



The New Zealand Ecolabelling Trust

Licence criteria for building insulants

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Specification change history

Minor clarifications, corrections or technical changes made since the specification was last reviewed and issued in August 2017.

Date	Version	Change
25/02/2020	February 2020	Amended the first bullet point in section 5.3 (b) from “formaldehyde is exempt” to “formaldehyde-containing binders are exempt” to correct the omission.
3/11/2022	November 2022	Remove Clause 5.2.6 a), requiring a minimum recycled content, as this has been found to be not feasible for products in the New Zealand Market. Add an exemption to Clause 5.3 for phenol-based resins and boric acid in fire-resistant products which cannot be manufactured without these ingredients. Amend Clause 5.2.4 to refer to the updated EC-63 Carpets and Rugs Specification.
01/06/2023	June 2023	Environmental Choice New Zealand renamed to Eco Choice Aotearoa and all the references in this document amended to reflect the new name. Wording in Section 7 ‘Use of Eco Choice Aotearoa Label’ updated – the requirement for the label to be accompanied by the specification is now optional.
20/02/2024	February 2024	Technical change to clause 6.2 to remove reference to an NRC value which can only be achieved by testing the insulation when in-situ within a wall cavity.
09/06/2025	June 2025	5.2 Environmental Management Systems Criteria: included section to align with recently updated standards. 5.3 Modern Slavery and Social Accountability Criteria and corresponding Appendix: included section to align with recently updated standards. 5.4.1 Threshold for material-specific criteria: included additional instructions regarding polyester and recyclable product percentages. 5.5 Hazardous Substances: addition of criteria to provide a publicly available document (SDS or TDS) 5.6 Waste Management: includes criteria for continuous improvements in waste management. 5.7 Energy management and greenhouse gas emissions (previously Energy Management Criteria): includes objectives and targets for reduction of energy use related to production and associated greenhouse gas emissions.

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1 Introduction

Eco Choice Aotearoa (ECA) is an environmental labelling programme which has been created to help businesses and consumers find products and services that ease the burden on the environment. The programme results from a New Zealand Government initiative and has been established to improve the quality of the environment by minimising the adverse environmental impacts generated by the production, distribution, use and disposal of products, and the delivery of services. The programme is managed by the New Zealand Ecolabelling Trust (The Trust).

ECA operates to the ISO 14024:1999 standard "Environmental labels and declarations – Type 1 Environmental labelling - Principles and procedures" and The Trust is a member of the Global Ecolabelling Network (GEN) an international network of national programmes also operating to the ISO 14024 standard.

ISO 14024 requires environmental labelling specifications to include criteria that are objective, reasonable and verifiable. It requires that interested parties have an opportunity to participate and have their comments considered. It also requires that environmental criteria be set, based on an evaluation of the environmental impacts during the actual product or service lifecycle, to differentiate product and services on the basis of preferable environmental performance.

The lifecycle approach is used to identify and understand environmental issues (adverse or beneficial impacts) across the whole life of a product or service (within a defined product or service category). This information is evaluated to identify the most significant issues and from those to identify the issues on which it is possible to differentiate environmentally preferable products or services from others available in the New Zealand market. Criteria are then set on these significant and differentiating issues. These must be set in a form and at a level that does differentiate environmentally preferable products or services, is attainable by potential ECA licence applicants and is able to be measured and verified. As a result of this approach, criteria may not be included in an ECA specification on all aspects of the lifecycle of a product or service. If stages of a product or service lifecycle are found not to differentiate environmentally preferable products or services, or to have insufficient data available to allow objective benchmarking in New Zealand, those stages will not generally be included in criteria in the specification. For some issues, however, (such as energy and waste) criteria may be set to require monitoring and reporting. These criteria are designed to generate information for future reviews of specifications.

The Trust is pleased to publish this ECA specification for building insulants. The specification provides a means to recognise products that are demonstrably environmentally preferable but are not covered by an existing ECA specification.

