

ACCA's Manual "J" Residential Load Calculations
Comments by Residential Products Division of Trane (
American Standard

July 8, 2003

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Residential Products Division of Trane / American Standard
Tyler, Texas

These comments refer to:

ACCA's Manual "J"
Residential Load Calculations
8th edition 4th printing Version 1.10 dated February 2003
ISBN #1-892765-28-4

It is our opinion that the above document should not be published as an ANSI standard based on the following:

- I) The document is a "Manual for a Residential Heating and Cooling Load Calculation Procedure" (hereinafter referred to as the "Manual") and is not written in the language or format typically used in industry. An industry "standard" usually defines a mandatory procedure or a minimum requirement. This document contains numerous mandatory processes and required procedures that purport to be "standard" in every residential application. In truth, many of these processes, procedures and requirements may not be appropriate in a particular application depending upon a multiplicity of other factors. Accordingly, whether a particular process, procedure or method is required in a specific residential application must be left to the professional judgment and discretion of the individual utilizing the Manual. In our opinion, the adoption of the Manual as an ANSI standard would result in conflict, confusion and disagreement among HVAC design professionals, other professionals utilizing the manual, inspectors as well as governing bodies in different areas of the country.

A true "industry standard" should produce uniform, consistent, reliable and predictable results when used in the prescribed manner. Due to the wide variety of environment and multifaceted considerations inherent to the residential heating and cooling industry, the Manual is not capable of producing such results.

- II) The document does not reference all the sources, study's, methods, research projects, other documents used to justify the procedures, HTM values, or CLTD values. There is not sufficient information within the document to justify that the procedures, values, or factors are correct.
- III) The procedures and listed values as presented and defined in the above document produced heating and cooling BTUH load calculation estimates that are considered "grossly oversized" when compared to:
- a) ACCA's Manual "J" 7th edition procedures
 - b) Actual installed and operating residential systems
(Attachment "A" lists the results on three different homes in the Tyler area.)

These units are operating in a hot, humid climate in a variety of residences that represent standard residential construction and building envelopes of average integrity. Each system was sized in accordance with ACCA's Manual "J" 7th Edition. The occupants of these residences are satisfied with the comfort delivered by their systems. This strongly suggests that the systems in these residences are appropriately sized to meet the needs and expectations of the occupants. This further confirms Trane's experience that systems sized to the 7th Edition are doing the job in a very demanding high heat, high humidity climate.

Conclusion: While the Manual J 8th edition may be procedurally acceptable, the quantitative results are not consistent with established operating systems and accepted load calculation practices. The load estimates produced by the 8th edition result in considerable equipment sizing increases and result in driving up the costs of the equipment and the installed system.

The 8th edition load calculations are much more laborious and tedious than using the 7th edition. The added complexity is not matched by improved results. As noted, the results of application of the 8th edition are gross over-sizing, not more accurate sizing.

We also believe, based upon experience, that comfort levels delivered by residential systems sized in accordance with the 8th Edition will be frequently inadequate as oversized systems are known to produce poor comfort control for residential homeowners.

In light of these concerns, we oppose ANSI approval of the 8th edition. Additionally, we respectfully recommend the suspension of the 8th Edition pending resolution of these issues and concerns to the satisfaction of the professional community.

Loran R. Dailey
Quality Manager - After Sale Support

Richard F. Welguisz
Senior Application Engineer

Attachment "A"

**Loads and Installed Equipment Systems;
Manual "J" 8th edition vs. Manual "J" 7th edition vs. Actual**

Andy Bugg's residence:

- a) House was built in 1955, 1,800 ft² of conditioned space and located in the city of Tyler
- b) Current equipment size is a Trane 3 ton split system variable speed cooling / gas furnace
- c) 7th edition requires equipment slightly larger than 3 tons (38,995 ARI BTUH)
- d) 8th edition requires equipment slightly larger than 5 tons (61,344 ARI BTUH)

	Sensible Cooling	Latent Cooling	Heating
Equipment(Full variable speed system)	Hi speed 23,730 Lo speed 8,880	9,310 3,200	73,000 2 nd stage 48,000 1 st stage
7 th edition	26,709	3,790	41,457
8 th edition (Peak)	42,016	3,776	49,956
8 th edition (Average)	35,450	3,776	49,956

This house does not have AED (Adequate Exposure Diversity) and load should be calculated using the peak values. Procedure allows the designer to use either the "Peak" or "Average" values. Designer's choice.

Loran Dailey's residence:

- a) House newly built, 2,400 ft² of conditioned space and located 5 miles outside of Tyler.
- b) Current equipment is a Trane 3 ton two-stage split system heat pump
- c) 7th edition requires equipment slightly smaller than 2 ½ tons (28,793 ARI BTUH)
- d) 8th edition requires equipment slightly larger than 3½ tons (42,499 ARI BTUH)

	Sensible Cooling	Latent Cooling	Heating
Equipment (1 st stage)	14,920	2,660	Heat pump
Equipment (2nd stage)	28,240	5,940	Heat pump
7 th edition	19,721	4,007	34,204
8 th edition (Average)	29,109	4,943	55,702

This house does have AED and the "Average" values were used.

R. F. Welguisz residence:

- a) House was built in 1981, 2,900 ft² of conditioned space, located 4 miles outside of Tyler
- b) Current equipment: System 1 is a Trane 2½ ton single-stage split system heat pump
System 2 is a Trane 1½ ton split system heat pump
- c) 7th edition requires equipment slightly smaller than 4 tons (44,324 ARI BTUH)¹
For 2 equipment systems, tonnage is slightly under 4 tons (44,464 ARI BTUH)²
- d) 8th edition requires equipment slightly larger than 5½ tons (66,253 ARI BTUH)¹
For 2 equipment systems, tonnage is slightly over 5 tons (60,552 ARI BTUH)²
For a 2 zoned damper system using a single equipment system, tonnage requirement is slightly under 5½ tons (65,246 ARI BTUH)

	Sensible Cooling	Latent Cooling	Heating
System 1 equipment ^a	20,900	8,360	Heat pump & strip
System 2 equipment	11,580	4,000	Heat pump & strip
7 th edition ¹	30,359	5,548	58,661
7 th edition ²	30,455	5,568	59,351
System #1	18,991	3,215	34,755
System #2	11,464	1,101	24,596
8 th edition ¹	45,379	5,754	63,600
8 th edition ²	41,474	5,612	59,923
System #1	26,000	5,049	32,895
System #2	15,474	2,332	27,028
8 th edition ³	44,689	5,754	63,600

a) Holds indoor temperature to 107°F ambient

- 1) Single equipment system / duct system to serve entire house.
- 2) Two equipment systems / duct systems serving house. One equipment / duct system serves Main Living Area, the other serves the Sleeping Area.
- 3) Single equipment system / duct system to serve entire house. House is zoned by dampers.

D) Design condition for Tyler and for all homes used is 97°F ambient with 75°F indoor drybulb and 50%RH as listed in both Manual "J" 7th and 8th editions. All equipment BTUH at 97°F ambient and 75°F db / 63°F wb to indoor.

II) For copies of load calculations, takeoff's, etc., please contact:

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