Example of Manual J,D and S Forms required to be submitted

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Design Conditions

Location:
Chicago Midway AP, IL, US
Elevation: 617 ft
Latitude: 42°N

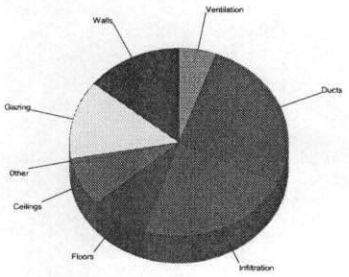
Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	4	90
Daily range (°F)	-	16 (L)
Wet bulb (°F)	-	73
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	66	15
Relative humidity (%)	30	50
Moisture difference (gr/lb)	27.8	34.1

Infiltration:	
Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

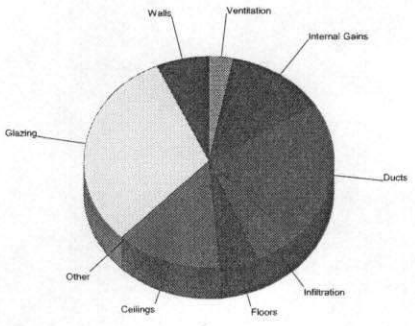
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.3	6033	14.2
Glazing	23.0	5735	13.5
Doors	17.1	359	0.8
Ceilings	1.7	3310	7.8
Floors	1.9	3632	8.6
Infiltration	5.8	9719	22.9
Ducts		11276	26.6
Piping		0	0
Humidification		0	0
Ventilation		2335	5.5
Adjustments		0	
Total		**42397**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	0.8	1125	6.8
Glazing	20.4	5080	30.9
Doors	7.3	154	0.9
Ceilings	1.1	2098	12.8
Floors	0.4	807	4.9
Infiltration	0.5	914	5.6
Ducts		3638	22.1
Ventilation		519	3.2
Internal gains		2120	12.9
Blower		0	0
Adjustments		0	
Total		**16454**	**100.0**



Latent Cooling Load = 4609 Btuh
Overall U-value = 0.054 Btuh/ft²-°F

Data entries checked.

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ACCA Manual J Street, Oak Park, IL 60301

Design Conditions

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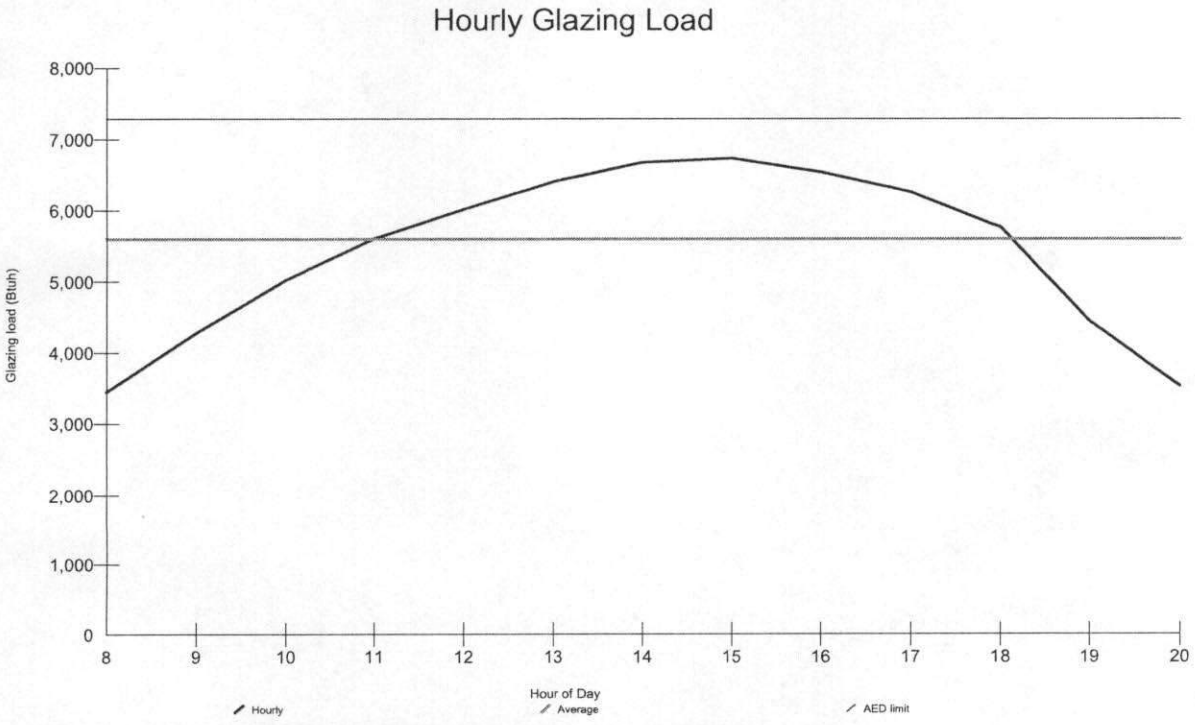
Chicago Midway AP, IL, US
Elevation: 617 ft
Latitude: 42°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	4	90
Daily range (°F)	-	16 (L)
Wet bulb (°F)	-	73
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	66	15
Relative humidity (%)	30	50
Moisture difference (gr/lb)	27.8	34.1

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 20.3%.

House has adequate exposure diversity (AED), based on AED limit of 30%.

AED excursion: 0 Btuh

[redacted]

Example of Manual J,D and S Forms required to be submitted

Project Information

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ACCA Manual J Street, Oak Park, IL 60301

Design Conditions

Location:
Chicago Midway AP, IL, US
Elevation: 617 ft
Latitude: 42°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	4	90
Daily range (°F)	-	16 (L)
Wet bulb (°F)	-	73
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	66	15
Relative humidity (%)	30	50
Moisture difference (gr/lb)	27.8	34.1

Infiltration:

