CHAPTER 5

EXTERIOR COMPONENTS

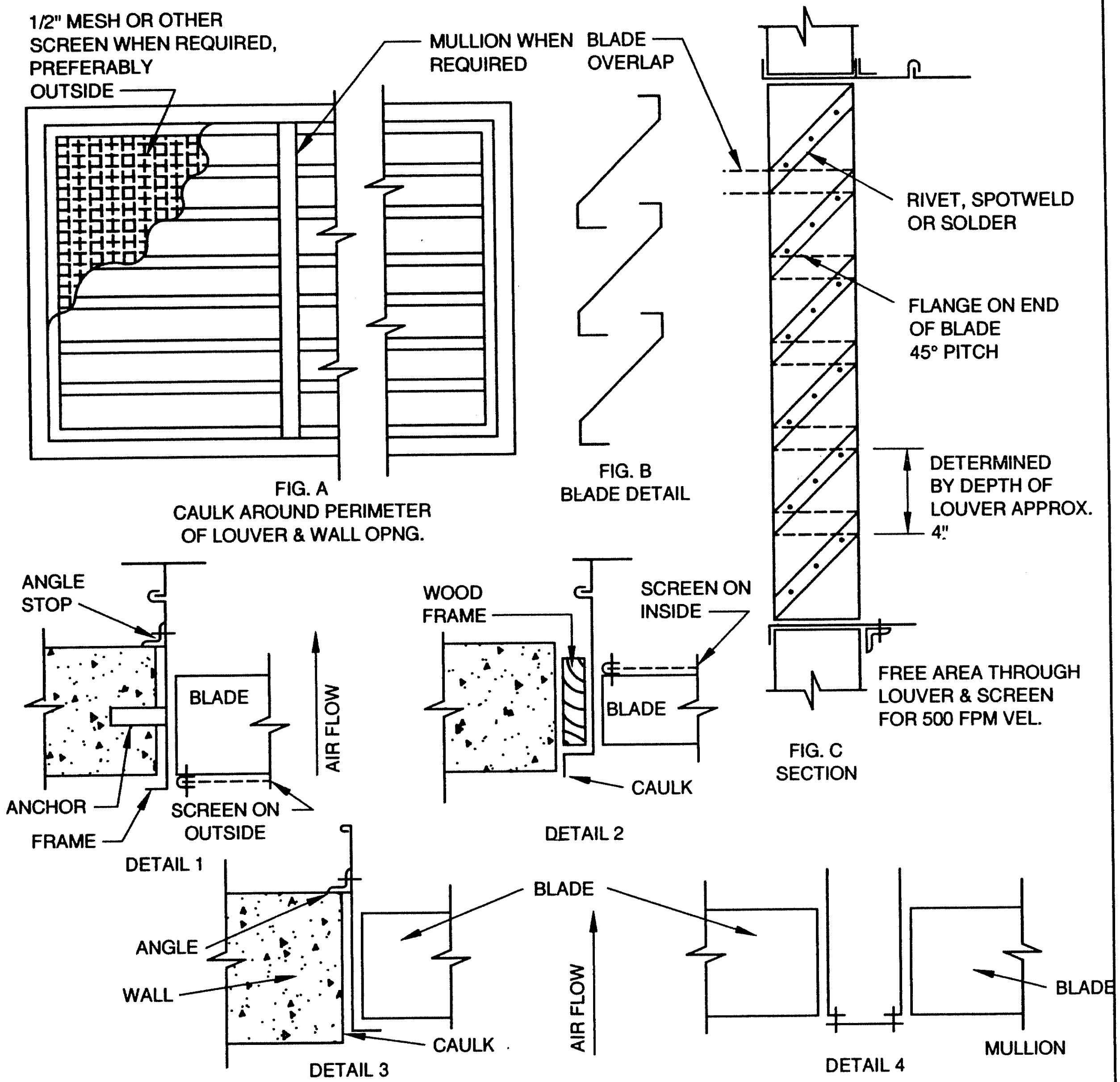
5.1 INTRODUCTION

Among the deliberations that designers should consider in the selection of louvers, rooftop ducts, curbs, ventilators, supports, and other components are the following.

1.) waterproofing details
2.) durability/service life
3.) wind, snow and hail resistance
4.) corrosion rate — chemical, electrolytic and atmospheric
5.) maintenance/repair frequency
6.) orientation of air intakes and discharges to prevent hazards
7.) vibration control
8.) how the presence of proximity of screen enclosures used for aesthetic purposes affect the performance of the HVAC systems
9.) infiltration, exfiltration and prevailing wind direction
10). the details and resource references dealing with the preceding in the SMACNA duct standards, *HVAC Duct System Design Manual* and the *Architectural Sheet Metal Manual.*

Information on air flow pressure loss standard stock sizes, strength, corrosion, comparative cost and much other data on perforated metals is available from the Industrial Perforators Association. Some perforated metals have the appearance of wire mesh screens.