This specification sets out the requirements that a building insulant must meet in order to be licensed to use the ECA Label. The requirements include some environmental criteria and product characteristics that are generally applicable to a wide range of products and which are common to other ECA specifications. The requirements also define a process to set appropriate insulant product-specific criteria. The insulant product will need to meet the generally applicable requirements and the product-specific criteria.

The process set out in the specification will require the ECA Licence holders to provide a significant amount of information on management and improvement programmes. Information will be required that is of sufficient quality for The Trust to understand and monitor performance and improvement of performance over time. The Trust will use this information to inform future reviews of this specification, including to set criteria that differentiate the product on the basis of environmental preference across the product lifecycle.

This specification is valid for a period of five years. Twelve months before the expiry date (or at an earlier date if required), The Trust will initiate a further review process for the specification.

2 Background

As a building product, thermal insulants are unusual. For most building products, the majority of the overall life cycle environmental impacts occur at the manufacturing stage. However, for thermal insulants a significant environmental impact in their life cycle occurs during their use in the building, having the potential to reduce the energy consumption required for space heating and space cooling over the lifetime of the building.

Achieving good in-situ thermal performance is therefore critical to the overall environmental impact of the insulant. There are several aspects that determine the overall environmental impact over the life cycle of the insulant including representative and informative product labelling, correct handling of the product, and correct installation. As an example, the thermal performance of an insulant can be reduced by 50 % even if small (5 %) gaps remain after installation.

Acoustic building insulants are designed to provide additional functions beyond thermal resistance. While thermal insulation may inadvertently reduce noise transmission, acoustic insulation is specifically designed for this purpose. Acoustic insulation is used in residential and commercial spaces. Indoor comfort levels are increased by diminishing penetration of external noise and preventing internal noise from being transmitted to other rooms.

Acoustic and thermal building insulants are often made of the same materials and acoustic insulants can have comparable thermal resistance to thermal insulants. In New Zealand, both types of insulation are manufactured from natural wool, glass wool and polyester. Cellulose (paper), mineral wool (rock or slag), polystyrene, and foams (e.g. polyisocyanurate or polyurethane) may also be used. The manufacturing processes for thermal and acoustic insulation are very similar, although acoustic insulation is typically denser than thermal insulation. Each of these insulation types have potentially significant environmental impacts associated with their manufacture.

Sheep's wool insulation is derived from a renewable resource, however, chemicals and grease-laden effluent from the scouring process may adversely impact receiving waters if the correct process controls are not in place. Sheep's wool insulation is often treated with borate to resist pests, fire and mold¹. Borate is mined from natural deposits and is a non-renewable resource. Sheep's wool insulation may be blended with some polyester fibre to reduce slumping in wall cavities².

Glass wool insulation often includes the use of a high percentage of recycled glass cullet, although some virgin sand is required. Phenol formaldehyde binders are commonly used and formaldehyde emissions can be produced during manufacture³. Boron may be used as a flame retardant and treatment against microbial growth³.

Mineral wools are derived from non-renewable sources such as virgin rock, however, iron ore blast furnace slag can also be used. This is a waste product from the iron making process. Phenol formaldehyde is commonly used to bind the fibres and, as for glass wool, formaldehyde emissions can be produced during manufacture.

Cellulose insulation is most commonly derived from recycled scrap paper³. It is typically composed of 80 % paper and 20% fire retardants, insect resist agents and acrylic binders³. Borates are commonly used as flame retardants and insect resist agents, and can be leached from the paper if it gets wet⁴. The additives in cellulose insulation may make it difficult to recycle at end-of-life².

Polymer-based materials (polyester, polystyrene, polyisocyanurate and polyurethane) are made from fossil fuel feedstock. However, high proportions of recycled materials are often included in polymer-based insulation products, and some of these products are easily recycled at end-of-life, e.g. polyester and polystyrene.

