



MANUAL D DUCTSIZE OVERVIEW

The Elite Software graphic Manual D Ductsize program quickly calculates optimal duct sizes using ACCA's 3rd edition Manual D duct design procedures. Elite Software's RHVAC and Drawing Board software is required to use graphic Manual D Ductsize which is not to be confused with the tabular Manual D Ductsizer tool built into RHVAC that uses a non-graphic tabular data entry system. Besides calculating duct sizes, duct system total pressure drop is also calculated such that the required fan static pressure can be compared to the available static pressure of the equipment available. Both supply and return duct systems can be designed. Detailed reports show velocity and pressure losses throughout the system as well as equivalent feet of length for each fitting in the duct system. A bill of materials report complete with material and labor costs can also be obtained if used with Elite Software's Bill of Material program. All common types of duct materials can be drawn and calculated for such as fiberglass duct board, galvanized steel, aluminum, and flex duct. All the fittings from ACCA Manual D are built-into the software. The software can automatically assign fittings or let you specify them. The fitting selector displays hundreds of these fittings for quick and easy selection. These diffusers and registers can be shown with their model numbers along with flow direction arrows in any combination desired. Manual D Ductsize is setup to work with both conventional duct and high velocity duct systems like Unico and SpacePak at no additional charge. The software allows virtually unlimited number of duct sections. Diversity of flow in trunk ducts used in VAV type systems can also be accounted for. Using the duct height and width constraints to control sizes, Manual D Ductsize can also be used to troubleshoot existing systems. You can easily find out which duct section is the bottleneck and evaluate the effects of upsizing only the problem duct sections.

DEMONSTRATION VERSION

A functional demonstration version of Manual D Ductsize can be downloaded free of charge from Elite's web site, www.elitesoft.com. Manual D Ductsize is an application program contained within Elite's RHVAC program and requires both RHVAC and Drawing Board. Downloading the demo of RHVAC also provides demos of Drawing Board, Bill of Materials, Proposal Maker and Manual D Ductsize.

MANUAL D DUCTSIZE FEATURES

- Calculates Optimal Air Conditioning Duct Sizes Directly from Drawings Created with RHVAC and Drawing Board
- **ACCA Approved with Manual D Sizing Procedures**
- Computes Round and/or Rectangular Duct Sizes
- Calculates for both Supply and Return Systems
- Calculates Cumulative Static Pressure Losses
- Allows for all Types of Duct Materials
- **Sizes Conventional Duct & High Velocity Unico Duct**
- Contains All Fittings in ACCA's Manual D
- Automatically Draws and Connects Runout Ducts
- **Works with Elite's Bill of Materials Software**
- Analyzes and Troubleshoots Existing Duct Systems
- **No Copy Protection Hassles—No Annual Fees**

CALCULATION METHOD

The graphic Manual D Ductsize Program is based on the design procedures given in the latest 3rd edition of ACCA's Manual D and is ACCA approved. The equal friction sizing method is used to determine optimal duct sizes to the nearest inch or centimeter. You can select to size ducts based on a user-defined schedule of sizes or to the nearest whole size. A Presize option is available where you enter existing sizes of a duct system so that the software can evaluate existing. Static pressure losses resulting from fittings and dampers are based on Manual D's equivalent length definitions based on the several hundred fittings definitions from Manual D built in to the program, including pictures.

PROGRAM INPUT

Manual D Ductsize is a graphic based design application program. It requires that you already own Elite's RHVAC and Drawing Board software. The primary input data for Manual D Ductsize is obtained by drawing duct system objects such as the air handler/furnace location and the main trunk duct. Once a fan location is given and the route of the main trunk duct is indicated, Manual D Ductsize can automatically draw and attach runout ducts such that a complete duct system is automatically created and sized. Any duct section already created can be modified as desired; lengthen it, bend it, even change the material type. New duct sections can be added individually as needed. Any duct section can be have its own information such as height and width constraints, velocity constraints, material type (duct board, galvanized steel, aluminum, flex duct, etc.), and roughness factor. Manual D fittings are automatically selected for you as the duct system is created, but it is easy to override and select your own preferred fittings. Manual D Ductsize has built-in defaults to work with either conventional duct systems or with the small 2" high velocity duct systems made popular by Hi-Velocity, Unico and SpacePak. Manual D Ductsize knows all the common rules for duct design needed in both conventional and high velocity duct systems.

SYSTEM REQUIREMENTS

Manual D Ductsize requires Windows 2000 or higher. Full copies of RHVAC and Drawing Board software are required to be purchased before graphic Manual D Ductsize can work.

PROGRAM OUTPUT

The output of the Manual D Ductsize program is both graphic and text based. Nice drawings with title blocks and borders show the floor plan and ductwork layouts. The sizing reports include trunk and runout duct calculations and a system summary report. The trunk and runout data lists all data needed to manually verify the sizing results. Printed for each duct section are size, air cfm, velocity, fitting names and equivalent feet, and static pressure loss. In addition, the velocity, static and total pressure are printed both on a cumulative basis and on a per duct section basis. The runout duct where the greatest total system static pressure loss occurs is clearly identified. The comprehensive color reports can be printed, previewed on screen, saved to disk or created as an HTML or RTF file.

