



Recommended Specifications



9865 WAYNE AVENUE • CINCINNATI, OHIO 45215
PHONE (513) 733-5955 FAX (513) 733-8050

SPIDA Spec 2
AIA MASTERSPEC FORMAT
SECTION 15891
SPIRAL ROUND AND FLAT OVAL DUCTWORK
PART 1: GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Condition and Division 1 Specification sections, apply to work of this section.

SUMMARY

This section includes spiral round and flat oval ductwork.

Refer to other Division - 15 sections for exterior insulation of metal ductwork; not work of this section.

Refer to other Division – 15 sections for ductwork accessories; not work of this section.

Refer to other Divisions- Shop Drawings detailing metal ductwork and fittings including, but not limited to, duct sizes, location, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections.

Show interface and spatial relationship between ductwork and proximate equipment.

Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

QUALITY ASSURANCE

Manufacturer's Qualifications

Manufacturers are limited to members of Spiral Duct

Refer to other Division - 15 sections for fans and air handling units; not work of this section.

Refer to other Division - 15 sections for testing, adjusting, and balancing of metal ductwork systems; not work of this section.

SUBMITTALS

Product Data Submit manufacturer's technical product data for spiral round and flat oval ductwork material and products. Manufacturers Association (SPIDA) who are dedicated to producing quality uniform products in accordance with Sheet metal & Air Conditioning Contractors National Association (SMACNA) Standards.

Installer's Qualifications Contractor with at least 3 years successful installation experience on projects with metal ductwork systems similar to that required for project.

PART 2 – PRODUCTS

DUCTWORK MATERIALS

Exposed Ductwork Materials Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, dents and other imperfections including those which would impair painting where painting is indicated on drawings, material shall be a paintable grade galvanized sheet metal suitable for painting after standard surface cleaning preparation recommended by the paint manufacturer.

Galvanized Ductwork standard round and flat oval ductwork shall be fabricated with galvanized sheet metal (ASTM A653) with a minimum G 90 coating and lock forming quality (LFQ).

Stainless Steel where indicated, provide stainless steel complying with ASTM A167; type 304 or 316; with No. 2B finish.

Aluminum Ductwork where indicated provide aluminum sheet complying with ASTM B209; Alloy 3003, Temper H14.

Underground/Under slab Ductwork where indicated on drawings, provide one of the following:

Method #1: Polyvinyl Chloride Duct provide a minimum G90 galvanized spiral duct coated with a minimum of 4 mil, polyvinyl chloride coating hot fused to the outside of duct and a 1 mil coating on the inside.

All fitting should be manufactured from the same material all mechanical fasteners to be stainless steel type all joints to be sealed to the manufactures recommendations all scratches and abrasions to the coating shall be repaired with the manufacturers approved touch-up Backfill should be sand or pea gravel with proper compaction.

Method #2: Galvanized spiral duct [provide G90 galvanized spiral duct. Contractor to fully encase spiral in a minimum of 2" (two) inches of concrete it is the contractors responsibility to supply proper tie downs to eliminate the duct floating during the concrete installation. Induce no heat for 20 days following concrete placement the Portland Cement Assoc. has guidelines for water tightness and protection of raw materials such as galvanized duct without a protective coating in contact with concrete (Pamphlet S7.33).

Under slab/Underground Gauges & Load Specifications

3" - 8" - 26 ga.
 9" - 16" - 24 ga.
 18" - 24" - 22 ga.
 25" - 32" - 20 ga.
 34" - 60" - 18 ga.

Load Specifications

4" - 8" - 400-lbs/linear ft.
 9" - 12" - 600-lbs/linear ft.
 14" - 36" - 1,800-lbs/linear ft.

NOTE 1: It is recommended that all duct work over 14" in diameter be corrugated spiral. The above load specifications only apply when METHOD #1 is used and installed as recommended with proper compaction in back filling.

NOTE 2: Ducts should always be above the water table. The designer should carefully evaluate the exposure to moisture or ground water.

Fume Exhaust Systems where indicated on the drawings, provide stainless steel or G-90 galvanized spiral ductwork with 4-mil vinyl chloride internal coating.