Similar data for bird screen, insect screen and other meshes for wire cloth is available from the American Wire Cloth Institute and its members.



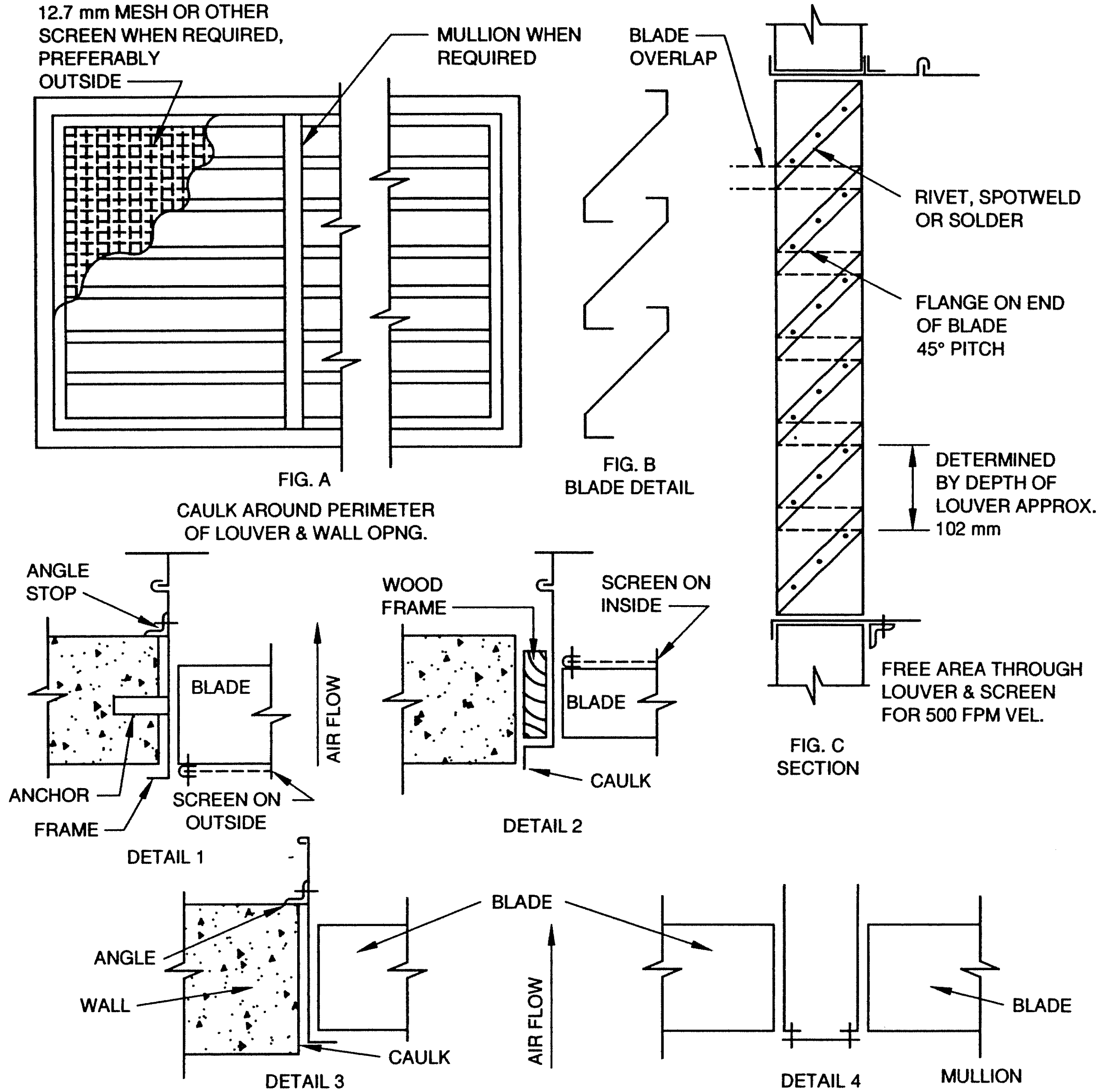
SCHEDULE
BLADES & FRAMES

WIDTH	GALV.	STAINLESS	ALUM.	COPPER
TO 24"	24 Ga.	24 Ga.	.040"	16 OZ.
25 TO 36"	20 Ga.	22 Ga.	.040"	20 OZ.
37 TO 48"	18 Ga.	20 Ga.	.064"	20 OZ.
49 TO 60"	16 Ga.	18 Ga	.064"	24 OZ.
61" & UP	MULTIPLE SECTIONS OF ABOVE			

NOTE: SEPARATE COPPER LOUVERS FROM GALVANIZED STEEL DUCT BY INSTALLING LEAD COATED COPPER

LOUVERS AND SCREENS

FIG. 5-1



SCHEDULE
BLADES & FRAMES

WIDTH	GALV.	STAINLESS	ALUM.	COPPER
TO 610 mm	0.70 mm	0.61 mm	1.02 mm	0.45 kg
635 TO 914 mm	1.00 mm	0.80 mm	1.02 mm	0.57 kg
940 TO 1219 mm	1.31 mm	0.95 mm	1.60 mm	0.57 kg
1245 TO 1524 mm	1.61 mm	1.27 mm	1.60 mm	0.68 kg
1548 mm & UP	MULTIPLE SECTIONS OF ABOVE			

NOTE: SEPARATE COPPER LOUVERS FROM GALVANIZED STEEL DUCT BY INSTALLING LEAD COATED COPPER

LOUVERS AND SCREENS — FIG. 5-1M

Consult AMCA Standard 500 for complete information on free area, static pressure loss, water penetration and cfm ratings.