Polystyrene, polyisocyanurate and polyurethane are all available as sprayed foam or foam board. Polyisocyanurate is a foam made from isocyanurate and polyol and is similar to polyurethane¹. It is mostly used for heating and air condition ducts, as well as for roofing insulation and walls of warehouses, factories and office buildings. Polystyrene insulation comes in two forms – expanded polystyrene (EPS) and extruded

¹ <https://energy.gov/energysaver/insulation-materials>

² <http://www.smarterhomes.org.nz/materials/insulation-materials>

³ Pfundstein, M. et al., *Insulating Materials: Principles, Materials, Applications*, 2008

⁴ US Department of the Interior, *Environmental Considerations of Building Insulation*

polystyrene (XPS). Due to concerns about the depletion of the ozone layer, chlorofluorocarbon (CFC) blowing agents in polymer foams were replaced by hydrochlorofluorocabons (HCFCs) which have significantly lower ozone depletion potential (ODP) than CFCs, but they do have very high global warming potential (GWP)⁵. There are currently two major replacement options for HCFCs in foam manufacturing: hydrofluorocarbons (HFCs), a group of fluorinated greenhouse gases with zero ODP, but which still have high GWP, and natural blowing agents such as CO₂ and hydrocarbons which have both low ODP and GWP⁵ (see Section 3 for definitions of ODP and GWP).

The potential impacts of different types of insulation materials can be reduced by promoting the use of recycled raw materials. Restricting the use of certain hazardous substances (e.g. formaldehyde binders and bleaching of cellulose) can further reduce potentially harmful manufacturing impacts.

Energy management requirements have been included in this specification to encourage energy efficiency during manufacture and reduce overall energy use. For similar reasons, waste management requirements are also included.

The benefits of having well insulated buildings include improved indoor comfort levels, a reduction in respiratory problems⁶, warmer internal surfaces, a reduction in the reliance on fossil fuels for heating, which contribute to global warming, an improved durability of internal finishes and a reduced risk of mildew growth.

Based on a review of currently available information, the following product category requirements will produce environmental benefits by improving energy efficiency, reducing the use of non-renewable fuel stocks and hazardous substances and reducing global warming contributions. As information and technology change, product category requirements will be reviewed, updated and possibly amended.

⁵ <https://www.giz.de/expertise/downloads/Fachexpertise/giz2009-en-natural-foam-blowing-agents.pdf>

⁶ <https://www.asthmafoundation.org.nz/your-health/healthy-living>

3 Interpretation

AS/NZS means Australian/New Zealand Standard.

ASTM means American Society for Testing and Materials.

Blowing agent means a substance (gas, liquid) that is able to produce cells in the plastic structure of a foam. This process can vary according to the property of the substance, e.g. a liquid may develop cells when changing into gas and a gas may expand when pressure is released⁵.

Cellulose fibre insulation means fibrous insulation manufactured from macerated paper or paperboard stock and modified with chemical additives.

CFC means chlorofluorocarbon.

EPS means expanded polystyrene.

GEN means Global Ecolabelling Network.

Global Warming Potential (GWP) is a measure of how much a gas is estimated to contribute to global warming. It is a relative scale that compares the contribution of the gas to that of the same mass of carbon dioxide (CO₂), which has a GWP of 1, over a defined time frame. E.g. methane has a GWP of 21 (100-year time frame). This means that, over 100 years, methane will be approximately 21 times more heat-absorptive than CO₂ per unit of weight⁵.

HCFC means hydrochlorofluorocarbon.

HFC means hydrofluorocarbon.

ISO means International Organisation for Standardisation.

Label means the Eco Choice Aotearoa Label.

Loose fill insulants or loose fill insulation means insulants, which are made from macerated paper, mineral fibre, sheep's wool and polyester.

NRC means noise reduction coefficient, a dimensionless number that quantifies sound wave absorption.

Ozone Depleting Potential (ODP) is a relative value that indicates the potential of a substance to destroy ozone gas (and thereby damage the Earth's ozone layer) as compared with the impact of a similar mass of chlorofluorocarbon-11 (CFC-11). CFC-11 is assigned a reference value of 1. E.g. a substance with an ODP of 2 is twice as harmful to the ozone layer as CFC-11⁵.