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

Construction descriptions	Or	Area ft²	U-value Btuh/ft²-°F	Insul R ft²-°F/Btuh	Htg HTM Btuh/ft²	Loss Btuh	Clg HTM Btuh/ft²	Gain Btuh
Walls								
12F-0bw: Frm wall, brk 4" ext, 1/2" wood shth, r-21 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm	n	472	0.065	21.0	4.27	2014	0.80	376
	e	234	0.065	21.0	4.27	999	0.80	186
	s	467	0.065	21.0	4.27	1996	0.80	372
	w	240	0.065	21.0	4.27	1023	0.80	191
	all	1413	0.065	21.0	4.27	6033	0.80	1125
Partitions								
(none)								
Windows								
10D-c: 2 glazing, clr low-e outr, air gas, clad wd frm mat, clr innr, 1/4" gap, 1/8" thk; NFRC rated (SHGC=0.31)	n	54	0.350	0	23.0	1251	7.73	421
	n	37	0.350	0	23.0	839	11.0	403
	e	45	0.350	0	23.0	1035	34.2	1541
	s	74	0.350	0	23.0	1705	18.5	1369
	w	39	0.350	0	23.0	904	34.2	1347
	all	249	0.350	0	23.0	5735	20.4	5080
Doors								
11E0: Door, wd sc type, wd strm	s	21	0.260	0	17.1	359	7.32	154
Ceilings								
16C-38aw: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh		1938	0.026	38.0	1.71	3310	1.08	2098
Floors								
19A-30bstp: Flr floor, frm flr, 10" thkns, r-30 cav ins, tight bsmt ovr		1938	0.034	30.0	1.87	3632	0.42	807

Load Short Form
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Example of Manual J,D and S Forms required to be submitted

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Design Information

	Htg	Clg
Outside db (°F)	4	90
Inside db (°F)	70	75
Design TD (°F)	66	15
Daily range	-	L
Inside humidity (%)	30	50
Moisture difference (gr/lb)	28	34

Infiltration

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

HEATING EQUIPMENT

Make	Goodman Mfg.
Trade	GOODMAN
Model	GCH950453BX**
AHRI ref	3653909

Efficiency	95 AFUE	
Heating input	46000	Btuh
Heating output	44000	Btuh
Temperature rise	51	°F
Actual air flow	800	cfm
Air flow factor	0.020	cfm/Btuh
Static pressure	0.60	in H2O
Space thermostat		

COOLING EQUIPMENT

Make	Goodman Mfg.
Trade	GOODMAN
Cond	SSX160241B*
Coil	CA*F3636*6D*
AHRI ref	4652177

Efficiency	13.2 EER, 16 SEER	
Sensible cooling	18720	Btuh
Latent cooling	5280	Btuh
Total cooling	24000	Btuh
Actual air flow	800	cfm
Air flow factor	0.050	cfm/Btuh
Static pressure	0.60	in H2O
Load sensible heat ratio	0.78	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Master Bedroom	240	7575	2618	151	131
Master Bath	112	2734	590	55	30
Master Wic	98	0	0	0	0
Den	150	2507	644	50	32
Dining	129	2095	506	42	25
Kitchen	176	4861	3265	97	164
Living Room	394	9296	4527	186	227
CL 2	34	0	0	0	0
Bedroom 2	192	5733	2242	114	113
Hall	126	0	0	0	0
Bath 2	90	1481	312	30	16
Bedroom 3	198	3780	1232	75	62

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Entire House	d	1939	19863	14985	800	800
Other equip loads			2135	579		
Equip. @ 1.00	RSM			16454		
Latent cooling				4609		
TOTALS		1939	42397	21064	800	800

Example of Manual J,D and S Forms required to be submitted

[redacted] Worksheet
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

1	Room name					Entire House				Master Bedroom				
2	Exposed wall					187.0 ft				31.0 ft				
3	Room height					9.0 ft		d		9.0 ft		heat/cool		
4	Room dimensions									16.0 x 15.0 ft				
5	Room area					1938.9 ft²				240.0 ft²				
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	563	472	2014	376	144	90	383	71
.	G	10D-c	0.350	n	22.99	7.73	54	0	1251	421	54	0	1251	421
.	G	4A5-2oc	0.350	n	22.99	11.05	37	0	839	403	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	279	234	999	186	0	0	0	0
11	G	4A5-2oc	0.350	e	22.99	34.24	45	0	1035	1541	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	563	467	1996	372	0	0	0	0
	G	4A5-2oc	0.350	s	22.99	18.46	74	0	1705	1369	0	0	0	0
	D	11E0	0.260	s	17.08	7.32	21	21	359	154	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	279	240	1023	191	135	115	493	92
	G	4A5-2oc	0.350	w	22.99	34.24	39	0	904	1347	20	0	452	673
	C	16C-38aw	0.026	-	1.71	1.08	1938	1938	3310	2098	240	240	410	260
	F	19A-30bstp	0.034	-	1.87	0.42	1938	1938	3632	807	240	240	450	100
6	c) AED excursion									0				144
	Envelope loss/gain								19068	9264			3438	1761
12	a) Infiltration								9719	914			1611	151
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					4			920	0			0
		Appliances/other								1200				0
	Subtotal (lines 6 to 13)								28787	12298			5049	1912
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			393	108
14	Subtotal								28787	12298			5443	2020
15	Duct loads						39%	30%	11276	3638	39%	30%	2132	598
	Total room load								40063	15935			7575	2618
	Air required (cfm)								800	800			151	131

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

[redacted]

[redacted] Worksheet
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

1	Room name						Master Bath				Master Wic			
2	Exposed wall						14.0 ft				0 ft			
3	Room height						9.0 ft		heat/cool		9.0 ft		heat/cool	
4	Room dimensions						14.0 x 8.0 ft				14.0 x 7.0 ft			
5	Room area						112.0 ft²				98.0 ft²			
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	126	120	510	95	0	0	0	0
.	G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	G	4A5-2oc	0.350	n	22.99	11.05	7	0	149	72	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	0	0	0	0
	G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	0	0	0	0
	D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	112	112	191	121	98	98	167	106
	F	19A-30bstp	0.034	-	1.87	0.42	112	112	210	47	98	98	184	41
6	c) AED excursion									-18				-7
	Envelope loss/gain								1061	317			351	140
12	a) Infiltration								728	68			0	0
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								1789	385			351	140
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								176	70			-351	-140
14	Subtotal								1964	455			0	0
15	Duct loads						39%	30%	769	135	39%	30%	0	0
	Total room load								2734	590			0	0
	Air required (cfm)								55	30			0	0

