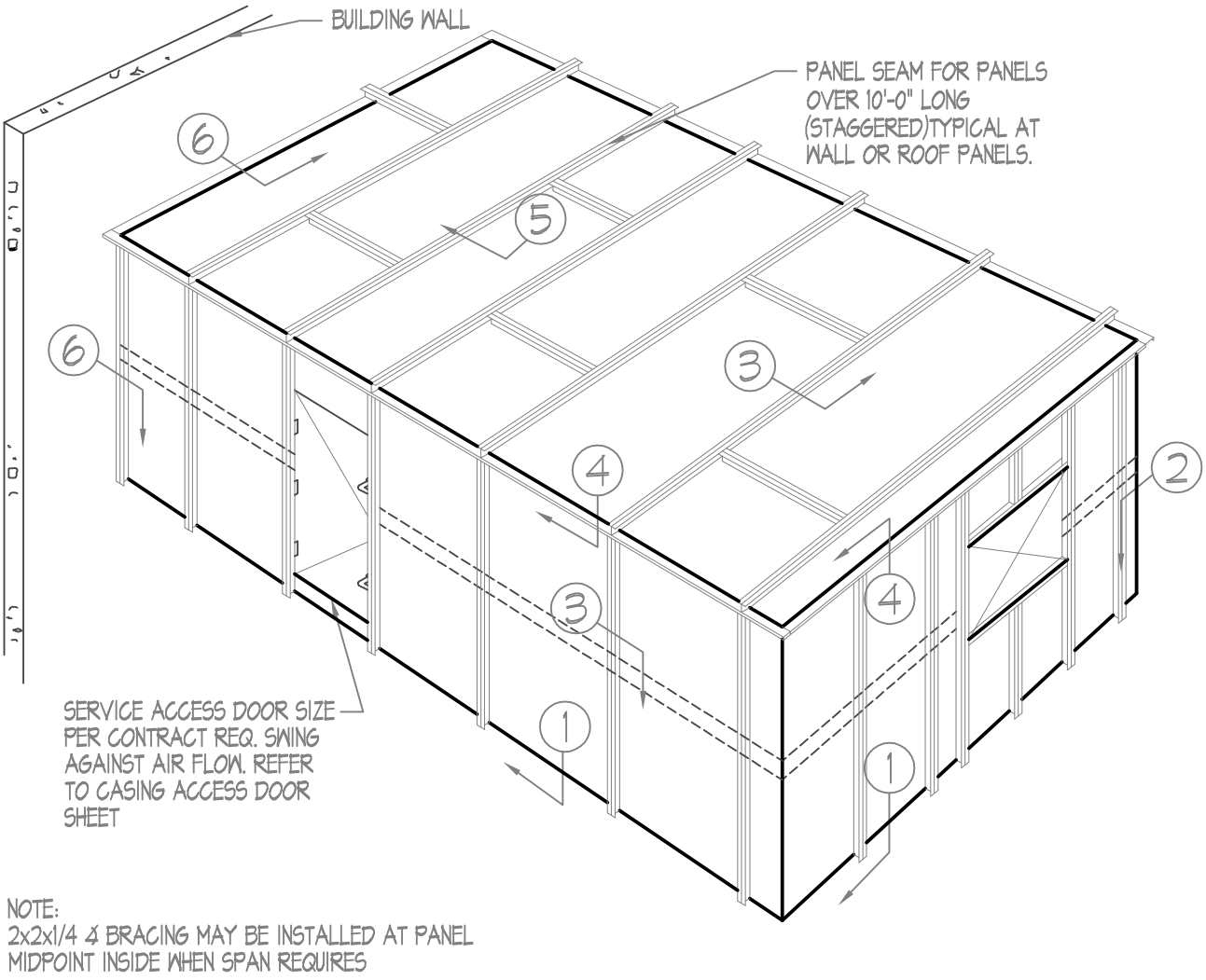
NOTES:

1) The following single wall plenum panel construction details and tables are in compliance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition 2005.

2) All galvanized steel sheet to be of ASTM 653 with G-90 galvanized coating.

3) All stainless steel sheet to be of ASTM A312 type 304L with a 2B finish.