SINGLE WALL SPIRAL SEAM GAUGE SELECTION GALVANIZED OR STAINLESS STEEL (Unreinforced)			
Duct Diameter in Inches	Maximum 10" w.g. Static Positive	Duct Diameter in Inches	Maximum 2" w.g. Static Negative
	Spiral Seam		Spiral Seam
3 thru 14	28	3 thru 36	28
16 thru 24	26	38 thru 48	26
26 thru 42	24	50 thru 60	24
44 thru 60	22	62 thru 72	24

SINGLE WALL LONGITUDINAL SEAM GAUGE SELECTION GALVANIZED OR STAINLESS STEEL (Unreinforced)			
Duct Diameter in Inches	Maximum 10" w.g. Static Positive	Duct Diameter in Inches	Maximum 2" w.g. Static Negative
	Spiral Seam		Spiral Seam
3 thru 14	28	3 thru 14	28
16 thru 18	26	16 thru 18	26
20 thru 24	24	20 thru 24	24
26 thru 42	22	26 thru 42	22
44 thru 60	20	48 thru 60	20

ALUMINUM ROUND DUCT THICKNESS				
Duct Diameter in inches	Maximum 2" w.g. Static Positive		Maximum 2" w.g. Static Negative	
	Spiral Seam Gauge	Longitudinal Seam Gauge	Spiral Seam Gauge	Longitudinal Seam Gauge
3 thru 8	0.025	0.032	0.025	0.040
9 thru 14	0.025	0.032	0.032	0.040
15 thru 26	0.032	0.040	0.040	0.050
27 thru 36	0.040	0.050	0.050	0.063
37 thru 50	0.050	0.063	0.063	0.070
51 thru 60	0.063	0.071	N.A.	0.090
61 thru 84	N.A.	0.09		N.A.

Fittings shall be of wall thickness not less than that specified above for Longitudinal seam straight ducts. See **Field Quality Control** for sealing requirement.

MISCELLANEOUS DUCTWORK MATERIALS

General provide miscellaneous materials and products of types and sizes indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

Fittings provide radius type elbow fittings fabricated of multiple sections with maximum 22 ½” change of direction per section.

Die stamped elbows are acceptable through 14 inch diameter unless specifically detailed otherwise, use 45° laterals and 45° elbow, 90° conical type fittings for branch connections.

Duct Sealant Non Hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication / installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

Duct Cement Non hardening non migrating mastic or liquid neoprene based cement, type applicable for fabrication/installation detail as compounded and recommended by manufacturers specifically for sealing joints and seams in ductwork.

Ductwork Support Materials except as otherwise indicated, provide rust resistant steel fasteners, anchors, anchors, rods, straps, trim and angles for support of ductwork

FABRICATION

Fabricate Round and flat Oval Ductwork in 4, 8, and 10-foot lengths, unless otherwise indicated or required to complete runs as shown on approved shop drawings. Match mark sections for assembly and coordinated installation.

Shop Fabricated Ductwork of gauges complying with SMACNA “HVAC Duct Construction standards”, 2005 (see tables on the next page).

FLAT OVAL DUCT CONSTRUCTION			
Major Dimension Duct Width	Spiral Seam Duct Gauge	Longitudinal Seam Duct Gauge	Gauge Of Fittings
to 24"	24	20	20
25" to 36"	22	20	20
37" to 48"	22	18	18
49" to 60"	20	18	18
61" to 70"	20	16	16
71" and up	18	16	16

See field Quality Control for sealing requirements

Internally Insulated Spiral Pipe			
Where indicated on drawings. Construct with outer pressure shell, 1" thick insulation layer, and solid or perforated inner liner construct shell and liner of galvanized sheet steel G-90 complying with ASTM A653 of spiral lock seam construction.			
Nominal Duct Diameter	Outer Shell	Inner Shell	Ribbed
3" to 12"	26 ga.	26 ga.	26 ga.
13" to 24"	24 ga.	26 ga.	26 ga.
25" to 34"	22 ga.	26 ga.	26 ga.
35" to 48"	20 ga.	26 ga.	26 ga.
49" to 58"	18 ga.	26 ga.	26 ga.
Over 59"	16 ga.	26 ga.	26 ga.

Fittings and Couplings		
To be constructed of minimum gauges listed below. See Field Quality Control for sealing requirements.		
Nominal Duct Diameter	Outer Shell	Inner Shell
3" to 34"	20 ga.	24 ga.
35" to 59"	18 ga.	22 ga.
60" and Over	16 ga.	20 ga.

Perforated Inner Liner Perforate with 3/32" holes for 22% open area.

Solid Inner Liner spiral and flat oval ductwork and fittings shall be same gauge for pressure classification listed above for inner liner.

Insulation stops provided at all locations where insulation ends are indicated.

PART 3 EXECUTION

INSPECTION

General Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

SMACNA Standards comply with SMACNA “HVAC Duct Construction Standards, Metal and Flexible”, 2005 for fabrication and installation of metal ductwork.

Comply with NFPA 90A “Standard for the installation of Air Conditioning and Ventilating Systems” and NFPA 90B “Standard for the installation of Warm Air Heating and Air conditioning Systems.”