Free area is the minimum area through which air can pass and is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head and bottom blade and sill, by the minimum distance between jambs. The percent free area is the free area thus calculated, divided by the face area of the louver x 100. See cross sections of louvers and frames.

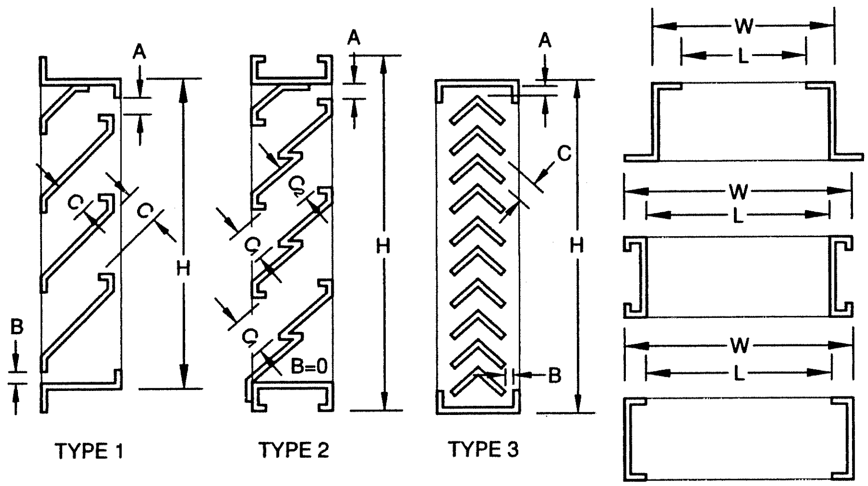
$$\text{Free Area (sq. in. (mm))} = L\,[A + B + (N \times C)]$$

$$\text{Percent Free Area} = \frac{L\,[A + B + (N \times C)]\,100}{W \times H}$$

Where:

- A = Minimum distance, in inches (mm), between the head and top blade.
- B = Minimum distance, in inches (mm), between the sill and bottom blade.
- C = Minimum distance, in inches (mm), between adjacent blades. Note that in louver Type 2, C_1, may not be equal to C, and the minimum C should be used.
- N = Number of "C" openings in the louver.
- L = Minimum distance, in inches (mm), between louver jambs.
- W = Actual louver width, in inches (mm).
- H = Actual louver height, in inches (mm).

Size listing: conventional practice is to list width by height.



TYPICAL LOUVER AND FRAME CROSS SECTIONS

SHOWING MINIMUM DISTANCES IN FORMULA

LOUVER FREE AREA CALCULATION

FIG. 5-2

5.2 ROOFTOP EQUIPMENT INSTALLATION

5.3 COMMENTARY

Each installation of a roof-mounted HVAC unit or roof-supported duct involves customized design requirements. The construction details and recommendations here are therefore advisory and depend on contract documents for clarification. Openings in roofs require coordination of the architectural, structural, mechanical, and electrical contract drawings. The height of equipment and ducts above the roof level may be influenced by snow loading, snow drifting, and wind loading as well as esthetic considerations. Designers must specify constructions appropriate for the specific locality and circumstances.

All ducts that are not watertight through the use of welded constructions or protective shields and are exposed directly to weather and solar radiation should have secure, watertight mechanical connections and receive exterior duct sealant treatment as defined in Section 1.9(h).

Exterior duct sealant treatment should consist of applying products marketed specifically as forming a positive airtight and watertight seal, bonding well to the metal involved, remaining watertight with metal movement, and having a service temperature range of -30°F (-34°C) to 175°F (79°C). If exposed to direct sunlight it should also be ultraviolet ray- and ozone-resistant or should, after curing, be painted with a compatible coating that provides these plus weather resistance. The term sealant is not limited to materials of adhesive or mastic nature, but is inclusive of tapes and combinations of woven fabric strips and mastics. Asphalt-based compounds should not be used for sealing ducts.

Duct systems should not be pressurized until the sealant has had time to cure. Follow the sealant manufacturer's recommendations on curing.

Unless otherwise prescribed by the HVAC equipment manufacturer, ducts should be flanged for attachment to equipment with mechanical fastening plus exterior duct sealant. Typical connections are shown in Figure 5-3. The attachment method should accommodate disconnection if this is required for routine maintenance of the equipment.