R-value means thermal resistance, measured in m²C/W or m²K/W.

Recycled Content/Recycled Materials includes:

- Post-Consumer: Material generated by households, or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.
- Pre-Consumer: Material diverted from the waste stream during a manufacturing process. Excluded is re-utilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Resistive-type thermal insulant means any of the following bulk insulation types:

- a board-type thermal insulation materials,
- b loose-fill and spray on thermal insulation materials, and
- c segment and blanket-type thermal insulation materials.

Thermal insulant or thermal insulation means bulk (resistive-type) thermal insulant.

XPS means extruded polystyrene.

4 Category definition

This category includes all bulk, resistive-type and acoustic-type insulation products where at least 95 % by weight of the insulation material is comprised of one or more of the following materials: glass wool, mineral wool, polyester, wool, cellulose, EPS, XPS, polyisocyanurate or polyurethane.

It excludes reflective foil-type insulants and those used for specialist applications, such as pipe and hot water cylinder lagging.

To be licensed to use the Label, a thermal (resistive-type) or acoustic building insulant must meet all of the environmental criteria set out in clause 5 and product characteristics set out in clause 6.

5 Environmental criteria

5.1 Legal requirements

Criteria

- a The product must comply with the provisions of all relevant environmental laws and regulations that are applicable during the product's life cycle.
- b Materials or processes involved in the production of an insulation product may not be under the direct control of a licence applicant/holder. Where this is the case, the licence applicant/holder must have and implement a formal supplier regulatory compliance management/assurance programme that:
 - includes documented requirements for suppliers to provide raw materials or services compliant with applicable environmental regulatory requirements (for example in supply contract conditions);
 - identifies suppliers, materials or processes that involve, or would be expected to be subject to a high level of regulatory control and/or which present a high potential risk of regulatory non-compliance;
 - includes appropriate requirements (based on the risk assessment) for suppliers to provide assurance to the licence applicant/holder on the supplier's environmental regulatory compliance.

Verification required

Conformance with this requirement shall be demonstrated by providing a written statement on regulatory compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by documentation identifying the applicable regulatory requirements and demonstrating how compliance is monitored and maintained. In cases where there is a high potential risk associated with environmental regulatory compliance and limited assurance provided by the licence applicant/holder's supplier regulatory compliance management programme, the Trust's assessor may require an on-site inspection at the relevant supplier's premises.

Explanatory notes

Relevant laws and regulations could, for example, include those that relate to:

- Producing, sourcing, transporting, handling and storing raw materials and components for manufacture
- Manufacturing processes
- Handling, transporting and disposing of waste products arising from manufacturing
- Transporting product within and between countries
- Using and disposing of the product.

The documentation required may include, as appropriate:

- Procedures for approving and monitoring suppliers and supplies
- Information provided to customers and contractors regarding regulatory requirements.

Assurance and/or information that licence applicants/holder may require from their suppliers could include:

- Evidence of a formal certified environmental management system (for example an ISO 14001 certificate) and supporting records on regulatory compliance (for example, copies of regulatory requirements registers, procedures to manage regulatory compliance, monitoring and evaluation reports on regulatory compliance, internal or external audits covering regulatory compliance and management review records covering regulatory compliance)
- Copies of published environmental, sustainability and/or annual reports expressly addressing environmental regulatory compliance (for example verified environmental statements prepared under the European EMAS regulations)

- Audit reports completed by independent and competent auditors addressing regulatory compliance (for example, reports for other eco-label licences or reports from regulator audits)
- Participation by the supplier in the licence applicants/holders own supplier audit programme.

It is not intended to require licence holders to accept increased legal responsibility or liability for actions that are outside their control. The Trust's intention is to ensure any potential for environmental regulatory non-compliance associated with an ECA labelled product is managed to a level that minimises risk of reputation damage to the ECA label and programme.