4) When called for, reinforcing angle to be prime coated black iron where installed on galvanized duct, and stainless steel where installed on stainless steel duct.




# SINGLE WALL EQUIPMENT PLENUM DETAILS & NOTES

## CONSTRUCTION NOTES:

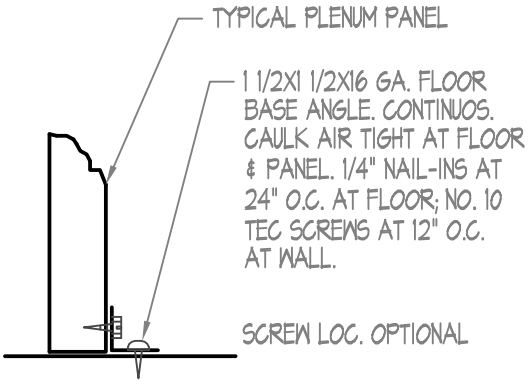
1) STANDARD DETAIL ABOVE SHOWS ISOMETRIC VIEW OF TYPICAL PANEL ARRANGEMENT OF CENTRAL BUILT - UP SINGLE WALL PLENUM.

2) THE PLENUMS ARE MADE OF SELF - REINFORCED PANEL SEAM CONSTRUCTION, SEE DETAILS ON PLENUM PANEL DETAILS SHEET.

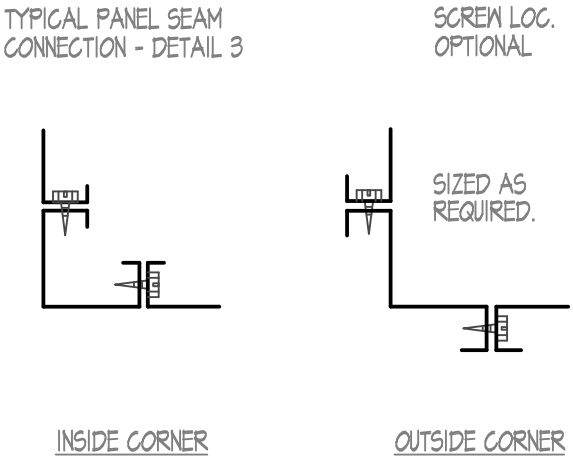
3) ACCESS DOORS ARE INSTALLED IN PLENUM FOR ACCESS TO ALL EQUIPMENT. SEE SHOP DRAWINGS FOR LOCATIONS. SEE CASING ACCESS DOOR SHEET FOR DETAILS.

4) SAFING SHEETS ARE INSTALLED AT TOP, BOTTOM AND SIDES BETWEEN PLENUM AND EQUIPMENT SUCH AS COILS AND FILTERS TO PREVENT AIR BY - PASS.

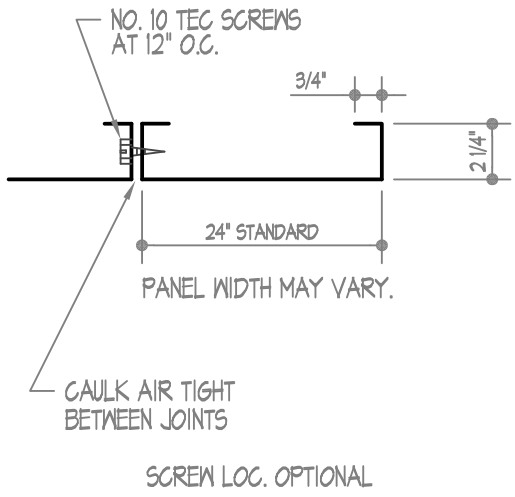
5) SEE CONSTRUCTION CHART FOR GAUGES, PANEL WIDTH & SPAN.



