

SPECIFYING AIR FILTERS

INTRODUCTION

This TECHnote discusses options for specifying particulate air filters for air conditioning and ventilation.

OLDER AUSTRALIAN STANDARDS

Currently, the principal Australian Standard dealing with air filters is AS ISO 16890.1. Older standards, AS 1324.1 and AS 1324.2 with filters for general ventilation and air conditioning remain in place during a transitional period to AS ISO 16890.1. AS 4260 is available for high efficiency particulate arrestance (HEPA) filters for specialised applications such as hospitals and laboratories. AS 1324.1 is referenced by AS 1668.2 and AS 1324.2 is referenced by AS/NZS 3666.1. Both are referenced by NCC and consequently are mandatory. AS 1668.2 Table 2.2 sets the minimum filter ratings to ISO 16890-1, ASHRAE 52.2 and AS 1324.1. AS/NZS 3666.1 clause 2.4 Note 1 recommends minimum filter performance to AS 1324.2.

Despite being mandatory, AS 1324.1, AS 1324.2 and AS 4260 are quite old, having been published in 2001, 2003 and 1997 respectively, although AS 4260 was reconfirmed in 2018. Consequently, all three rely on other standards which have since been either amended or withdrawn. Most significantly, AS 1324.1 and AS 1324.2 rely heavily on EN 779 (replaced by ISO 16890-1) and ASHRAE 52 (now called ASHRAE 52.1 and replaced by ASHRAE 52.2). AS 4260 also references AS 1324.1 and AS 1324.2.

The recent COVID-19 pandemic focused attention on the adequacy of filtration practices in comfort HVAC applications. As this research is ongoing, specifiers should consult professional associations such as ASHRAE and AIRAH for current recommendations.

For these reasons, NATSPEC now offers specifiers a range of standard for specifying filters (AS 1324.1, AS ISO 16890.1 and ASHRAE 52.2) rather than relying on the Australian Standards alone.

AS ISO 16890.1

AS ISO 16890.1 is an adoption of ISO 16890-1 with minor Australian amendments. ISO 16890-1 provides such a significant change from past practice that AIRAH DA15 calls it 'the future of filter testing'. Published in 2016, ISO 16890-1 draws on ASHRAE 52.2 and EN 779.

Filters tested to this standard are rated based on the percentage of particles of one of three sizes the filter captures. The significance of the sizes (ePM) is that they are the values used in numerous studies of the health effects of particulates, so it is possible to specify filters to achieve evidence-based results. The particle size ratings are 1 µm (ePM₁), 2.5 µm (ePM_{2.5}) 10 µm (ePM₁₀) and larger than 10 µm (Coarse). For example, a filter rated as ePM_{2.5} 65%, captures 65% of particles in the 0.3 to 2.5 µm range.

ASHRAE 52.2

ASHRAE 52.2 uses a single figure rating value termed the minimum efficiency reporting value (MERV) ranging from 1 (coarsest) to 16 (finest).

Comparison of filter standards

With some limitations, ISO 16890-1 and ASHRAE 52.2 can be used to specify both conventional and HEPA filters. The following gives an approximate equivalence of ASHRAE 52.2 MERV and ISO 16890-1 ratings:

- MERV 1-8: ISO Coarse
- MERV 9-10: ISO ePM₁₀
- MERV 11-12: ePM_{2.5}
- MERV 13-16: ePM₁

AIRAH DA15 Table 5.1 summarises the approximate relationships between ratings to AS 1324.1, ASHRAE 52.1, ASHRAE 52.2, EN 779 and ISO 16890-1. Similar comparison tables are available from filter suppliers. As an example, a typical general purpose panel filter used in packaged equipment might be rated AS 1324.1 G4, ASHRAE 52.2 MERV 6, EN 779 G4 or ISO 16890-1 Coarse 90%.

For a comprehensive discussion of air filter standards see AIRAH DA15.

FILTERS IN NATSPEC WORKSECTIONS

0721 Packaged air conditioners

This worksection provides default text for typical standard filters supplied by equipment manufacturers. If higher performance filters are required, delete this clause and include details of the filters in 0732 Air filters.

0722 Room air conditioners

This worksection provides default text for typical standard filters supplied by equipment manufacturers. Higher performance filters are usually not available for this kind of equipment.

0732 Air filters

This worksection covers a wide variety of air filter types but does not set specific performance requirements, leaving this for the specifier to document. To do this, the specifier must nominate the required type of filter, applicable standard, minimum performance to the standard and in most cases the required minimum dust holding capacity.

0736 Space heating

This worksection provides default text for filters in hot water fan convectors typical of those supplied by equipment manufacturers.

Relevant standards

AS 1324.1 *Air filters for use in general ventilation and airconditioning - Application, performance and construction*
 AS 1324.2 *Air filters for use in general ventilation and airconditioning - Methods of test*
 AS 4260 *High efficiency particulate air (HEPA) filters - Classification, construction and performance*
 ASHRAE 52.1 *Gravimetric and dust-spot procedures for testing air-cleaning devices used in general ventilation for removing particulate matter*
 ASHRAE 52.2 *Method of testing general ventilation air-cleaning devices for removal efficiency by particle size*
 EN 779 *Particulate air filters for general ventilation. Determination of the filtration performance*
 ISO 16890-1 *Air filters for general ventilation - Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM)*

Relevant worksections

0721 Packaged air conditioners
 0722 Room air conditioners
 0732 Air filters
 0736 Space heating

Other documents

AIRAH DA15 *Air filters and cleaning devices*