Fabricate and Install in accordance with SMACNA “HVAC Duct Construction Standards, Metal and Flexible” 2005

INSTALLATION OF METAL DUCTWORK

General Assemble and install ductwork in accordance with recognized industry practices which will achieve virtually airtight and noiseless (no objectable noise) systems, capable of performing each indicated service install each run with minimum number of joints. Align ductwork accurately at connections. Support ducts rigidly with suitable ties, braces, hangers and anchors of type, which will hold ducts true to shape and prevent buckling. Support vertical ducts at every floor.

Field Fabrication Complete fabrication of work at project as necessary to match shop fabricated work and accommodate installation requirements.

Routing Locate ductwork runs except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagram, details and notations or if not otherwise indicated run ductwork in shortest route, which does not obstruct usable space or block access for servicing building and its equipment.

Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building limit clearance to ½” where furring is shown for enclosure or concealment of ducts but allow for insulation thickness, if any.

Where possible, locate insulated ductwork for 1” clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts hollow wall construction above suspended ceilings.

Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

Electrical Equipment Spaces Do not route ductwork through transformer vaults and electrical equipment spaces and enclosures.

Penetrations Where duct pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1 ½” fasten to duct and substrate. Where duct pass through fire rated floors, walls or partitions, provide fire stopping between duct and substrate, in accordance with requirements of Divisionion-7 Section “Fire stopping”.

Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

Installation install metal ductwork in accordance SMACNA “HVAC Duct Construction Standards, Metal and Flexible”, 2005

FIELD QUALITY CONTROL

Duct Sealing Requirements All ductwork shall be sealed in accordance with pressure class listed herein

Seal Class	Sealing Requirements	Static Pressure Construction Class
A	All transverse joints, Longitudinal seams and Duct wall penetrations	4" w.g. and up
B	All transverse joints and Longitudinal Seams	3" w.g.
C	Transverse joints	2" w.g. or less

Where sealing is required above and otherwise herein it shall mean the following:

- A) The use of adhesives, gaskets, tape systems or combinations thereof to close openings in the surface of the ductwork and field erected plenums and casings through which air leakage would occur; or
- B) The use of continuous welds;
- C) The prudent selection and application of sealing methods by fabricators and installers, giving due consideration to the designated pressure class, pressure mode (positive or negative), chemical compatibility of the closure system, potential movement of mating parts, workmanship, amount and type of handling cleanliness of surfaces, product shelf life curing time and manufacturer identified exposure limitations.

D) That these provisions are applicable to duct connections to equipment and apparatus but are not for equipment and apparatus.

E) That where distinctions between seams and joints are made herein, a seam is defined as joining of two longitudinal (in the direction of airflow) oriented edges of duct surface material occurring between two joints. Helical (spiral) lock seams are exempt from sealing requirements. All other duct surface connections made on the perimeter are deemed to be joints. Joints are inclusive of but not limited to girth joints; branch and sub branch intersections; so called duct collar tap ins;

F) Fittings sub sections; louver and air terminal connections to ducts; access door and access panes frames and jambs; duct, plenum and casing abutments to building structures.

G) That sealing requirements herein do not contain provisions to:

- 1: Resist chemical attack
2. Be dielectrically isolated
3. Be waterproof, weatherproof or ultraviolet ray resistant
4. Withstand temperatures higher than 120°F or lower than 40°F
5. Contain atomic radiation or serve in other safety related construction
6. Be electrically grounded
7. Maintain leakage integrity at pressures in excess of the duct classification herein
8. Be underground below that water table
9. Be submerged in liquid
10. Withstand continuous vibrations visible to the naked eye
11. Be totally leak free within an encapsulating vapor barrier
12. Created closure in portions of the building structure used as ducts, e.g., ceiling plenums, shafts pressurized compartment.

The exclusions in this section (f) shall mean “not defined or prescribed herein” and that the prescription of the designer is required independently of this standard if obligatory.

H) The requirements to seal apply to both positive and negative pressure modes of operation

I) Externally insulated ducts located outside of building shall be sealed prior to being insulated as though they were inside. If metal surfaces of ducts located on the exterior of buildings are exposed to weather, they shall receive exterior duct sealant. An exterior duct sealant is defined as a sealant that is marked specifically as forming a positive air and water tight seal, bonding well to the metal involved, remaining flexible with metal movement and having a service temperature range of –30°F to 175°F if exposed to direct sunlight it shall also be ultraviolet ray and ozone resistant or shall, after curing, be painted with a compatible coating that provides such resistance. The term sealant herein is not limited to materials of adhesive or mastic nature but is inclusive of tapes and combinations of open wave fabric strips and mastics.