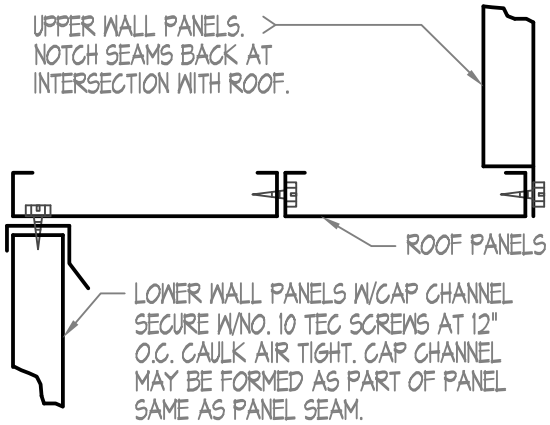

① FLOOR BASE INSTALLATION



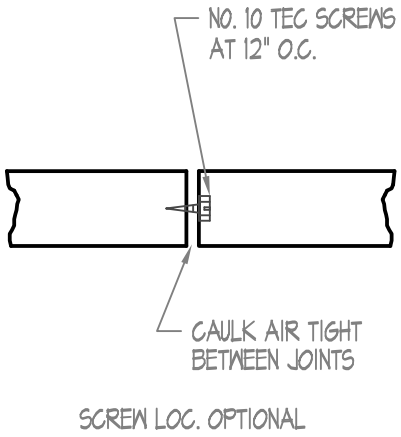

② PREFORMED WALL PANELS



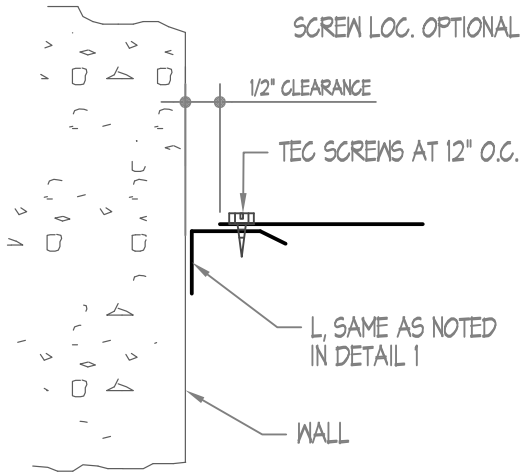

③ TYPICAL PANEL SEAMS




④ WALL AT ROOF JOINT




⑤ PANEL END SEAM CONNECTION




⑥ CONNECTION AT BUILDING

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# SINGLE WALL PLENUM PANEL DETAILS