Where vibration isolation material is required at the connection of ducts to equipment, such material should be impervious to water. Ducts should be supported to avoid the transfer of duct weight across flexible connections.

Roof penetrations by ducts should have curbs. Ducts that are interrupted at the curb should overhang the top of the curb or be flashed to divert water over the curb. Ducts that are continuous through the curb should have flashing that slopes over the curb and is sealed to the duct with caulking or a suitable tape. Adequate clearances between ducts and roof penetration openings should be provided. *See* Figure 5-4.

Curbs may be supplied with rooftop units or provided independently. The equipment manufacturer may outline flashing methods, structural opening requirements, sealing techniques, etc., which must be coordinated with project construction. With considerable pitch in the roof, a subbase may be required to adapt to a pre-engineered curb. Furthermore, curb mountings may incorporate vibration isolation features.

All penetrations into ducts should be watertight. Duct reinforcements and supports attached to the duct should have external sealant at points of penetrations. Attach supports with a minimum number of duct penetrations.

Horizontal ducts should be pitched and provided with drainage outlets as illustrated by the system designer.

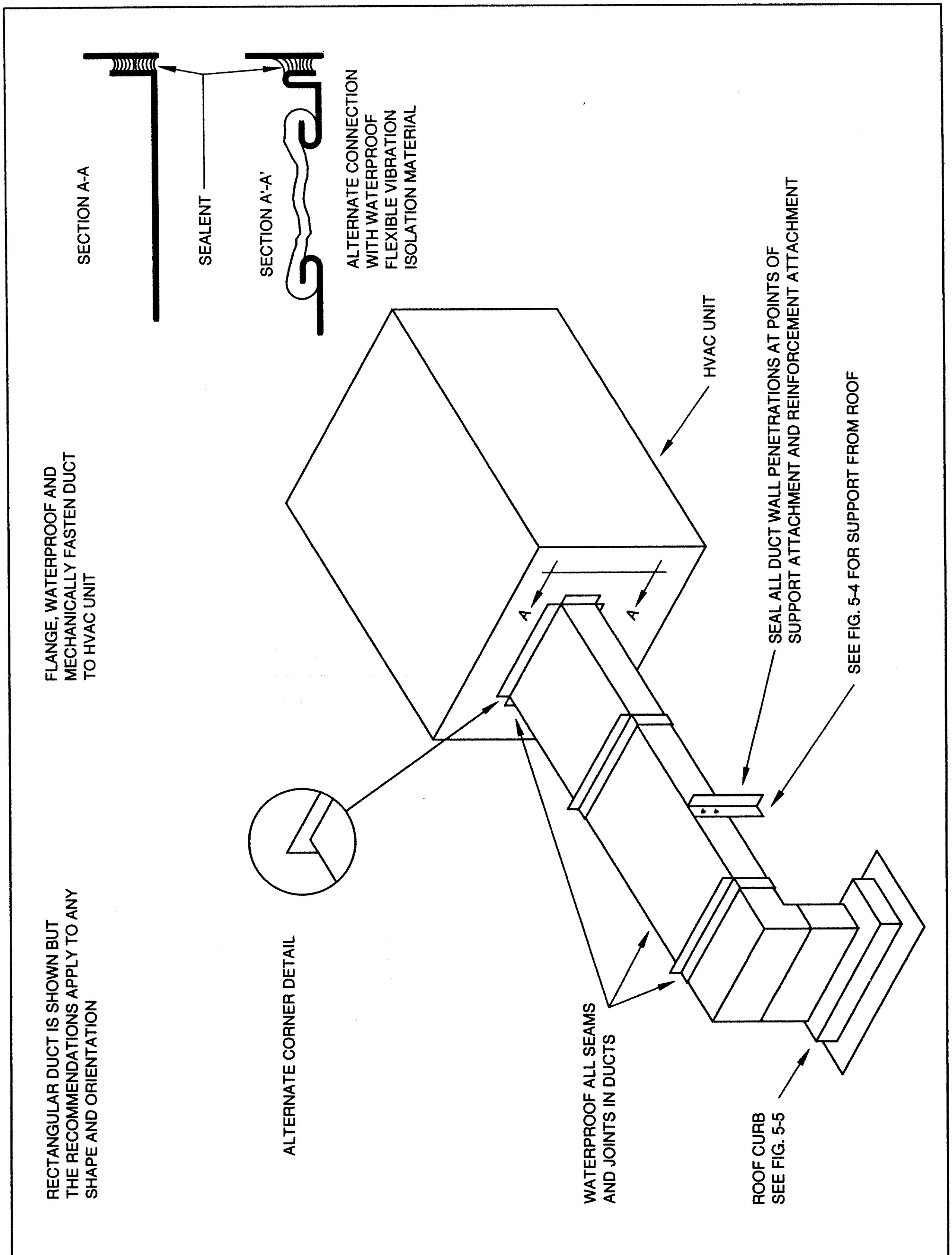
If airtight, waterproof flexible insulation jackets are applied on positive pressure ducts, the installation should accommodate some duct leakage; ducts are not completely airtight.