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

[redacted] J● Worksheet
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

1	Room name					Den				Dining				
2	Exposed wall					10.0 ft				9.5 ft				
3	Room height					9.0 ft		heat/cool		9.0 ft		heat/cool		
4	Room dimensions					10.0 x 15.0 ft				9.5 x 13.6 ft				
5	Room area					150.0 ft²				128.8 ft²				
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	90	80	342	64	86	76	322	60
.	G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	G	4A5-2oc	0.350	n	22.99	11.05	10	0	230	110	10	0	230	110
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	0	0	0	0
	G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	0	0	0	0
	D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	150	150	256	162	128	128	219	139
	F	19A-30bstp	0.034	-	1.87	0.42	150	150	281	62	128	128	240	53
6	c) AED excursion									-20				-19
	Envelope loss/gain								1109	379			1012	344
12	a) Infiltration								520	49			494	46
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								1629	428			1506	391
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								173	69			0	0
14	Subtotal								1802	497			1506	391
15	Duct loads						39%	30%	706	147	39%	30%	590	116
	Total room load								2507	644			2095	506
	Air required (cfm)								50	32			42	25

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

[redacted] J● Worksheet
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

1	Room name						Kitchen					Living Room			
2	Exposed wall						26.5 ft					40.0 ft			
3	Room height						9.0 ft			heat/cool		9.0 ft			heat/cool
4	Room dimensions						13.0 x 13.6 ft					22.5 x 17.5 ft			
5	Room area						176.3 ft²					393.8 ft²			
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	117	107	457	85	0	0	0	0
.	G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	G	4A5-2oc	0.350	n	22.99	11.05	10	0	230	110	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	122	107	455	85	158	128	544	102
11	G	4A5-2oc	0.350	e	22.99	34.24	15	0	345	514	30	0	690	1027
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	203	139	595	111
	G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	42	0	968	777
	D	11E0	0.260	s	17.08	7.32	0	0	0	0	21	21	359	154
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	176	176	300	190	394	394	673	426
	F	19A-30bstp	0.034	-	1.87	0.42	176	176	329	73	394	394	738	164
6	c) AED excursion									-97				-166
	Envelope loss/gain								2115	961			4567	2595
12	a) Infiltration								1377	129			2079	195
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					1			230	3			690
		Appliances/other								1200				0
	Subtotal (lines 6 to 13)								3493	2520			6646	3480
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			34	14
14	Subtotal								3493	2520			6680	3494
15	Duct loads						39%	30%	1368	745	39%	30%	2617	1033
	Total room load								4861	3265			9296	4527
	Air required (cfm)								97	164			186	227

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Example of Manual J,D and S Forms required to be submitted

1	Room name					CL 2				Bedroom 2				
2	Exposed wall					4.0 ft				28.0 ft				
3	Room height					9.0 ft		heat/cool		9.0 ft		heat/cool		
4	Room dimensions					8.5 x 4.0 ft				16.0 x 12.0 ft				
5	Room area					34.0 ft²				192.0 ft²				
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	0	0	0	0	0	0	0	0
.	G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	G	4A5-2oc	0.350	n	22.99	11.05	0	0	0	0	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	144	132	563	105
	G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	12	0	278	223
	D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	36	36	154	29	108	88	377	70
	G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	20	0	452	673
	C	16C-38aw	0.026	-	1.71	1.08	34	34	58	37	192	192	328	208
	F	19A-30bstp	0.034	-	1.87	0.42	34	34	64	14	192	192	360	80
6	c) AED excursion									-5				161
	Envelope loss/gain								276	75			2359	1521
12	a) Infiltration								208	20			1455	137
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								483	95			3814	1657
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								-483	-95			306	73
14	Subtotal								0	0			4119	1730
15	Duct loads						39%	30%	0	0	39%	30%	1614	512
	Total room load								0	0			5733	2242
	Air required (cfm)								0	0			114	113

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

[redacted]-J● Worksheet
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

1	Room name					Hall					Bath 2			
2	Exposed wall					0 ft					7.5 ft			
3	Room height					9.0 ft		heat/cool			9.0 ft		heat/cool	
4	Room dimensions					31.5	x	4.0 ft			7.5	x	12.0 ft	
5	Room area					126.0 ft²					90.0 ft²			
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	0	0	0	0	0	0	0	0
.	G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	G	4A5-2oc	0.350	n	22.99	11.05	0	0	0	0	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	68	68	288	54
	G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	0	0	0	0
	D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	126	126	215	136	90	90	154	97
	F	19A-30bstp	0.034	-	1.87	0.42	126	126	236	52	90	90	169	37
6	c) AED excursion									-9				-10
	Envelope loss/gain								451	180			611	178
12	a) Infiltration								0	0			390	37
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								451	180			1001	215
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								-451	-180			64	26
14	Subtotal								0	0			1064	241
15	Duct loads						39%	30%	0	0	39%	30%	417	71
	Total room load								0	0			1481	312
	Air required (cfm)								0	0			30	16

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

[redacted]

Example of Manual J,D and S Forms required to be submitted

1	Room name				Bedroom 3									
2	Exposed wall				16.5 ft									
3	Room height				9.0 ft				heat/cool					
4	Room dimensions				16.5 x 12.0 ft									
5	Room area				198.0 ft²									
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area or perimeter		Load	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12F-0bw	0.065	n	4.27	0.80	0	0	0	0				
.	G	10D-c	0.350	n	22.99	7.73	0	0	0	0				
.	G	4A5-2oc	0.350	n	22.99	11.05	0	0	0	0				
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0				
11	G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0				
	W	12F-0bw	0.065	s	4.27	0.80	149	129	549	102				
	G	4A5-2oc	0.350	s	22.99	18.46	20	0	460	369				
	D	11E0	0.260	s	17.08	7.32	0	0	0	0				
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0				
	G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0				
	C	16C-38aw	0.026	-	1.71	1.08	198	198	338	214				
	F	19A-30bstp	0.034	-	1.87	0.42	198	198	371	82				
6	c) AED excursion									45				
	Envelope loss/gain								1718	814				
12	a) Infiltration								858	81				
	b) Room ventilation								0	0				
13	Internal gains:	Occupants @ 230					0			0				
		Appliances/other								0				
	Subtotal (lines 6 to 13)								2576	895				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								141	56				
14	Subtotal								2716	951				
15	Duct loads						39%	30%	1064	281				
	Total room load								3780	1232				
	Air required (cfm)								75	62				

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Project Summary
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Notes: Joe Contractor
Superior HVAC

Design Information

Weather: Chicago Midway AP, IL, US

Winter Design Conditions

Outside db	4	°F
Inside db	70	°F
Design TD	66	°F

Summer Design Conditions

Outside db	90	°F
Inside db	75	°F
Design TD	15	°F
Daily range	L	
Relative humidity	50	%
Moisture difference	34	gr/lb