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14-2

REVISION DATE: 07/10/08

# SINGLE WALL PLENUM PANELS

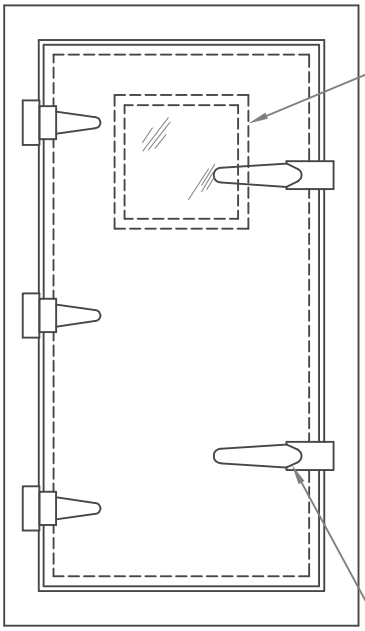
MAXIMUM ALLOWABLE PANEL WIDTH FOR A GIVEN PANEL GAUGE, SPAN AND LOAD CLASS

| SPAN | PANEL GAUGE | DEPTH | LOAD CLASS ("W.G. STATIC") | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2" | 3" | 4" | 6" | 10" |
| 6'-0" | #22 | 2" | 20" | 14" | 12" | - | - |
| | #22 | 3" | 20" | 16" | 14" | - | - |
| | #22 | 4" | 22" | 16" | 14" | 12" | - |
| | #20 | 2" | 24" | 18" | 16" | 12" | - |
| | #20 | 3" | 24" | 20" | 18" | 14" | - |
| | #20 | 4" | 24" | 20" | 18" | 14" | - |
| | #18 | 2" | 24" | 24" | 22" | 16" | 12" |
| | #18 | 3" | 24" | 24" | 24" | 18" | 14" |
| | #18 | 4" | 24" | 24" | 24" | 20" | 14" |
| | #16 | 2" | 24" | 24" | 24" | 22" | 16" |
| | #16 | 3" | 24" | 24" | 24" | 24" | 18" |
| | #16 | 4" | 24" | 24" | 24" | 24" | 18" |
| 8'-0" | #22 | 2" | 16" | 12" | - | - | - |
| | #22 | 3" | 18" | 14" | 12" | - | - |
| | #22 | 4" | 20" | 16" | 14" | - | - |
| | #20 | 2" | 20" | 16" | 12" | - | - |
| | #20 | 3" | 24" | 18" | 16" | 12" | - |
| | #20 | 4" | 24" | 20" | 18" | 12" | - |
| | #18 | 2" | 24" | 22" | 18" | 14" | - |
| | #18 | 3" | 24" | 24" | 22" | 16" | 12" |
| | #18 | 4" | 24" | 24" | 22" | 18" | 12" |
| | #16 | 2" | 24" | 24" | 24" | 18" | 12" |
| | #16 | 3" | 24" | 24" | 24" | 22" | 14" |
| | #16 | 4" | 24" | 24" | 24" | 22" | 16" |
| 10'-0" | #22 | 2" | 12" | - | - | - | - |
| | #22 | 3" | 16" | 12" | - | - | - |
| | #22 | 4" | 18" | 14" | 12" | - | - |
| | #20 | 2" | 16" | 12" | - | - | - |
| | #20 | 3" | 22" | 16" | 12" | - | - |
| | #20 | 4" | 24" | 18" | 14" | - | - |
| | #18 | 2" | 24" | 18" | 14" | - | - |
| | #18 | 3" | 24" | 22" | 18" | 14" | - |
| | #18 | 4" | 24" | 24" | 20" | 16" | - |
| | #16 | 2" | 24" | 24" | 20" | 12" | - |
| | #16 | 3" | 24" | 24" | 24" | 18" | 12" |
| | #16 | 4" | 24" | 24" | 24" | 20" | 14" |