When moving rooftop units across the roof, handle them in a manner to prevent roof damage.

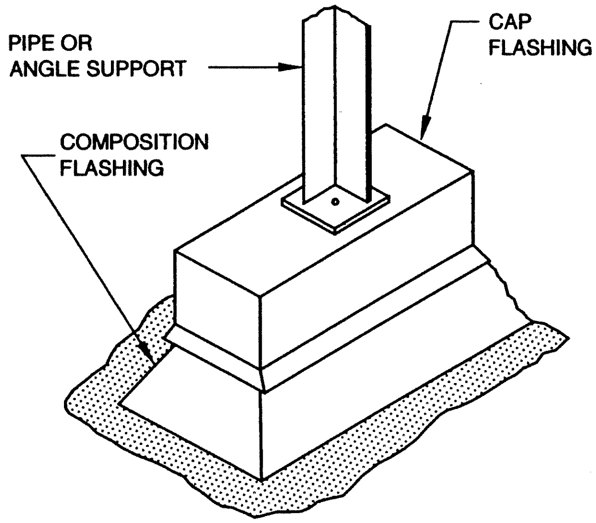
Supports for ducts should be as indicated in Figure 5.4. If the support does not rest on a cap-flashed curb, the penetration of the roof membrane should have base flashing and umbrella flashing.

Pitch pockets require periodic maintenance and are not permanently watertight. They are not recommended.

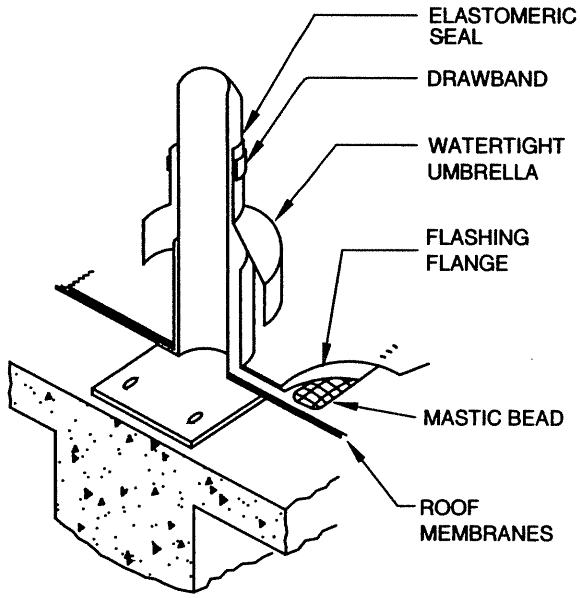
Designers should carefully consider the proximity of intakes to exhausts and the possibility of drawing in contaminated air. The direction and elevation of discharges may be controlled by codes or standards such as NFPA-89M, 90A, 91, 96, 204 or 211.



