SPECIFICATION

108-120074

EMI Shielding Ventilation Panels & Kemvents

This specification covers the product requirements for EMI ventilation panels across two different applications; EMI Shielding Ventilation for Enclosures & EMI Shielding Ventilation Covers for Fan assemblies.
The EMI Shielding aspect of these product applications, utilizes the principle of "Waveguide" beyond cutoff. The honeycomb structure of the ventilation panel attenuates incident EMI frequencies.
The design of these assemblies is integral to ensure that the appropriate cell structure is selected to ensure optimal EMC performance is achieved whilst also allowing, sufficient airflow for the desired application.

RoHS and REACH compliant.

Typical continuous operating temperature:
Aluminium Honeycomb Ventilation Panels -50°C to 200°C (-58°F to 392°F).
Kemvents – -40°C to 70°C (-40°F to 158°F).

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1 SCOPE

This specification establishes the quality standard of manufacture of aluminium honeycomb ventilation panels & Kemvents. The raw material specifications are defined within, as well as the quality standard of finished product, designed for utilization in EMI shielding applications.
The performance of materials and products covered by this specification, are defined by and tested to the industry standard, and do not represent application-based performance. The suitability for application of all products covered within this specification should be tested and verified within representative functional conditions for the products intended use.

2 REVISION HISTORY

Revision number	Change request	Date	Incorporated By
A	-	04/11/22	James M

3 RELATED DOCUMENTS

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified herein.

3.1 STANDARD MATERIAL SPECIFICATIONS

The following specifications define the named material or have been combined to define a material where there is a lack of single specification to completely define the product.

Aluminium Alloys

EN AW-6063: Aluminium Alloy 6063-T6 – Extruded Aluminium Frames

AMS C7438: Aluminium Alloy 5052 Foil for Sandwich Construction – Honeycomb Media

ISO 18273:2015: Aluminium 5356 TIG Welding Rod – Welding of Aluminium Frames

Gasket Materials

2423839-1 To Drawing: C-RECTANGULAR-SKW-MESH

3.2 MILITARY DETAILS (MIL-DTL) & STANDARDS

MIL-STD-285 – MILITARY STANDARD ATTENUATION MEASUREMENTS FOR ENCLOSURES, ELECTROMAGNETIC SHIELDING, FOR ELECTRONIC TEST PURPOSES, METHOD OF

MIL-DTL-5541 – DETAIL SPECIFICATION, CHEMICAL CONVERSION COATINGS ON ALUMINIUM AND ALUMINIUM ALLOYS

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4. REQUIREMENTS

4.1 COMPOSITION AND APPEARANCE

The formed and finished components covered by this specification are ventilation panels which fall into one of two of the following categories of construction, either “Kemvents” or “Aluminium Honeycomb Vents” each of which is briefly described below.

4.1.1 Kemvents

Kemvents are constructed from an ABS (plastic) housing, containing aluminium honeycomb media and a conductive “Fabric Over Foam” gasket.
Kemvents are used as “Fan Vent” covers and are supplied in the following standard sizes:

- Kemvent 40 – For 40mm Fans
- Kemvent 60 – For 60mm Fans
- Kemvent 80 – For 80mm Fans
- Kemvent 92 – For 92mm Fans
- Kemvent 120 – For 120mm Fans

4.1.2 Aluminium honeycomb vents

Aluminium honeycomb vents are constructed from a notched or cut, extruded Aluminium frame with partial or full welding in the corners (design specific). They contain various configurations of aluminium honeycomb media and knitted wire mesh gaskets where appropriate (design specific). In certain instances, where required a piece of aluminium knitted wire mesh is inserted internally between the honeycomb and the external frame. This mesh assists with contact between the frame and the honeycomb and is typical of vents with a mounting flange and no “biting fixtures” through the jaws of the frame.
A chemical conversion coating in line with MIL-DTL-5541 is applied to the assembly as standard. Typically, this is a trivalent chromium-based passivation coating, to aid inhibition of corrosion of aluminium, however other finishes are available, please seek technical advice for other finishes.
Aluminium honeycomb vents can be manufactured to customer specification and various sizes, please seek advice from a customer service assistant or product manager to discuss any bespoke design requirements.