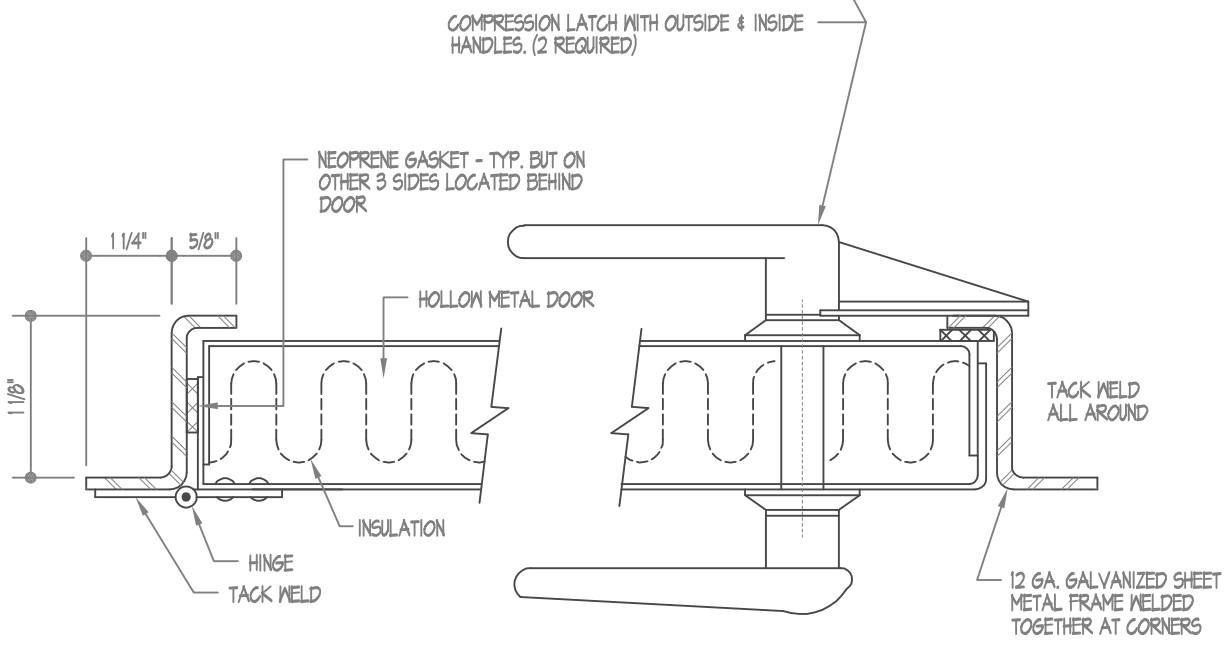
# SINGLE WALL PLENUM PANELS

MAXIMUM ALLOWABLE PANEL WIDTH FOR A GIVEN PANEL GAUGE, SPAN AND LOAD CLASS

| SPAN | PANEL GAUGE | DEPTH | LOAD CLASS ("W.G. STATIC") | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2" | 3" | 4" | 6" | 10" |
| 12'-0" | #22 | 3" | 14" | - | - | - | - |
| | #22 | 4" | 16" | 12" | - | - | - |
| | #20 | 2" | 14" | - | - | - | - |
| | #20 | 3" | 18" | 14" | - | - | - |
| | #20 | 4" | 22" | 16" | 12" | - | - |
| | #18 | 2" | 20" | 14" | - | - | - |
| | #18 | 3" | 24" | 20" | 16" | - | - |
| | #18 | 4" | 24" | 22" | 18" | 14" | - |
| | #16 | 2" | 24" | 18" | 14" | - | - |
| | #16 | 3" | 24" | 24" | 22" | 16" | - |
| | #16 | 4" | 24" | 24" | 24" | 18" | 12" |
| 14'-0" | #22 | 3" | 12" | - | - | - | - |
| | #22 | 4" | 14" | - | - | - | - |
| | #20 | 3" | 18" | - | - | - | - |
| | #20 | 4" | 18" | 14" | - | - | - |
| | #18 | 2" | 12" | - | - | - | - |
| | #18 | 3" | 22" | 16" | 12" | - | - |
| | #18 | 4" | 24" | 20" | 16" | 12" | - |
| | #16 | 2" | 16" | - | - | - | - |
| | #16 | 3" | 24" | 22" | 18" | 12" | - |
| | #16 | 4" | 24" | 24" | 22" | 16" | - |
| 16'-0" | #22 | 3" | 12" | - | - | - | - |
| | #22 | 4" | 12" | - | - | - | - |
| | #20 | 4" | 16" | 12" | - | - | - |
| | #20 | 3" | 18" | 12" | - | - | - |
| | #18 | 4" | 24" | 18" | 14" | - | - |
| | #18 | 3" | 24" | 16" | 12" | - | - |
| | #18 | 4" | 24" | 24" | 18" | 14" | - |
| 16'-0" | #20 | 4" | 14" | - | - | - | - |
| | #18 | 3" | 12" | - | - | - | - |
| | #18 | 4" | 22" | 14" | - | - | - |
| | #16 | 3" | 16" | - | - | - | - |
| | #16 | 4" | 24" | 20" | 14" | - | - |




CASING ACCESS DOOR




NOTES:

1) LATCHES TO BE VENTLOCK NO. 260 OR DURO DYNE SP-20.

2) STANDARD DOOR SIZE IS 2'-0" x 5'-0" OTHER DOOR SIZES AVAILABLE.

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CASING ACCESS DOOR

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REVISION DATE: 07/10/08

# SECTION 15

## DUCT GASKET AND SEALANTS

### GENERAL NOTES FOR DUCT GASKETS AND SEALANTS

NOTES:

1) All flanged duct joints (including Ductmate, TDC (SMACNA T-25), companion angle, and Vanstone angle) to be sealed with Ductmate gasket 440 tape.

2) All Pittsburgh-type longitudinal seams formed in the shop to be injected with non-hardening Fosters 10-42 pumpable cold sealant at decoil duct line.

3) All Snaplock and Pittsburg (non-decoil) longitudinal seams to be sealed only after assembly. Both shop and field sealant to be Ductmate Proseal or Permatite 711.

4) All shop round tack-and-seal joints and seams, as well as continuous resistance welds, to be sealed with Ductmate Proseal or Permatite 711.