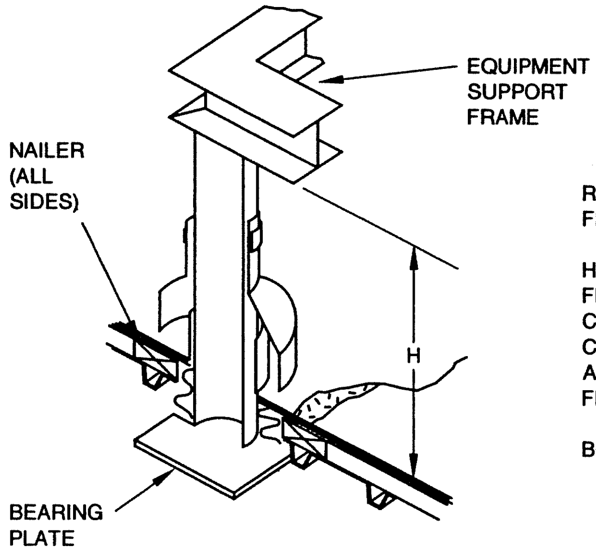
ROOFTOP DUCT INSTALLATION **FIG. 5-3**



PIER OR CURB BASE



CONCRETE DECK



INSULATED STEEL DECK

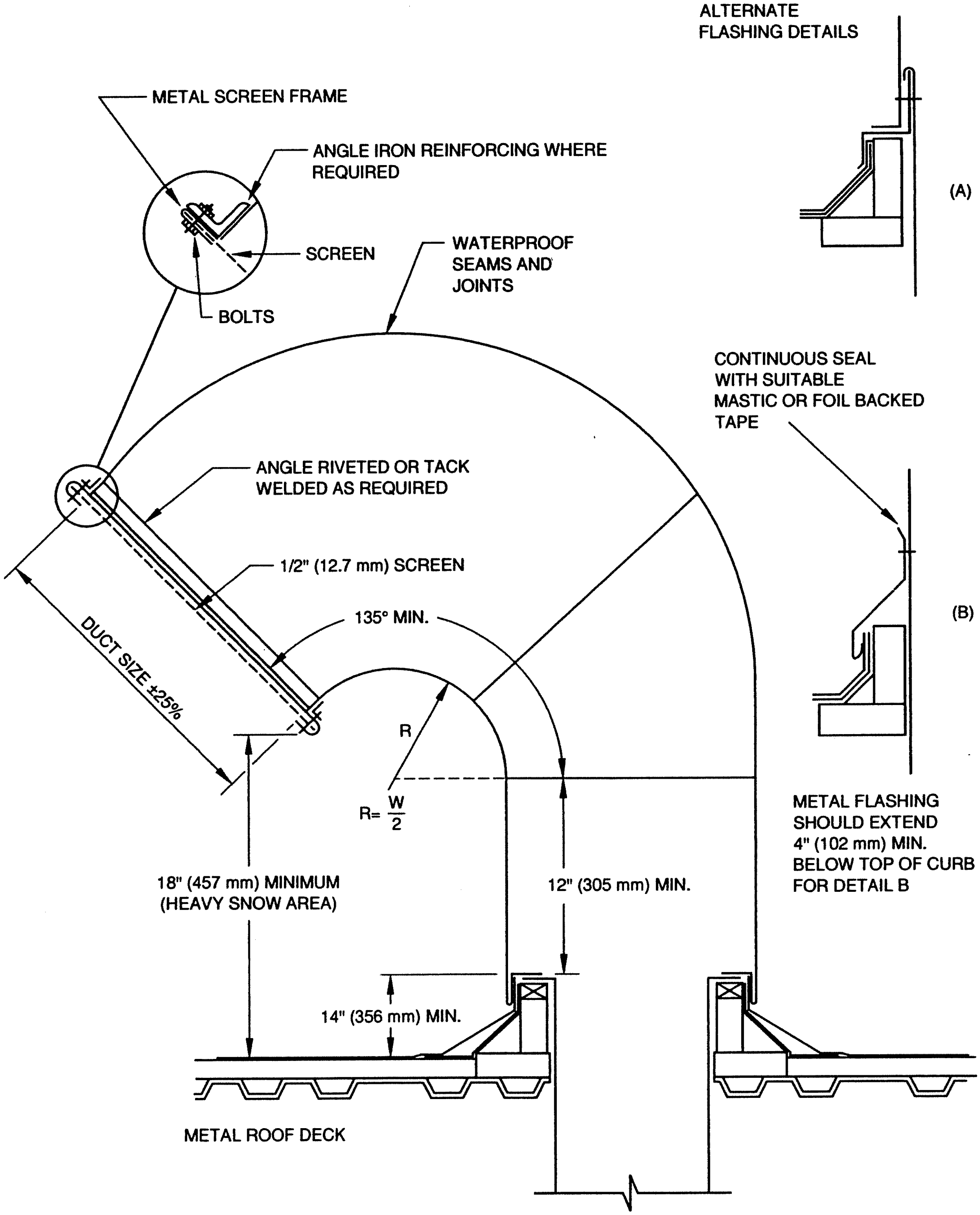
ROOF JACK
FLASHING REQUIREMENTS

HEIGHT: 8" (203 mm) MIN. ABOVE ROOF
FLANGE: 3" TO 4" (76 mm TO 102 mm) WIDTH
CLEARANCE TO PIPE: 1/4" (6.4 mm) MIN.
CLEARANCE TO UMBRELLA: 1/4" (6.4 mm) MIN.
ALL ARE SET IN MASTIC AND STRIPPED IN.
FLANGE IS FASTENED TO WOOD NAILER ON INSULATED DECKS.
BOTTOM OF UMBRELLA TO BE 4" (102 mm) BELOW TOP OF FLASHING.

WIDTH OF EQUIPMENT	HEIGHT H
UP TO 24" (510 mm)	14" (356 mm)
25" TO 36" (635 mm TO 914 mm)	18" (457 mm)
37" TO 48" (940 mm TO 1219 mm)	24" (610 mm)
49" TO 60" (1245 mm TO 1524 mm)	30" (762 mm)
61" (1549 mm) AND WIDER	48" (1219 mm)