4.2 PART SELECTION & PERFORMANCE

4.2.1 Kemvent Selection

Selection of an appropriate Kemvent should be performed based upon the size of the fan within the enclosure that requires shielding. The fixing mechanism of the Kemvent should be checked against the standard enclosure fixing to ensure compatibility.
The range of standard Kemvent assemblies has been designed to cater for a range of standard fan sizes, whilst optimizing the shielding performance and pressure drop through the enclosure.
Please consult all technical documentation & drawings to assist in your selection of the appropriate Kemvent.

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4.2.2 Kemvent Performance

Kemvents provide a low-cost solution for EMC shielding of Fan assisted ventilation within electronic enclosures.

A single layer of 6.35mm thick, 3.2mm cell aluminium honeycomb acts as a waveguide for electromagnetic frequencies, attenuating their effects through the enclosure opening. The fabric over foam gasket ensures grounding between the Kemvent and the enclosure surface, to provide additional EMC protection at the mating seam.

Shielding data representative of a Kemvents performance was collected for an 80mm size, in accordance with a modified method of MIL-STD-285 and is shown in the table below:

Frequency	Field	Typical Attenuation (dB)
200 kHz	H	53
100 MHz	E	102
500 MHz	P	85
2 GHz	P	74
10 GHz	P	58

4.2.3 Aluminium Honeycomb Vent Selection

Aluminium Honeycomb Vents are available in multiple configurations. The standard product offering reflects a small proportion of the options available. Please see the following drawings for specification of the standard vent offering:

- Customer Drawing **1702-1270-1270-C**
- Customer Drawing **1702-2540-1270-C**
- Customer Drawing **1703-1270-1270-C**
- Customer Drawing **1703-2540-1270-C**

For specific applications, customers should seek technical advice through their sales contact channels, in order to customize an Aluminium Honeycomb vent to suit their specific application.

4.2.4 Aluminium Honeycomb Performance

The shielding performance of Aluminium honeycomb vents is largely dependent upon the configuration of the vent in question, particularly the configuration of the honeycomb media.

The table below describes the 6 configurations of Honeycomb media:

Honeycomb Configuration	Configuration Description
Type 1	2 layers of 3.2mm thick, polarized, 3.2mm cell aluminium honeycomb.
Type 2	1 layer of 6.35mm thick, 3.2mm cell aluminium honeycomb.
Type 3	1 layer of 6.35mm thick, 1.6mm cell aluminium honeycomb.
Type 4	2 layers of 6.35mm thick, polarized, 3.2mm cell aluminium honeycomb.
Type 5	1 layer of 6.35mm thick, 3.2mm cell honeycomb & 1 layer of 6.35mm thick 3.2mm cell angled honeycomb.
Type 6	1 layer of 12.7mm thick, 3.2mm cell aluminium honeycomb.

Type 5 honeycomb is available in one of three specified angles – 30^0, 45^0 & 60^0, if the angle of honeycomb is unspecified, then a standard of 45^0 will be assumed for Type 5.