Heating Summary

Structure	28787	Btuh
Ducts	11276	Btuh
Central vent (33 cfm)	2335	Btuh
Humidification	0	Btuh
Piping	0	Btuh
Equipment load	42397	Btuh

Sensible Cooling Equipment Load Sizing

Structure	12298	Btuh
Ducts	3638	Btuh
Central vent (33 cfm)	519	Btuh
Blower	0	Btuh
Use manufacturer's data	y	
Rate/swing multiplier	1.00	
Equipment sensible load	16454	Btuh

Infiltration

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

	Heating	Cooling
Area (ft²)	1939	1939
Volume (ft³)	17450	17450
Air changes/hour	0.47	0.20
Equiv. AVF (cfm)	138	58

Latent Cooling Equipment Load Sizing

Structure	2120	Btuh
Ducts	1740	Btuh
Central vent (33 cfm)	750	Btuh
Equipment latent load	4609	Btuh
Equipment total load	21064	Btuh
Req. total capacity at 0.78 SHR	1.8	ton

Heating Equipment Summary

Make	Goodman Mfg.
Trade	GOODMAN
Model	GCH950453BX**
AHRI ref	3653909

Efficiency	95 AFUE	
Heating input	46000	Btuh
Heating output	44000	Btuh
Temperature rise	51	°F
Actual air flow	800	cfm
Air flow factor	0.020	cfm/Btuh
Static pressure	0.60	in H2O
Space thermostat		

Cooling Equipment Summary

Make	Goodman Mfg.
Trade	GOODMAN
Cond	SSX160241B*
Coil	CA*F3636*6D*
AHRI ref	4652177

Efficiency	13.2 EER, 16 SEER	
Sensible cooling	18720	Btuh
Latent cooling	5280	Btuh
Total cooling	24000	Btuh
Actual air flow	800	cfm
Air flow factor	0.050	cfm/Btuh
Static pressure	0.60	in H2O
Load sensible heat ratio	0.78	

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

[redacted]

Example of Manual J,D and S Forms required to be submitted

Residential Plans Examiner Review Form for HVAC System Design (Loads, Equipment, Ducts)

Form RPER 1
15 Mar 09

Header Information

Contractor:

Mechanical license:

Building plan #:

Home address (Street or Lot#, Block, Subdivision): ACCA Manual J Street, Entire House

REQUIRED ATTACHMENTS	ATTACHED
Manual J1 Form (and supporting worksheets):	Yes ☐ No ☐
or MJ1AE Form* (and supporting worksheets):	Yes ☐ No ☐
OEM performance data (heating, cooling, blower):	Yes ☐ No ☐
Manual D Friction Rate Worksheet:	Yes ☐ No ☐
Duct distribution sketch:	Yes ☐ No ☐

HVAC LOAD CALCULATION (IRC M1401.3)

Design Conditions

Winter Design Conditions

Outdoor temperature:	4	°F
Indoor temperature:	70	°F
Total heat loss:	42397	Btuh

Summer Design Conditions

Outdoor temperature:	90	°F
Indoor temperature:	75	°F
Grains difference:	34 gr/lb @ 50%	RH
Sensible heat gain:	16454	Btuh
Latent heat gain:	4609	Btuh
Total heat gain:	21064	Btuh

Building Construction Information

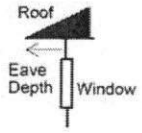
Building

Orientation: Front Door faces South
North, East, West, South, Northeast, Northwest, Southeast, Southwest

Number of bedrooms:	3	
Conditioned floor area:	1939	ft²
Number of occupants:	4	

Windows

Eave overhang depth:	0	ft
Internal shade: Blinds, drapes, etc.	none	
Number of skylights:	0	



HVAC EQUIPMENT SELECTION (IRC M1401.3)

Heating Equipment Data

Equipment type: Furnace, Heat pump, Boiler, etc.	Gas furnace
Model:	Goodman Mfg. GCH950453BX**+
Heating output capacity: Heat pumps - capacity at winter design outdoor conditions	44000 Btuh
Aux. heating output capacity:	0 Btuh

Cooling Equipment Data

Equipment type: Air Conditioner, Heat pump, etc.	Split AC
Model:	Goodman Mfg. SSX160241B*+CA*F3636*6D*
Total cooling capacity:	23021 Btuh
Sensible cooling capacity:	18121 Btuh
Latent cooling capacity:	4900 Btuh

Blower Data

Heating cfm:	800
Cooling cfm:	800
Static pressure: Fan's rated external static pressure for design airflow	0.60 in H2O

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow:	800 cfm	Longest supply duct:	232 ft	Duct Materials Used	
Equipment design ESP:	0.60 in H2O	Longest return duct:	197 ft	Trunk duct:	Sheet metal
Total device pressure losses:	-0.3 in H2O	**Total effective length (TEL):**	429 ft		
Available static pressure (ASP):	0.33 in H2O	**Friction rate:** Friction Rate = ASP ÷ (TEL x 100)	0.077 in/100ft	Branch duct:	Round flex vinyl, Sheet metal

I declare the load calculation, equipment, equipment selection and duct design were rigorously performed based on the building plan listed above. I understand the claims made on these forms will be subject to review and verification.

Contractor's printed name: _____

Contractor's signature: _____ Date: _____

Reserved for County, Town Municipality or Authority having jurisdiction use.

*Home qualifies for MJ1AE Form based on Abridged Edition Checklist

[redacted]

Duct System Summary
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S Forms required to be submitted

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

	Heating	Cooling
External static pressure	0.60 in H2O	0.60 in H2O
Pressure losses	0.27 in H2O	0.27 in H2O
Available static pressure	0.33 in H2O	0.33 in H2O
Supply / return available pressure	0.178 / 0.152 in H2O	0.178 / 0.152 in H2O
Lowest friction rate	0.077 in/100ft	0.077 in/100ft
Actual air flow	800 cfm	800 cfm
Total effective length (TEL)	429 ft	