Elite Software Development, Inc.					
Manual D Ductsize - Duct System 1 - Supply			Page 1		
Units: Pressure: in.wg, Duct lengths: feet, Duct sizes: inch, Airflow: CFM, Velocity: ft./min, Temperature: °F					
---Duct Name, etc.					
Type	Roughness	Diameter	Velocity	SPL Duct	
Upstream	Temperature	Width	Loss/100	Fit	
Shape	Length	Height	Fit, Eq. Len	SPL Tot	
Sizing	CFM		SP Avail	SPL Cumul	
---Duct Name: ST-100, Feeds Into: Kitchen, Fitting: 1-C					
Trunk	0.0003	14	898	0.016	
Up: Fan	55	11	0.08326	0.028	
Round	19.0	15	33.5	0.044	
Nearest Inch	960		0.144	0.044	
---Duct Name: ST-110, Feeds Into: Living Room, Fitting: 9-B2					
Trunk	0.0003	9.1	734	0.006	
Up: ST-120	55	7	0.09729	0.003	
Round	6.5	10	2.7	0.009	
Nearest Inch	332		0.115	0.073	
---Duct Name: SR-160, Supplies: Kitchen, Fittings: 4-H, 11-A2					
Runout	0.0003	7	554	0.004	
Up: ST-120	55	5.4	0.08091	0.064	
Round	4.5	7.7	79.4	0.068	
Nearest Inch	148		0.056	0.132	
---Duct Name: SR-170, Supplies: Kitchen, Fittings: 4-H, 11-A2					
Runout	0.0003	7	554	0.002	
Up: ST-120	55	5.4	0.08091	0.064	
Round	2.5	7.7	79.4	0.066	
Nearest Inch	148		0.057	0.130	
---Duct Name: SR-180, Supplies: Living Room, Fittings: 4-H, 11-A2					
Runout	0.0003	7	621	0.006	
Up: ST-110	55	5.4	0.09962	0.081	
Round	6.5	7.7	81.1	0.087	
Nearest Inch	166		0.027	0.160	

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Manual D Ductsize - Duct System 1 - Supply (cont'd)			Page 2		
Summary					
Main trunk airflow:	960				
Largest trunk diameter:	14	ST-100			
Largest runout diameter:	9	SR-200			
Smallest trunk diameter:	9.1	ST-110			
Smallest runout diameter:	7	SR-160			
Runout maximum cumulative static pressure loss:	0.188	SR-190			
Longest total effective length (ft.):	199.6	SR-190			
Supply fan device pressure losses:	0.000				
Supply fan external static pressure:	0.188				

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Duct Static Pressure Loss Calculations			Page 1						
Path 1 - From Fan To Living Room, Ups Path: 0, Ups Item: 0, Ups Loss: 0.000, Total Path SP Loss: 0.444									
Item	Type	Flow	Length	Sizing Opt	Rough	Calc. Dia	Calc. Vel	Calc. Loss/100	SP Loss
Description	Fit/Misc	Duct Ref	Des. Loss	Shape	Min. Vel	Max. Vel	Calc. Vel	Loss/100	Subtotal
1	Misc	0.3							0.300
	Equipment	Below							0.300
2	Duct	669	5	Inch	0	0	12.4	793	0.004
	Main Trunk	Rect	0.080		0	0	10	0.076	0.304
3	Fitting	1-F1						793	0.075
	Fitting 1-F1	Above						98.16	0.378
4	Duct	472	16	Inch	0	0	10.7	8	0.014
	To Living and Kitchen	Rect	0.080		0	0	12	0.085	0.392
5	Fitting	9-A1						762	0.046
	Fitting 9-A1	Above						53.77	0.438
6	Duct	107	8	Inch	0	0.01	7	400	0.007
	Runout R-100	Rnd	0.080		0	0	5.4	0.082	0.444
Path 2 - Partial Route To Kitchen, Ups Path: 1, Ups Item: 4, Ups Loss: 0.392, Total Path SP Loss: 0.423									
1	Duct	152	11	Inch	0	0.0003	6.9	591	0.010
	Trunk to Kitchen	Rect	0.080		0	0	5	0.093	0.402
2	Fitting	9-A1						387	0.012
	Fitting 9-A1	Below						12.46	0.414
3	Duct	76	9	Inch	0	0.01	6	387	0.009
	Runout R-700	Rnd	0.080		0	0	4.7	0.095	0.423

SAMPLE FITTINGS

Fitting Selector			
Group 1: Supply Air Fittings at the Air Handling Equipment			
Picture	Fit. ID	Eq. Len	Description
	1-A	35	Round abrupt takeoff at 90 degrees
	1-B	10	Round takeoff at 90 degrees with transition
	1-C	35	Rectangular abrupt takeoff at 90 degrees
	1-D	10	Rectangular takeoff at 90 degrees with transition

Fitting Selector			
Group 9: Supply Trunk Junction Fittings			
Picture	Fit. ID	Eq. Len	Description
	9-A1	80	Round takeoff from rectangular main (branch)
	9-A2	5	Round takeoff from rectangular main (main)
	9-B1	80	Rectangular takeoff from rectangular main (branch)
	9-B2	5	Rectangular takeoff from rectangular main (main)
	9-C1	80	Rectangular takeoff from rectangular main (branch), with scoop
	9-C2	5	Rectangular takeoff from rectangular main (main), with vanes
	9-D1	75	Rectangular takeoff from rectangular main (branch), with vanes
	9-D2	5	Rectangular takeoff from rectangular main (main), with taper
	9-E1	50	Rectangular takeoff from rectangular main (branch), with taper
	9-E2	5	Rectangular takeoff from rectangular main (main), with taper and scoop
	9-F1	45	Rectangular takeoff from rectangular main (branch), with taper and scoop
	9-F2	5	Rectangular radius takeoff from rectangular main (main)
	9-G1	35	Rectangular radius takeoff from rectangular main (branch)
	9-G2	5	Round takeoff from round main (main)
	9-H1	100	Round takeoff with 90 degree elbow from round main (branch)
	9-H2	5	Round takeoff with 90 degree elbow from round main (main)
	9-I1	85	Round takeoff from round main (branch)
	9-I2	5	Round takeoff from round main (main)