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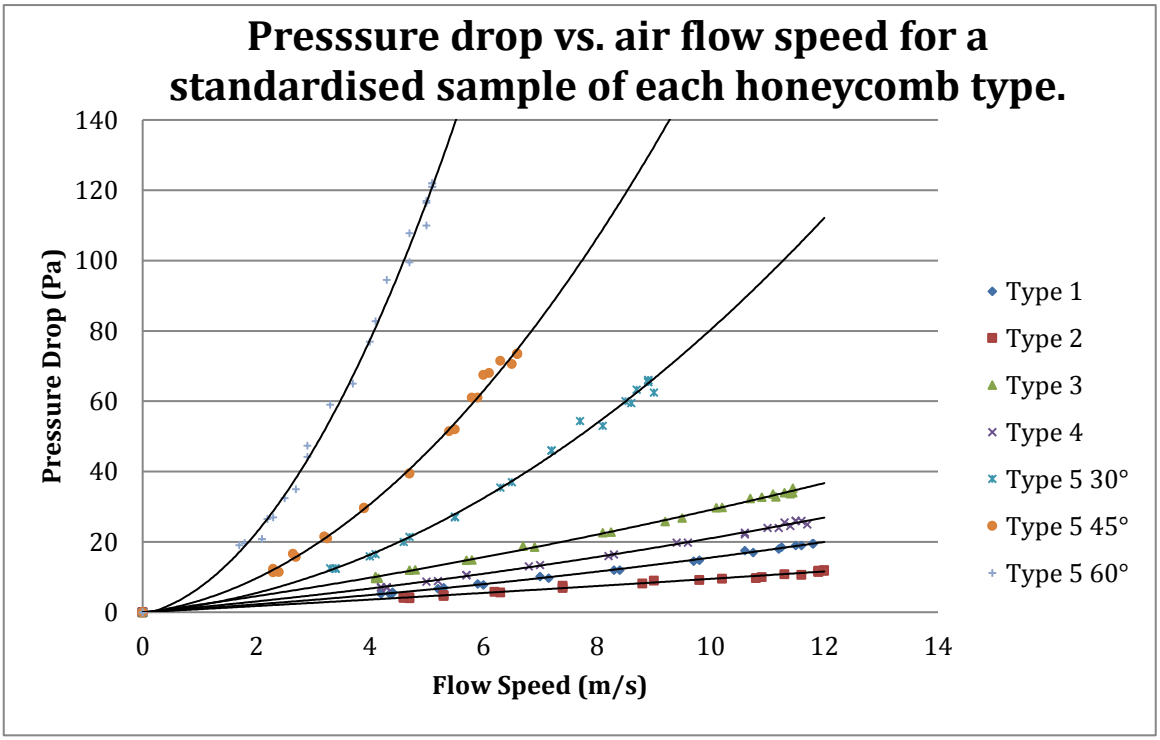
Type 5 honeycomb can be selected to act as a “louvre” for the ventilation panel, directing airflow appropriately according to the selected angle.

The following table provides a typical performance comparison for each of the different honeycomb configurations:

		Typical Attenuation (dB) for various Honeycomb Configuration					
Frequency	**Field**	**Type 1**	**Type 2**	**Type 3**	**Type 4**	**Type 5**	**Type 6**
200 kHz	H	66	39	65	71	71	78
100 MHz	E	105	80	105	105	105	100
500 MHz	P	81	55	50	93	93	55
2 GHz	P	85	52	60	94	94	96
10 GHz	P	85	61	72	82	90	80

Another key factor when considering the performance of an Aluminium Honeycomb Vent is air flow. The ventilation panel is only successful in its function, if it shields an enclosure, but also allows an appropriate level of airflow through the enclosure.
The media placed in the aperture of ventilation, restricts air flow and therefore careful selection and design of the ventilation panel to allow sufficient airflow is required.

The following data chart shows the pressure drop of a vent over a 247mm x 124mm aperture, with each of the different honeycomb media types.
This demonstrates a comparative level of air flow through each of the honeycomb media types.



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5. QUALITY ASSURANCE PROVISIONS

5.1 CLASSIFICATION OF TESTS

5.1.1 Validation Tests

Validation tests are those which are conducted periodically at our discretion to confirm that the materials manufactured perform in accordance with this specification.

5.1.3 Acceptance Tests

Acceptance Tests are those that are performed on each batch of finished formed product to confirm that the production requirements have been met.

5.2 SAMPLE PREPARATION

Details of the sample preparation for each of the different types of tests are detailed below.

5.2.1 Validation Test Samples

Samples are finished parts or materials manufactured to the specification of the test methodology and procedure. This may be a complete finished vent, or bespoke assembly utilizing the materials used to manufacture a vent for comparative purposes.