Supply Branch Detail Table

Name	Design (Btuh)	Htg (cfm)	Clg (cfm)	Design FR	Diam (in)	H x W (in)	Duct Matl	Actual Ln (ft)	Ftg.Eqv Ln (ft)	Trunk
Bath 2	h 1481	30	16	0.084	4.0	0x0	VlFx	21.3	190.0	st5
Bedroom 2	h 5733	114	113	0.115	7.0	0x0	VlFx	29.5	125.0	st4
Bedroom 3	h 3780	75	62	0.081	5.0	0x0	VlFx	29.5	190.0	st5
Den	h 2507	50	32	0.082	4.0	0x0	VlFx	33.5	185.0	st6
Dining	h 2095	42	25	0.080	6.0	0x0	VlFx	44.0	180.0	st7
Kitchen	c 1633	49	82	0.078	6.0	0x0	VlFx	54.5	175.0	st10
Kitchen-A	c 1633	49	82	0.077	6.0	0x0	VlFx	56.5	175.0	st10
Living Room	c 2264	93	114	0.087	7.0	0x0	VlFx	54.3	150.0	st11
Living Room-A	c 2264	93	114	0.088	7.0	0x0	VlFx	53.2	150.0	st11
Master Bath	h 2734	55	30	0.084	5.0	0x0	VlFx	22.0	190.0	st5
Master Bedroom	h 3787	76	66	0.107	5.0	0x0	VlFx	31.7	135.0	st2
Master Bedroom-A	h 3787	76	66	0.107	5.0	0x0	VlFx	32.3	135.0	st2

Supply Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st10	Peak AVF	97	164	0.077	470	8.0	0 x 0	ShtMetl	st7
st7	Peak AVF	325	417	0.077	764	10.0	0 x 0	ShtMetl	st6
st6	Peak AVF	375	449	0.077	572	12.0	0 x 0	ShtMetl	st5
st5	Peak AVF	534	556	0.077	708	12.0	0 x 0	ShtMetl	st1
st2	Peak AVF	151	131	0.107	566	7.0	0 x 0	ShtMetl	st4
st4	Peak AVF	266	244	0.107	761	8.0	0 x 0	ShtMetl	st1
st11	Peak AVF	186	227	0.087	850	7.0	0 x 0	ShtMetl	st7
st1	Peak AVF	800	800	0.077	453	18.0	0 x 0	ShtMetl	

[redacted]

Return Branch Detail Table

Example of Manual J,D and S
Forms required to be submitted

Name	Grill Size (in)	Htg (cfm)	Clg (cfm)	TEL (ft)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Stud/Joist Spacing (in)	Duct Mat'l	Trunk
rb2	20x11	375	449	197.0	0.077	572	12.0	0x 0		ShMt	rt3
rb5	10x10	206	161	130.5	0.116	590	8.0	0x 0		ShMt	rt1
rb3	10x10	144	128	126.5	0.120	539	7.0	0x 0		ShMt	rt4
rb4	6x10	75	62	185.5	0.082	384	6.0	0x 0		ShMt	rt3

Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt3	Peak AVF	450	511	0.077	650	12.0	0 x 0	ShtMetl	rt2
rt1	Peak AVF	800	800	0.077	573	16.0	0 x 0	ShtMetl	
rt2	Peak AVF	594	639	0.077	598	14.0	0 x 0	ShtMetl	rt1
rt4	Peak AVF	144	128	0.120	413	8.0	0 x 0	ShtMetl	rt2

[redacted]

Manual S Compliance Report
Entire House

Job: SEG 0314-077W
Date: Mar 17, 2014

Example of Manual J,D and S
Forms required to be submitted

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Cooling Equipment

Design Conditions

Outdoor design DB:	89.6°F	Sensible gain:	16454	Btuh	Entering coil DB: 77.0°F
Outdoor design WB:	73.3°F	Latent gain:	4609	Btuh	Entering coil WB: 64.1°F
Indoor design DB:	75.0°F	Total gain:	21064	Btuh	
Indoor RH:	50%	Estimated airflow:	800	cfm	

Manufacturer's Performance Data at Actual Design Conditions

Equipment type: Split AC
Manufacturer: Goodman Mfg. Model: SSX160241B*+CA*F3636*6D*

Actual airflow:	800	cfm		
Sensible capacity:	18121	Btuh	110% of load	
Latent capacity:	4900	Btuh	106% of load	
Total capacity:	23021	Btuh	109% of load	SHR: 79%

Heating Equipment

Design Conditions

Outdoor design DB:	4.3°F	Heat loss:	42397	Btuh	Entering coil DB: 60.8°F
Indoor design DB:	70.0°F				

Manufacturer's Performance Data at Actual Design Conditions

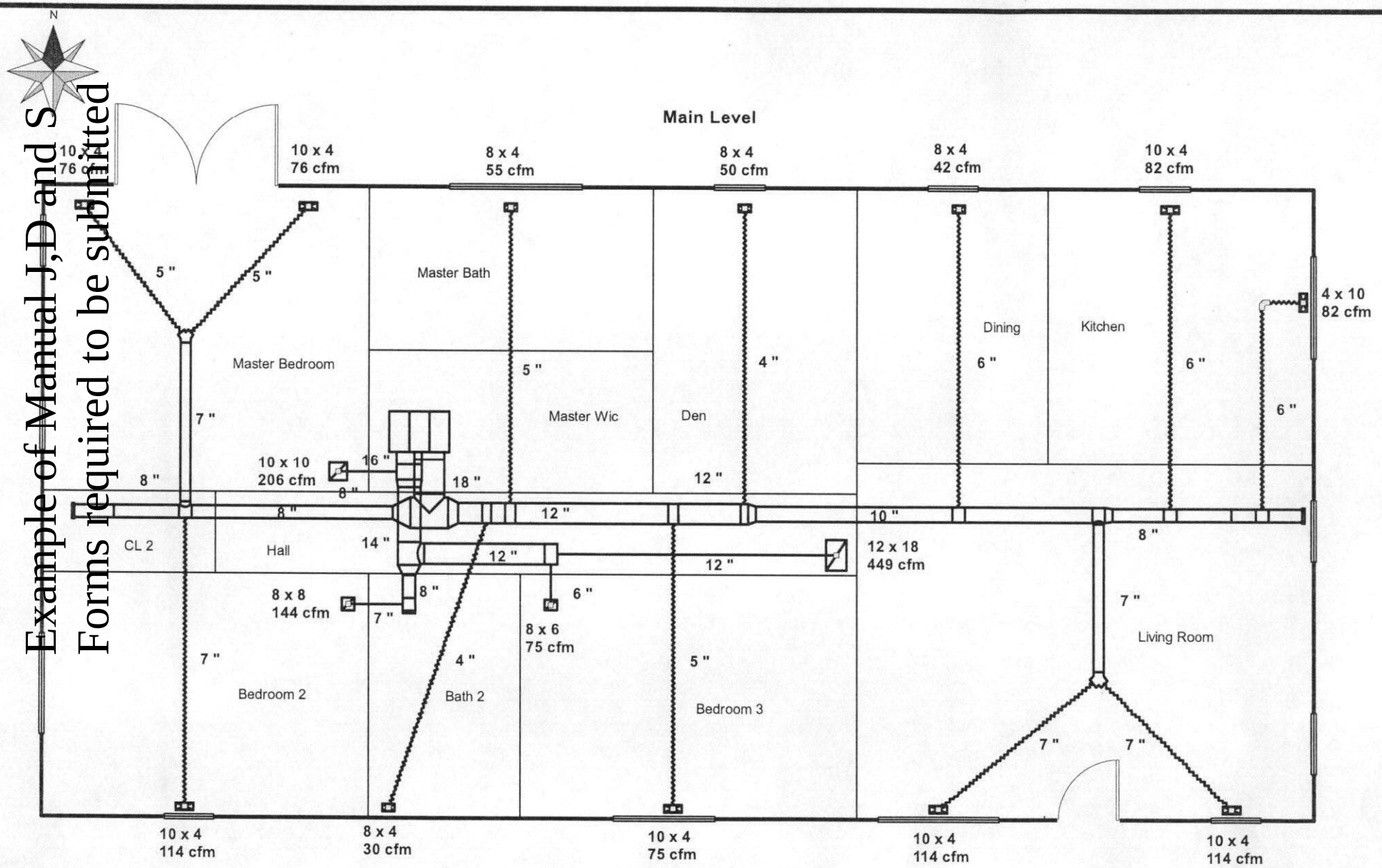
Equipment type: Gas furnace
Manufacturer: Goodman Mfg. Model: GCH950453BX**