ADJUSTING AND CLEANING

Temperature Closure at ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

Balancing Refer to **Division-15 section** “Testing, Adjusting, and Balancing” for air distribution balancing of metal ductwork, not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

	Carbon Steel	304 Stainless Steel	316 Stainless Steel	347 Stainless Steel	Monel	Inconel	Aluminum & Alloys	Copper & Cu Alloys	Brass	Lead	Nickel	Natural Rubber	Neoprene	Polyethylene	Polyvinylchloride	Epoxy Resins	Asphaltic Bitumastic
Aluminum Chloride	U	U	U	U	U	L	U	L	L	U	L	R	R	R	R	R	R
Aluminum Hydroxide		R	R	R	M		U	R	R	R	R			R	R		
Aluminum Sulfate	U	L	L	R	L	L	R	L	L	R	L	R	R	R	R	R	R
Alums, Dilute	U	R	L	L	R	R	R	L	L	R	R	R	R	R	R	R	R
Amines (various)	R	R	R	R		R	L	L	L		R	L			U	R	
Ammonia Gas	R	R	R	R			U	U			R	L	R	R	L		R
Ammonium Carbonate	M	M	M	R	M	M	L	L	L		R	R		R	R		R
Ammonium Chloride	U	U	L	L	M	M	U	U	U	L	M	R	R	R	R	R	R
Ammonium Hydroxide	R	R	R	R	U	R	L	U	U	M	U	L	L	R	R	R	L
Ammonium Nitrate	U	R	R	R	R	L	U	U	U			L	L	R	R		R
Ammonium Sulfate	R	L	L	M	M	R	L	L	L	L	M	R	R	R	R		
Benzene	M	R	R	R	M	R	R	R	R	M	M	U	U	L	U	R	U
Calcium Carbonate	R	R	R		R	R	U	R	R	R	R	R	L		R		
Calcium Chlorate		L	R	U	M	M		L	L	R					R		R
Calcium Chloride	R	L	L	L	M	M	L	M	M	U	R	R	R	R	R	R	R
Calcium Hydroxide	R	R	R	R	R	R	L	M	L	L	R	R	R		R		R
Calcium Hypochlorite	L	U	L	L	U	U	U	U	U	U	U	U	U	R	R	L	R
Calcium Sulfate	L	R	R		M		L	R	R			R	R		R		R
Carbon Dioxide (dry)	R	R	R	R	R	R	R	R	R	R	R	R	R		R		R
Carbon Dioxide (wet)	L	R	R	R	L	R	L	L	L	R	R	R	R	R	R	R	R
Chlorine (wet)	U	U	U	U	U	U	U	U	U	L	L	R	U	R	L	L	U
Chromic Acid Solution	L	U	L	U	U	L	M	U	U	M	U	U	U	U	R	L	U
Copper Chloride	U	U	U	U	U	U	U	U	U	U	U	L	U	R	R	R	R
Copper Sulfate	U	R	R	R	L	L	U	U	U	L	L	R	R	R	R	R	R
Fatty Acids	U	R	R	R	M	R	R	L	L	U	R	U	U	U	L	R	U
Ferrous Chloride	U	U	U	U	U	U	U	U	U	U	U	R	R		R	R	R
Ferrous Sulfate	U	M	U	R	U	U	M	L	L	L	U	R	R	R	R	R	R
Hydrochloric Acid (conc)	U	U	U	U	U	U	U	U	U	U	U	R	L	R	R	R	R
Hydrochloric Acid (dilute)	U	U	U	U	L	L	U	U	U	L	L	R	L	R	R	R	R
Hydrogen Chloride (dry gas)	R	L	R	L	L	L	U	U	U	L	L				R		U
Hydrofluoric Acid	L	U	U	U	M	L	U	U	U	L	U	U	R	L	U	R	U
Hydrocarbons (aliphatic)	R	R	R	R	R	R	R	R	R	R	R	R	U	R			
Hydrogen Peroxide (conc)	U	M	U	L	L		R	U	U	L		L	U		R	R	L
Hydrogen Sulfide (dry)	M	L	R	L	L	M	U	U	U	R	R			R		R	R
Hydrogen Sulfide (wet)	L	L	R	L	U	M	U	U	U	U	R			R			
Nitrating Acid (>15% H2 SO4)	R	L	L	L	U		U	U	U		U	U				R	U