5.2.3 Acceptance Test Samples

The acceptance test samples for a production run of either Kemvents or Aluminium Honeycomb Vents, consists of the first-off production part & the last off production part. These parts are inspected to the appropriate drawing and inspection for dimensions and quality of finish. During production run, there will be periodic inspection throughout the process to ensure conformance to the first off inspection.

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5.3 TEST PROCEDURES

All test procedures referenced from hereon are conducted at our discretion or by an approved test provider.

5.3.1 Validation Tests

5.3.1.1 Modified MIL-STD- 285 Honeycomb Shielding Effectiveness

An aperture within the wall of a standard shielded enclosure, is covered with a ventilation panel containing a standard configuration type of honeycomb. The shielding effectiveness is calculated from measurements at specific frequencies with and without the ventilation panel in place.
This process is repeated for each of the standard honeycomb media types, to give a comparison of performance across the product range.

5.3.1.2 Air Flow Pressure Drop

A standardized piece of a specified honeycomb type is placed between the flanges of an "Air-flow tunnel".
A motorized fan is fixed and sealed to the tunnel and is switched on at a set value.
The air flow for the set fan speed is measured using an anemometer (in m/s).
The pressure is measured before and after the sample using a manometer (in Pa) and these pressure measurements are used to calculate the pressure drop.
This process is repeated at different air-flow speeds and the pressure drop curve is plotted from the resultant data.

5.3.2 Acceptance Tests

First-off and last-off samples are inspected dimensionally according to the appropriate drawing. The following drawings specify the standard product offering:

- Customer Drawing **1702-1270-1270-C**
- Customer Drawing **1702-2540-1270-C**
- Customer Drawing **1703-1270-1270-C**
- Customer Drawing **1703-2540-1270-C**
- Customer Drawing **KEM_1651-KEMVENT_40-C**
- Customer Drawing **KEM_1651-KEMVENT_60-C**
- Customer Drawing **KEM_1651-KEMVENT_80-C**
- Customer Drawing **KEM_1651-KEMVENT_92-C**
- Customer Drawing **KEM_1651-KEMVENT_120-C**

In the absence of a drawing, a drawing will be created and approved by the customer prior to production of a ventilation panel.

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6 DIMENSIONS

For all product dimensions and tolerances, please see the appropriate product drawing.

7 PRODUCT HANDLING

Careful handling of Kemvents and Aluminium Honeycomb Vents is advised to protect the assembly from damage.

Protective gloves should be worn to prevent contamination of the surface finish of either Kemvents or Aluminium Honeycomb vents. These gloves should be clean protective rubber or latex gloves.

Handle with care to prevent cuts or abrasions from sharp edges, corners or burrs. Whilst we attempt to ensure that all burrs and sharps are removed from the product, we accept no liability for any damage caused but sharps present in any product.

Do not attempt to further fabricate, modify, or destroy any single part, or component supplied as an assembly that is covered by this specification. Both Kemvents & Aluminium Honeycomb Vents are designed to suit a specific application. They are therefore intended to be a “fit and forget” assembly.
We will not be held liable for any malfunction, damage or injury that occurs as a result of modifying or tampering with any of our product assemblies covered by the scope of this specification.

8 PACKAGING & STORAGE

8.1 PACKAGING

Each assembly covered by this specification will be packed between layers of cardboard, cut to an appropriate size in order to protect the edges of the assembly and the structure of the aluminium honeycomb.
These layers of cardboard are taped together to limit movement of the assembly within the product packaging. Each packed assembly is then packed into an appropriately sized box to fulfill the appropriate packaging quantity and shredded cardboard is added to the packaging as further protection for the assemblies.

8.2 STORAGE & SHELF-LIFE

Kemvents & Aluminium honeycomb vents should be stored under the following conditions:

- In original packaging or equivalent packaging to protect the product from contamination.
- Free from compression by other product.
- At ambient temperature and humidity
- Isolated from corrosive materials
- Isolated from any fluid exposure

Under these conditions, vent products have a shelf-life of 20 years.

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