Actual airflow:	800	cfm		
Output capacity:	44000	Btuh	104% of load	Temp. rise: 50 °F

The above equipment was selected in accordance with ACCA Manual S.

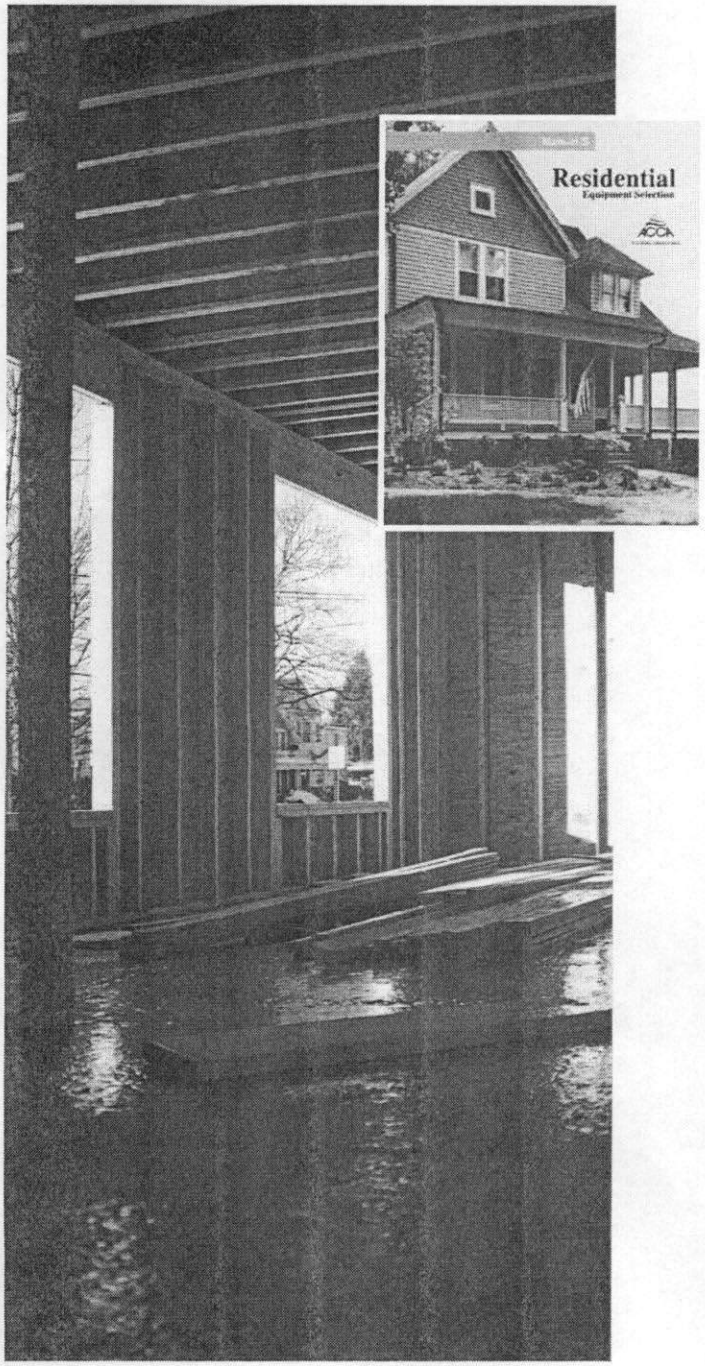
[redacted]

Example of Manual J, D and S
Forms required to be submitted



Job #: SEG 0314-077W Right-Sized Residence ACCA Manual J Street Oak Park, IL 60301	Phone:	Scale: 1 : 81 Page 1 [redacted] 2014-Mar-18 18:57:36 [redacted]

Reviewing HVAC Designs for Compliance with ACCA Manual S



by Wes Davis

An approved code change to the 2009 *International Residential Code* (IRC) clarifies an existing requirement for sizing HVAC equipment: "Heating and cooling equipment shall be sized *in accordance with ACCA Manual S* based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies" (emphasis added).

Air Conditioning Contractors of America (ACCA) Manual S, *Residential Heating and Cooling Equipment Selection,* provides clear instructions for interpreting and applying original equipment manufacturer (OEM) expanded performance data to select equipment that meets application requirements (heating, sensible cooling or latent cooling) for the applied design conditions used to calculate loads with ACCA Manual J, *Residential Load Calculation*. It also provides the methodology for identifying the blower airflow design value, in cubic feet per minute (cfm), which is subsequently used per IRC Section 1601.1 with ACCA Manual D, *Residential Duct Systems*, to calculate duct sizing.

In addition, Manual S sets equipment sizing limits, as summarized in Table 1. These sizing limits ensure

Table 1. Manual S equipment selection sizing limitations.

