

HVAC DUCT CONSTRUCTION STANDARDS

METAL AND FLEXIBLE



ANSI/SMACNA 006-2020



**SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.**

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HVAC DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE

FOURTH EDITION – 2020



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4201 Lafayette Center Drive

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www.smacna.org

**HVAC
DUCT CONSTRUCTION
STANDARDS
METAL AND FLEXIBLE**

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FOREWORD

Building on a history of duct construction standards nearly 100 years old the Fourth Edition of SMACNA's HVAC Duct Construction Standards Metal and Flexible represents the state of the art in sheet metal duct fabrication and installation

The advances in fabrication and installation are made possible by many in the industry providing suggestions for improvement based on knowledge, experience and research. Special thanks is given to those who volunteered their time and efforts towards developing this edition and previous editions of this long running standard. Although standardization intrinsically involves selection, no intention of discrimination against the use of any product or method that would serve a designer's need equally or better exists.

SHEET METAL AND AIR CONDITIONING CONTRACTORS'
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DUCT CONSTRUCTION

Ductwork and supports shall conform to the *HVAC Duct Construction Standards, Metal and Flexible*, FOURTH EDITION 2020. Where fittings or configurations not shown in the HVAC-DCS are shown on the contract drawings, they shall be constructed as though they were therein.

DUCT DIMENSIONS

Duct dimensions shown in the contract drawings are for air-flow area. When ducts are acoustically lined, their dimensions shall be increased as necessary.

DUCT PRESSURE CLASS

Duct pressure classes are to be identified on the contract drawings.

**Schedule the pressure classes here by fan system number, or portion thereof, if they are not shown on the drawings.*

See Section 1.4.

DUCT SEAL CLASS

Ducts shall be sealed as specified in the *HVAC-DCS*.

DUCT LEAKAGE CLASS

**Consult the HVAC-Air Duct Leakage Test Manual and select appropriate allowable leakage. If field leak tests are required, appropriate test pressure and clear scope of testing must be specified.*

DUCT LINER

Metal nosing shall be used on leading edges of each piece of lined duct when the velocity exceeds 4000 fpm (20.3 m/s) otherwise, it shall be used on the leading edge of any lined duct section that is preceded by unlined duct.

**NOTES FOR SPECIFIER*

**See duct liner test and references in the HVAC-DCS and specify the material, thickness, density and performance characteristics desired.*

FLEXIBLE DUCT AND CONNECTOR

Where the specifications for connecting and supporting these in the HVAC-DCS are more stringent or restrictive, they shall supersede.

VIBRATION ISOLATION CONNECTORS

Flexible isolation connectors shall not exceed 10 in. in length in direction of airflow and shall be made of flame-retardant fabric having a flame spread rating not over 25 and a smoke developed rating not over 50.

**Consult the applicable codes, The U.L. Fire Resistance Directory, references in the HVAC-DCS, the Air Duct Council's Flexible Air Duct Performance and Installation Standards and identify the products and performance characteristics desired.*

PROPRIETARY PRODUCTS

Description of products from a proprietary or single source manufacturer shall be submitted for approval along with substantiation of fitness for the service conditions that are proposed but not already identified in the project specifications.

PENETRATIONS

All wall penetrations that require special-purpose dampers (fire, smoke, etc.) shall be shown in the contract drawings.

**Consult the SMACNA Fire, Smoke, and Radiation Damper Guide and local codes for obligations to show the location of each barrier penetration protection device on contract drawing. Review the commentary in Section 2.3 of these standards for obligation to show all air volume control devices on the contract drawings when they are not specified to be integral with HVAC units or air terminal units. Also specify the size and location of all access doors and access panels to be used in ductwork.*



LIST OF SIGNIFICANT CHANGES FROM THE THIRD EDITION

1. Added information on spray and aerosolized duct sealants
2. Added tables for spiral flat oval duct for positive and negative pressure applications
3. Added options for internal supports for spiral flat oval duct
4. Updated liner requirements to include non-fiberglass liner types
5. Added information for lined round duct
6. Added details for hangers to better illustrate where hangers are required
7. Updated requirements for flex duct hanger spacing and hanger width.
8. Added information for spiral fittings

Although no changes were made to the root tables for rectangular duct a few inconsistencies were fixed in the tables specifically addressing T25a/b (TDC/TDF). Corrections included gage, reinforcement size, and number of tie rods required.

Also, minor corrections and clarifications were made to the round tables as well.



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CHAPTER 1

ENGINEERING AND DESIGN

1.1 INTRODUCTION

This chapter is intended to provide the design professional an understanding of the concepts involved in HVAC duct construction and guidance as to the required elements which are necessary in project plans and specifications to allow the fabricating and installing contractor to provide a duct system which meets the requirements of those plans and specifications.

1.2 INFORMATION REQUIRED FOR DUCT CONSTRUCTION

Various types of information are required in project plans and specifications in order for the fabricating and installing contractor to provide the duct system performance intended by the system designer. Among those are:

1. A comprehensive duct layout indicating sizes, design airflows, pressure class, and routing of the duct system.
2. The types of fittings to be used based on the designer's calculations of fitting losses (*i.e.*, square versus 45 degrees entry taps, conical versus straight taps, etc.).
3. Use of turning vanes or splitter vanes.
4. Location of access doors.
5. Location and type of control and balancing dampers.
6. Location and types of diffusers.
7. Requirements for duct insulation.
8. Location and types of any fire protection device including fire dampers, smoke dampers, combination fire/smoke dampers, and ceiling dampers. Building codes require this information to be shown on the design documents submitted for building permit.

NOTE: UL 555 (Fire Dampers) and UL 555S (Smoke Dampers) now indicate three velocity ratings and three pressure ratings for dynamic Fire, Smoke and Combination Fire/Smoke Dampers. It is recommended that a schedule of these dampers be included with equipment schedules in order to insure that the correct damper is used.

9. Details of offsets required to route ductwork around obstructions (columns, beams, etc.).

1.3 MODEL SPECIFICATIONS

Specification sections designated with an S are obligatory.

1.3.1 Duct Construction and Installation Standards**S1.0 General Requirements**

S1.1 These construction and installation specifications and illustrations include:

- a. Single-prescriptive method requirements,
- b. Optional alternatives, and
- c. Performance requirements for specific items that are different in detail from the generalized illustrations.

S1.2 These standards are not meant to exclude any products or methods that can be demonstrated to be equivalent in performance for the application. Substitutions based on sponsor demonstrated adequacy and approval of the regulating authority are recognized.

S1.3 These requirements presume that the designers have prepared contract drawings showing the size and location of ductwork, including permissible fitting configurations. Where area change, direction change, divided flow, or united flow fittings other than those illustrated here are shown on the contract drawings, are not of proprietary manufacture, and are defined with friction loss coefficients in either the SMACNA *HVAC Systems Duct Design* manual or the *ASHRAE Handbook - Fundamentals* chapter on duct design, such fittings shall be fabricated with materials, assembly techniques, and sealing provisions given here.

S1.4 EACH DUCT SYSTEM SHALL BE CONSTRUCTED FOR THE SPECIFIC DUCT PRESSURE CLASSIFICATIONS SHOWN ON THE CONTRACT DRAWINGS. WHERE NO PRESSURE CLASSES ARE SPECIFIED BY THE DESIGNER, THE 1 IN. WG (250 Pa) PRESSURE CLASS IS THE BASIS OF COMPLIANCE WITH THESE STANDARDS, REGARDLESS OF VELOCITY IN THE DUCT, EXCEPT WHEN THE DUCT IS VARIABLE VOL-