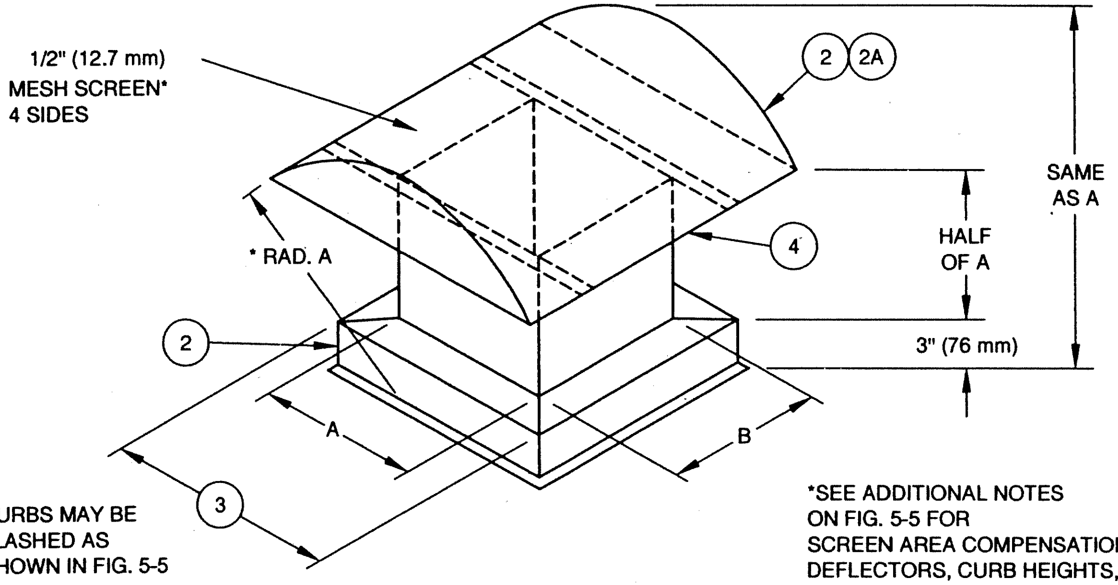
H CLEARANCE FOR ROOF MAINTENANCE IS RECOMMENDED FOR EQUIPMENT AND DUCTS.

EQUIPMENT AND DUCT SUPPORT FLASHING FIG. 5-4



SEE ADDITIONAL FLASHING ALTERNATIVES IN THE SMACNA ARCHITECTURAL SHEET METAL MANUAL.
CURBS ARE PREFERABLE FOR ALL DUCT PENETRATIONS OF ROOFS.

RECTANGULAR GOOSENECK **FIG. 5-5**



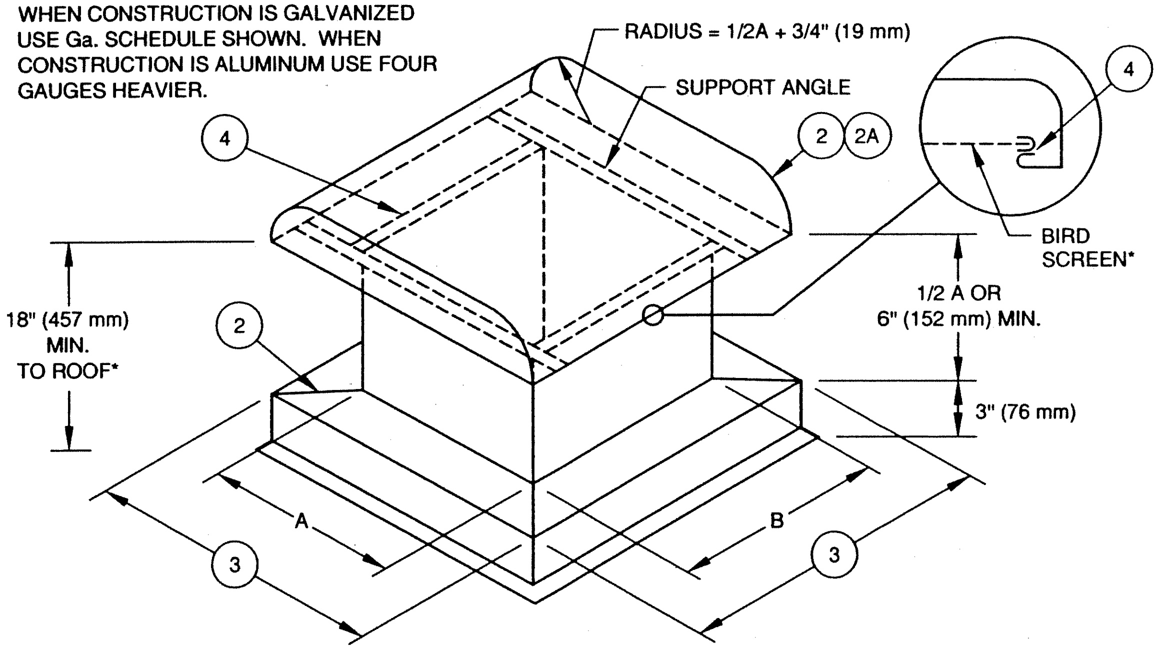
CURBS MAY BE FLASHED AS SHOWN IN FIG. 5-5

IF USED FOR DAMPER ACCESS, USE HINGES AND LATCHES

*SEE ADDITIONAL NOTES ON FIG. 5-5 FOR SCREEN AREA COMPENSATION, DEFLECTORS, CURB HEIGHTS, AND RIM ELEVATION.