Equipment	Sizing Limitations	Reference (section)
Furnaces	100–140% of total heating load	2-2
boilers	100–140% of total heating load	2-2
air conditioners	115% of total cooling load*	3-4
heat pumps	115%[1] or 125%[2] of total cooling load*	4-4
supplemental heat (heat pumps)		
electric	based on equipment balance point	4-8
dual fuel	100–140% of total heating load	6-8
emergency heat (heat pumps)	based on local codes	4-9

1. Heat pumps in a cooling dominant climate are allowed to be 115% of the cooling level.
2. Heat pumps in a heating dominant climate are allowed to be 125% of the cooling level.
*The size of the cooling equipment must be based on the same temperature and humidity conditions that were used to calculate the Manual J loads.

that equipment capacities meet the minimum needs of occupants while preventing the problems associated with oversizing.[1]

How to Apply Manual S

Heating, Part One

Manual J heating load calculations produce values, in British thermal units per hour (BTU/h), for selecting HVAC equipment.

Take for example a home that requires a minimum of 56,000 Btu/h of heat to maintain an indoor temperature of 70°F when the outdoor temperature drops in the winter. Based on the sizing limitations (100%–140% of heating load), the furnace must have a capacity between 56,000 Btu/h and 78,400 Btu/h (140% x 56,000). Per the manufacturer's product data given in Figure 1, XYZ model FR 80-036—with an output capacity of 64,000 Btu/h—meets the requirement. Model FR 80-024 does not meet the minimum design temperature, while FR 125-036 has too much output capacity.

Cooling

The cooling loads given in Manual J for the example home are: total cooling = 30,000 Btu/h, sensible cooling = 22,000 Btu/h and latent cooling = 8,000 Btu/h. Based on the Manual S sizing limitations (100%—115% of the cooling load), the air conditioner must have a capacity between 30,000 Btu/h and 34,500 Btu/h (115% x 30,000).

Table 2. Manual D input for design air flow.

Mode of Operation	Requirement	Reference (section)
heating	temperature rise requirement	2-6
cooling	air flow associated with the selected equipment's capacity	3-11

Table 3. Example cooling design conditions.

Indoor Conditions			Outdoor Conditions
design temperature	relative design humidity	indoor wet-bulb temperature (at 75°F and 50% Rh)	design temperature
75°F	50% Rh	63°F wet-bulb	95°F

When selecting cooling equipment, it is necessary to know the design conditions used to calculate the cooling load. Unlike heating equipment, cooling equipment OEM data offers a range of performance at different outdoor and indoor conditions. The design conditions for the example home are given in Table 3.

Figures 2 and 3 provide OEM expanded performance data for two air conditioners: a 2.5-ton capacity model and a 3.0-ton capacity model. Manufacturers may present this data in a different format, but all should include airflow, entering air wet-bulb temperature,[2] outdoor temperature, and cooling capacities (usually, total and sensible capacities). Note that a slightly different approach is employed when using Manual S to verify cooling equipment selection than to select the equipment. Verification begins by considering the outdoor air temperature and indoor wet-bulb temperature.

The 2.5-ton air conditioner seems like a natural choice for a home with a 30,000 Btu/h cooling load because a 2.5-ton unit has a nominal capacity of 30,000 Btu/h. However, the OEM data for XYZ model AC-30 reveals that the unit does not meet the Manual S total cooling capacity requirement at the design 95°F outdoor temperature and 63°F entering wet-bulb temperature. In contrast, according to the OEM data, XYZ model AC-36 has enough total cooling capacity (31,510 Btu/h) without exceeding the 115-percent limit (34,500 Btu/h). The system's sensible cooling capacity (23,000 Btu/h) also meets the sensible cooling load (22,000 Btu/h) and the latent capacity (total capacity – sensible capacity = latent capacity 8,510 Btu/h) meets the latent load (8,000 Btu/h).

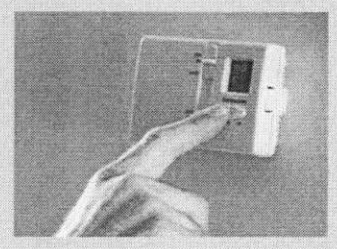
Another critical design element is the volume of air that must flow over the indoor air conditioner coil to achieve the required cooling capacities.[3] The furnace manufacturer will provide blower performance data indicating the air flow that the unit can deliver at different levels of resistance. Referring to the fan performance data given in Figure 4 for XYZ model FR 80-036 (1,035 cfm at 0.60 inches water column [iwc], interpolated to 1,050 cfm at 0.58 iwc), the furnace can deliver the airflow required per ACCA Manual D.

Heating, Part Two

Given the duct design value of 1,050 cfm, the final hurdle is to determine if the unit selection meets the furnace requirements for temperature rise. Referring back to Figure 1, the XYZ model FR 80-036 furnace has an OEM

Sensible and Latent Loads

There are two aspects to the consideration of cooling load: sensible and latent loads. The sensible load is the heat that is measured by a thermometer or a thermostat. This is the "dry" heat one consciously feels. The latent load is the heat associ-



ated with airborne moisture as measured by a hygrometer or humidistat.

When you enter a home whose thermostat shows a cool temperature but which has high latent heat—or relative humidity—the initial feeling is comfort. But as your body adjusts to the temperature you begin to feel sticky, clammy and uncomfortable. You may even feel warm again. This is why two homes with the same thermostat setting can feel very different.

XYZ Furnace Company						
General Data				Input Capacity		Output Capacity
			Efficiency			
Unit Size	FR60-024	FR 60-036	FR 80-024	FR 80-036	FR 125-036	FR 125-048
Output Capacity						
Upflow	48,000	48,000	64,000	64,000	100,000	100,000
Horizontal	48,000	48,000	64,000	64,000	100,000	100,000
Input Btu/h	60,000	60,000	80,000	80,000	125,000	125,000
Temp Rise Range	30 – 60	15 – 45	45 – 75	35 – 65	40 – 70	30 – 60

Figure 1. Furnace product data for XYZ 3.0-ton air conditioners.