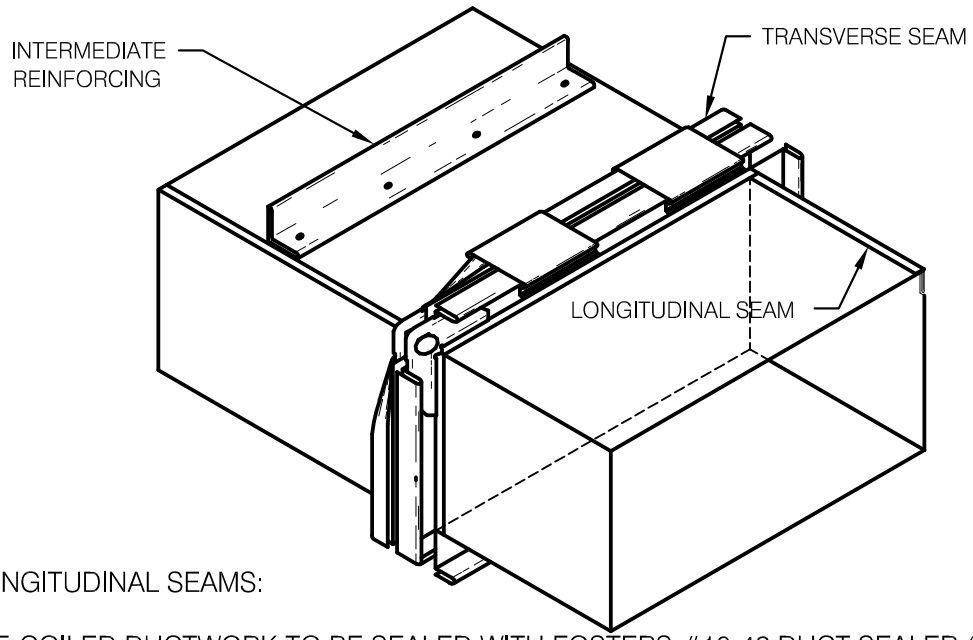
5) All indoor field joints, except those joints sealed with a gasket, to be sealed with Ductmate Proseal.

6) All outdoor field joints, except those joints sealed with a gasket, to be sealed with Ductmate E-Z-Seal.

NOTE: SEE PROJECT OVERVIEW FOR SEAL CLASS ASSIGNED PER SYSTEM

# DUCT SEALING REQUIREMENTS

| SEAL CLASS | SEALING REQUIRED | STATIC PRESSURE CONSTRUCTION CLASS |
|---|---|---|
| CLASS A | ALL TRANSVERSE JOINTS, LONGITUDINAL SEAMS AND DUCT WALL PENETRATIONS. | 4" W.G. AND UP |
| CLASS B | ALL TRANSVERSE JOINTS AND LONGITUDINAL SEAMS. | 3" W.G. |
| CLASS C | TRANSVERSE JOINTS | 2" W.G. |
| IN ADDITION TO THE ABOVE ANY VARIABLE AIR VOLUME SYSTEM DUCT OF 1" AND 1/2" W.G. CONSTRUCTION CLASS THAT IS UPSTREAM OF THE VAV BOXES SHALL ALSO MEET SEAL CLASS C. | | |




SEAL LONGITUDINAL SEAMS:

SHOP DE-COILED DUCTWORK TO BE SEALED WITH FOSTERS #10-42 DUCT SEALER (A SOLVENT BASED SEALER). SHOP ASSEMBLED DUCT FITTINGS TO BE SEALED WITH DUCTMATE PROSEAL OR PERMATITE 711. ALL FIELD ASSEMBLED DUCTWORK TO BE SEALED WITH DUCTMATE PROSEAL (WATER BASED).

SEAL TRANSVERSE JOINTS:

ALL FLANGE TYPE TRANSVERSE JOINTS TO BE SEALED WITH DUCTMATE BUTYL GASKET.
ALL S & DRIVE TRANSVERSE JOINTS TO BE SEALED WITH DUCTMATE PROSEAL (WATER BASED).

ALL PRODUCTS TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

# SECTION 16

## PAINT

### GENERAL NOTES FOR PAINT

NOTES:

1) All black iron materials to receive a single coat of primer paint per attached submittal. Black iron items include duct reinforcing angle, companion angle, Vanstone angles, and miscellaneous support materials.

2) All welds performed on galvanized materials to be painted with a single coat of zinc-rich paint per attached submittal.