CONSTRUCTION NOTES

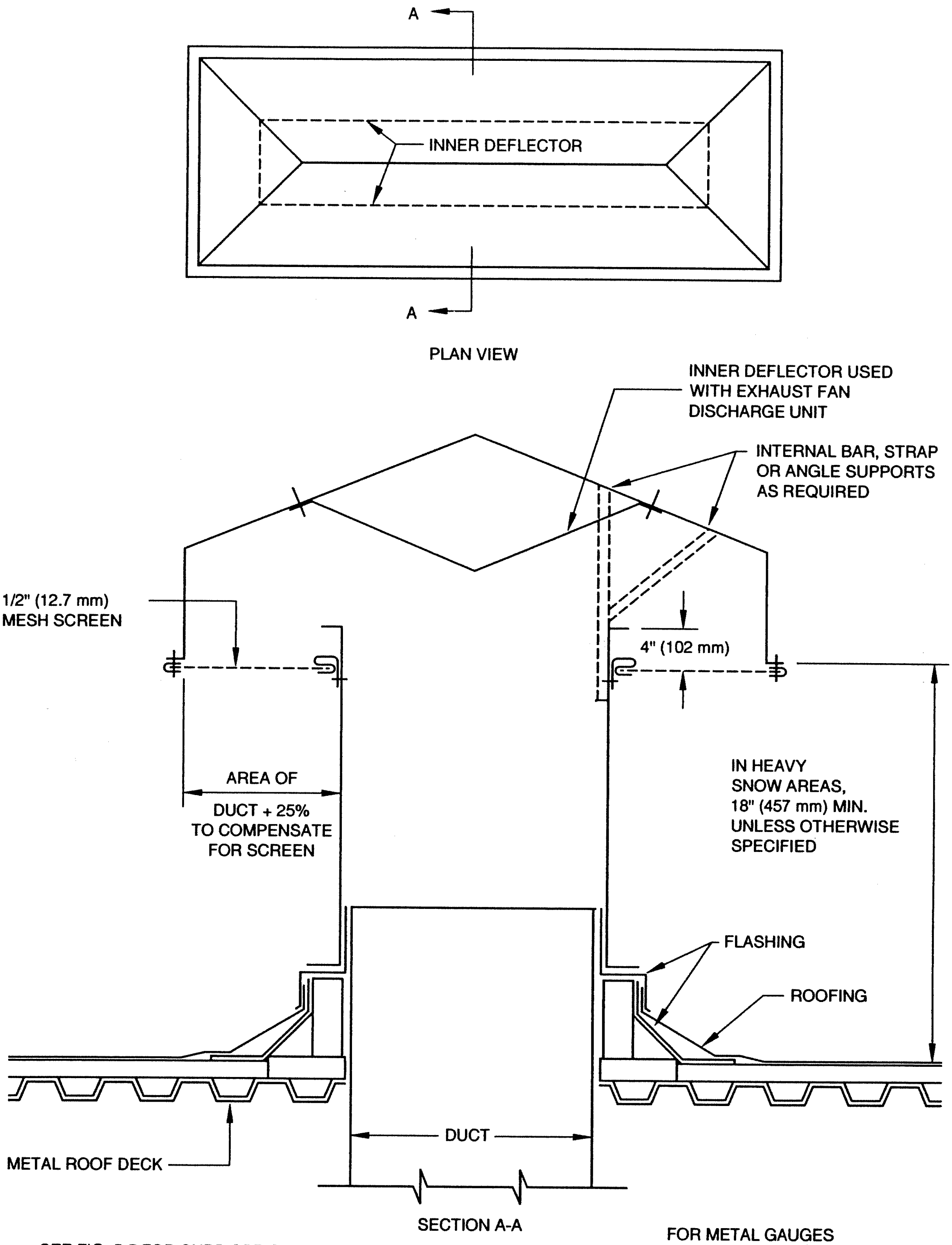
1. WHEN A x B = 12 SQ. FT. (1.11 SQ. M) USE 22 GA. (0.85 mm)
   WHEN A x B = 12 TO 18 SQ. FT. (1.11 TO 1.67 SQ. M) USE 20 GA. (1.00 mm)
   WHEN A x B = OVER 18 SQ. FT. (1.67 SQ. M) USE 18 GA. (1.31 mm)
   WHEN CONSTRUCTION IS GALVANIZED USE Ga. SCHEDULE SHOWN. WHEN CONSTRUCTION IS ALUMINUM USE FOUR GAUGES HEAVIER.



CONSTRUCTION NOTES

2. WELDED OR RIVETED AND SOLDERED.
2A. COVER END SEAMS ON UNITS MAY BE SEALED PITTSBURGH.
3. DIMENSIONS AS REQ'D. TO FLASH OVER CURB.
4. SUPPORT SCREEN ON 3/4" (19 mm) HEMMED FLANGE.

INTAKE OR EXHAUST VENTILATORS — FIG. 5-6



SEE FIG. 5-5 FOR CURB OPTIONS

FOR METAL GAUGES
SEE DUCT SCHEDULE

LARGE INTAKE OR EXHAUST VENTILATORS **FIG. 5-7**