Model AC-30 with Coil AC-030 (2.5 ton)

Evaporator Air		Condenser Entering Air Temp – DB (F)									
CFM	EWB (F)	75		85		95		105		115	
		Capacity		Capacity		Capacity		Capacity		Capacity	
		Total	Sensible	Total	Sensible	Total	Sensible	Total	Sensible	Total	Sensible
875	72	34,610	18,190	33,100	17,620	29,830	16,390	28,040	15,730	26,500	15,170
	67	31,400	22,240	30,000	21,650	28,820	21,040	26,960	20,390	25,300	19,720
	63	28,620	26,290	27,350	25,680	26,020	25,040	24,640	24,340	23,340	23,340
	57	27,840	27,840	26,820	26,820	25,740	25,740	24,580	24,580	23,340	23,340
1000	72	35,250	19,090	33,680	18,500	32,030	17,890	30,280	17,260	28,430	16,590
	67	31,990	23,660	30,530	23,060	29,000	22,440	27,380	21,790	25,670	21,110
	63	29,300	28,220	28,020	27,560	26,770	26,770	25,540	25,540	24,220	24,220
	57	29,020	29,020	27,930	27,930	26,780	26,780	25,540	25,540	24,230	24,230
1125	72	35,720	19,920	34,110	19,330	32,410	18,710	30,610	18,070	28,700	17,390
	67	32,430	25,010	30,930	24,410	29,360	23,780	27,700	23,120	25,960	22,420
	63	29,970	29,970	28,850	28,850	27,630	27,630	26,340	26,340	24,950	24,950
	57	30,000	30,000	28,850	28,850	27,640	27,640	26,340	26,340	24,950	24,950

Figure 2. OEM performance data for XYZ AC-30 2.5-ton air conditioner.

Model AC-36 with Coil AC-036 (3.0 ton)

Evaporator Air		Condenser Entering Air Temp – DB (F)									
CFM	EWB (F)	75		85		95		105		115	
		Capacity		Capacity		Capacity		Capacity		Capacity	
		Total	Sensible	Total	Sensible	Total	Sensible	Total	Sensible	Total	Sensible
1050	72	41,680	21,820	39,850	21,110	37,920	20,380	35,900	19,620	33,700	18,810
	67	37,930	24,680	36,260	23,950	34,460	21,200	32,570	24,420	30,540	23,590
	63	34,660	29,520	33,120	28,780	31,510	23,000	29,840	29,160	28,150	28,150
	57	33,650	31,650	32,400	30,400	31,090	27,090	29,680	29,680	28,160	28,160
1200	72	42,390	20,820	40,490	20,100	38,490	21,360	36,390	29,590	34,130	19,770
	67	38,650	26,290	36,870	25,560	35,000	26,790	33,949	26,010	30,950	25,170
	63	35,450	31,740	33,890	30,950	32,300	32,080	30,790	30,790	29,180	29,180
	57	35,020	33,020	33,690	31,690	32,290	32,290	30,800	30,800	29,190	29,190
1350	72	42,910	21,750	40,960	21,030	38,890	22,280	36,750	21,510	34,420	20,680
	67	39,150	27,820	37,320	27,080	35,410	28,320	33,410	27,530	31,270	26,680
	63	36,200	33,760	34,750	32,750	33,270	33,270	31,700	31,700	30,010	30,010
	57	36,160	34,160	34,760	32,760	33,270	33,270	31,710	31,710	30,010	30,010

Figure 3. OEM performance data for XYZ AC-36 3.0-ton air conditioner.

AHRI Versus OEM Expanded Performance Data

Manufacturers of heating and cooling equipment are responsible for testing and certifying the performance of their products. The Air Conditioning, Heating and Refrigeration Institute (AHRI) produces standards for rating such equipment, but data published in AHRI product directories should not be used because the test conditions simulate a very small geographic area in the U.S. As such, AHRI directories should only be used to compare equipment efficiency ratings—OEM expanded performance data should be used to select properly sized equipment.

design temperature rise range of 35°F–65°F.

Air temperature rise through the furnace depends on the rate of flow through the heat exchanger. If the air flow is outside of the temperature rise range, the equipment may cycle off at safety limits, suffer damage or possibly even create an unsafe condition. Incorrect air flow can cause too much temperature rise (slow-moving air may allow the heat exchanger to become too hot, which can result in warping or cracking of the metal heat exchanger) or too little temperature rise (fast-moving air may cause condensation in the metal heat exchanger, which can result in the production of an acid that can harm or penetrate the heat exchanger).

(continued on page 26.)

XYZ Company FR 80-036								
Air Delivery – CFM (with filter)								
Unit Size	Speed	External Static Pressure (inches water column)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
FR80 - 024	High	1075	1040	995	945	895	840	760
	Med – Hi	950	925	895	845	795	740	660
	Med – Lo	850	825	780	740	685	635	560
	Low	740	700	650	620	565	515	455
FR80 - 036	High	1470	1415	1400	1285	1215	1120	995
	Med – Hi	~~1315~~	~~1280~~	~~1235~~	~~1298~~	~~1115~~	1035	930
	Med – Lo	1125	1110	1085	1045	995	915	830
	Low	930	9256	910	850	830	770	705
FR80 - 048	High	1700	1685	1640	1580	1545	1450	1380
	Med – Hi	1500	1465	1435	1385	1255	1300	1250
	Med – Lo	1325	1295	1265	1230	1190	1150	1105
	Low	1205	1170	1145	1110	1080	1035	990
Note: Airflow based on a bottom only return air, 120v, with factory supplied 1-in filter (0.05 IWC).								

Figure 4. Fan performance data.

An air flow rate is acceptable if it yields a temperature rise within the range prescribed by the equipment manufaturer. In our example, 1,050 cfm equates to an acceptable (35°F–65°F) furnace temperature rise of approximately 55°F:

$\Delta T = Btu/h^4 \div (CFM \times 1.1 \times ACF)$

55.4°F = 64,000 ÷ (1,050 × 1.1 × 1.0)

where:

ΔT = temperature difference in the air between the inlet and outlet of the furnace or cooling coil

Btu/h = thermal output capacity of the furnace or cooling system

CFM = volume of air, in cubic feet per minute, moved through the furnace by the blower assembly

1.1 = a physical air constant (derived from the laws of physics)

ACF = altitude correction factor; 1.0 at sea level

Conclusion

This article serves to demonstrate the value of the adopted code revision in ensuring that appropriate load calculations are used as the basis for HVAC equipment selection: one more way that First Preventers can protect the health and safety of building occupants across the country. ◆

Notes

1. Oversizing can lead to health issues associated with excessive humidity; higher costs for equipment and installation labor and materials; greater energy consumption; and more wear and tear on equipment.
2. This considers both the temperature and moisture content of the air.
3. When the blower moves 1,050 cfm over the XYZ model AC-36 indoor air conditioner coil, it delivers the required cooling capacity. If the airflow value changes, the equipment capacity and performance also change.
4. In this case, the actual furnace output capacity of 64,000 Btu/h is used, not the 56,000 Btu/h design capacity from the load calculation.

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