Nitrating Acid (<15% H2 SO4)	U	L	L	L	U		U	U	U		U	U				R	U
Nitrating Acid (<15% HNO3)	U	L	L	L	U		U	U	U		U	U				R	U
Nitrating Acid (<1% acid)	U	L	R	L	U		U	U	U		U	U				R	U
Nitric Acid (conc)	U	M	M	R	U	L	L	U	U	L	U	L	U	U	U	R	U
Nitric Acid (dilute)	U	R	R	R	U	U	U	U	U	U	U	U	U	L	R	R	U
Nitrous Acid	U	R	R	R	R		R	R	R		U	L	U				R
Phenol (conc)	M	L	R	L	M	R	L	U	U	L	M	L	L		L	R	U
Phosphoric Acid (100%)	U	L	L	R	L	L	U			M	M	R	R	R	R		R
Phosphoric Acid (hot >45%)	U	U	U	R	U	U	U	U	M	U	L	L	L	R	R	R	U
Phosphoric Acid (cold>45%)	U	L	R	R	L	L	U	U	M	L	L	L	R	R	R	R	R
Phosphoric Acid (<45%)	U	L	R	R	L	L	U	U	M	L	R	L	R	R	R		
Potassium Carbonate	L	R	R		R	M	U	L	L	R	R	R	R	R	L		R
Potassium Chlorate	R	R	R		M	M	M	L	L		M				R		
Potassium Chloride	R	L	L		M		L	L	L		M	R	R	R	R		R
Potassium Permanganate	M	M	M	M	L	M	R	R	R	U	M	L	U	R		R	U
Sodium Bicarbonate	L	R	R	R	R	R	R	L	L	R	M	R	R		R		R
Sodium Bisulfate	U	L	R	R	M		U	L	L	R		R	R		R		R
Sodium Bisulfite	U	R	R				R	L	L	R		R	L	R	R		R
Sodium Carbonate	M	M	M		M	L	U	M	M	L	M	R	R	R	R	R	
Sodium Chlorate	L	R				M	M	M	M			R	R	R	R		R
Sodium Chloride	M	L	L	L	M	L	M	M	M	M	M	R	R	R	R	R	R
Sodium Hydroxide (cond)	L	L	R	R	R	R	U		L	U	R	R	R	R	R	U	R
Sodium Hydroxide (dilute)	R	M	M	M	L	L	U	R	R	U	L	R	R	R	R	L	R
Sodium Hydrosulfite						U	U	R	L		U	R					
Sodium Hypochlorite	U	L	L	L	U	U	U	U	U	U	U	R	U		R	R	U
Sodium Nitrate	R	R	R	R	M	R	R	M	M	U	M	R	R		R	R	R
Sodium Phosphate	R	R	R	M	M		U	L	L		M	R	L		R		R
Sodium Silicate	R	R	R	M	M	M	L	L	L		R	R	R		R		R
Sodium Sulfate	R	L	L	R	M	R	R	R	R	R	R	R	R		R		R
Sodium Sulfide	M	L	R	R	M	M	U	U	U	L	M	R	R		R		R
Sodium Sulfite	M	L	L	L	L	L	L	L	L	R	L	U	R		R		R
Stearic Acid	L	R	R	R	R	R	L	L	L	R	L	U	R	R	R	R	U
Sulfur Dioxide (dry)	R	R	R	L	U	U	R	R	R	R	U	L	U		R		R
Sulfur Dioxide (wet)	U	L	R		U	U		U	U	R	U	L	U		R		
Sulfur Trioxide	R	R	R		U	U	R	L	L	U	R	U			R		U
Sulfuric Acid (fuming 98%)	L	U	U		U	U	L	U	U	U	U				U		R
Sulfuric Acid (hot, conc)	U	U	U		U	U	U	U	U	L	U	U	U				U
Sulfuric Acid (cold, conc)	M	R	R	L	M		L	U	U	R		U	U		R		U
Sulfuric Acid (75-95%)	M	U	U	L	U	L	U	U	U	R	U		U	R	R		L
Sulfuric Acid (10-75%)	U	U	U	L	L	L	U	U	U	R	U	R	L	R	R		R
Sulfuric Acid (<10%)	U	U	L	L	L	L	U	U	U	R	L	R	R	R	R		R
Sulfurous Acid	U	L	R	L	U	U	L	U	U	L	U	L	R	U	R		R
Toluene	R	R	R	R	R	R	R	R	R	R	R	U	U	L	U		
Water (fresh)	R	R	R	R	R	R	R	R	R	R	R	R	R		R		R
Water (distilled)	U	R	R	R	U	R	U	R	R	U	L	R	R		R		
Zinc Chloride	U	U	L	U	M		U	U	U	L	M	R	R		R		R
Zinc Sulfate	U	M	M	M	M	M	L	M	M	M	M	R	R		R		R