



Energy efficiency requirements for fans in unitary AC equipment

Advisory Note

2020



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Enquiries about this publication can be sent to:

Australian Building Codes Board
GPO Box 2013
CANBERRA ACT 2601
Phone: 1300 134 631
Email: ncc@abcb.gov.au
Web: abcb.gov.au

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Introduction

The Australian Building Codes Board (ABCB) understands there is some confusion about the application of J5.4 'Fan Systems' of Volume One of the National Construction Code (NCC) 2019, and in particular, fans within unitary *air-conditioning* equipment. This may be due to unitary air-conditioning equipment also being covered by requirements of Clause J5.11.

Therefore, the purpose of this Advisory Note is to clarify when fans within unitary *air-conditioning* equipment must meet the minimum requirements for fans in *air-conditioning* systems, as per Clause J5.4 and Clause J5.11.

Minimum energy efficiency requirements

Clause J5.4 relates to the energy efficiency of fans within a ducted *air-conditioning* system. Compliance with Clause J5.4 can be achieved by demonstrating that either:

1. a ducted system's fan, duct and fittings each achieve a minimum level of energy efficiency, as per the method described in J5.4(a)(i); or
2. all components together in the ducted system achieve an overall level of energy efficient, as per the method described in J5.4(a)(ii).

Clause J5.11 requires that standalone unitary *air-conditioning* equipment meet a minimum energy efficiency level. This is demonstrated by meeting the requirements of the Minimum Energy Performance Scheme (MEPS), or if they are rated at a capacity greater than or equal to 65 kW_r based on J5.11 (a) or J5.11 (b).

J5.11 Unitary air-conditioning equipment

- (a) where water cooled, have a minimum energy efficiency ratio of $4.0 W_r / W_{input}$ power for cooling when tested in accordance with AS/NZS 3823.1.2 at test

condition T1, where input power includes both compressor and fan input power; or

- (b) where air cooled, have a minimum energy efficiency ratio of $2.9 W_r / W_{\text{input power}}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power.

Although the system efficiencies required by Clause J5.11 include fan energy, if the equipment is part of a ducted system, they cannot account for inefficiency that may result when design of the ducted system is unsuitable for the fan's application.

Unitary *air-conditioning* equipment is, therefore, required to comply with Clause J5.4 when it is part of a ducted *air-conditioning* system. This means that it is the task of the system designer to select unitary equipment correctly sized for the building / *air-conditioning* system it is within. The principle is that the efficiency of an individual piece of equipment in an *air-conditioning* system is irrelevant if it is being used in an inefficient manner.

The ABCB has developed a Fan System Calculator to assist *air-conditioning* system designers to design compliant systems by inputting information relating to fan motor power and system pressure. If the relevant static pressure loss data is not available for a given piece of unitary *air-conditioning* equipment then it is recommended that using the method described in J5.4(a)(ii) is the most straightforward path to follow.

Note also:

- Unitary *air-conditioning* equipment within the ducted system will also need to comply with Clause J5.11.
- The requirements of Clause J5.4 are not intended, nor structured, to apply to fans in standalone un-ducted unitary *air-conditioning* equipment.
- If the static pressure of the equipment is not known, J5.4(b)(i) can't be used, and so in these cases (b)(ii) should be used (as part of the (a)(ii) method).

Summary

1. Fans in un-ducted unitary *air-conditioning* equipment are not required to show compliance with Clause J5.4.
2. Fans within unitary *air-conditioning* equipment that form part of a ducted system are required to show compliance with Clause J5.4.
3. Unitary *air-conditioning* equipment needs to comply with Clause J5.11.

Further information

The Fan System Calculator assists in understanding and applying the Deemed-to-Satisfy (DTS) Provisions for energy efficiency in NCC Volume One, Clause J5.4 'Fan systems'. The [calculator](#) and a [video](#) on how to use the Fan System Calculator are available from the ABCB website.

Further information about MEPS is available from the [MEPS website](#).