5.2 Environmental management system or processes

The applicant / licence holder or manufacturer must have (or establish, if necessary) appropriate environmental management processes or an environmental management system (EMS), to manage the environmental impacts from the manufacturing of the product.

Verification required

Conformance with this requirement shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant / licence holder or manufacturer. The statement shall be supported by an EMS based on ISO 14001, or details of the processes for controlling hazardous substances, discharges to air, land and water or other relevant environmental impacts.

5.3 Modern slavery and social accountability

Criteria

- The applicant / licence holder and manufacturer must have a publicly available policy / policies on human rights, diversity & inclusion, and anti-bullying. At a minimum, it should comprise:
 - An explicit, commitment to respect all internationally recognized human rights standards – understood, at a minimum, as the International Bill of Rights and the International Labour Organization (ILO) Declaration on the Fundamental Principles (see below) and Rights at Work;
 - Stipulations concerning the company's expectations of personnel, business partners and other relevant parties e.g. a code of conduct; and
 - Information on how the company will implement its commitment and monitor compliance with it.

Note: The Trust expects the applicant / licence holder and manufacturer to show that it is undertaking activities to create more equitable conditions for those affected by, or involved in, the sourcing and manufacturing of products and materials, supported by a publicly available document.

- Where an applicant / licence holder and manufacturer has found instances of modern slavery in their business operations and or supply chains* in the past two years, there shall be evidence of corrective action.
- In addition to the above, the applicant / licence holder and manufacturer shall consider:
 - Providing information to confirm whether the requirements of Social Accountability International Standard, SA8000 have been considered;
 - Being a Living Wage employer (or equivalent); and
 - Having a senior member (example: manager, director, or C-suite level roles) of its organisation responsible for social and environmental sustainability.

Note: From ILO Declaration on the Fundamental Principles and Rights at Work, there are the following core labour standards:

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87);

- Right to Organise and Collective Bargaining Convention, 1949 (No. 98);
- Forced Labour Convention, 1930 (No. 29);
- Abolition of Forced Labour Convention, 1957 (No. 105);
- Minimum Age Convention, 1973 (No. 138);
- Worst Forms of Child Labour Convention, 1999 (No. 182);
- Equal Remuneration Convention, 1951 (No. 100); and
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

*Supply chains refer to the products and services (including labour) that contribute to the ECA-licensed products and services. This includes products and services sourced in NZ or overseas and extends beyond direct suppliers.

Verification required

Conformance with this requirement shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant/licence holder. This statement shall be accompanied by documentation that:

- Copies of the relevant policies, procedures and plans; and
- Records demonstrating the plans are being effectively implemented (including monitoring results).

Explanatory notes

Information on the United Nations International Bill of Human Rights and the ILO Declaration on the Fundamental Principles and Rights at Work is provided in Appendix C.

5.4 Raw materials

5.4.1 Threshold for material-specific criteria

Any insulant material in the insulation product shall meet the requirements for the relevant raw materials set in Clauses 5.4.2 through 5.4.6 if it contributes more than 5 % of the weight of the product. If the product contains a mixture of materials, the requirements below in Clause 5.4.2 to 5.4.6 apply to each material type and not the product **as a whole**, e.g. in a product containing both wool and polyester, the polyester material must meet the requirements in 5.4.3 and the wool material must meet the requirements in 5.4.4.

5.4.2 Glass wool (fibre glass) and mineral wool

Criteria

- a The product must meet the following minimum recycled content requirements, when calculated on a 12-month rolling basis and measured by weight of the final product:
 - 65 % for glass, or
 - 40 % for mineral, rock or slag
- b Licence holders must:
 - i maintain records of the types and percentages of recycled content used in licensed products;
 - ii have and implement an ongoing programme to review options and increase recycled content in licensed products until an optimal level is achieved, as determined by the required performance characteristics of the product or availability of recycled materials; and
 - iii report annually to the Trust on the progress of the programme.
- c Non-recycled sand and rock for use as raw materials in glass and mineral wools must come from mining operations with documented mine remediation programmes.
- d The applicant/licensee must have a procurement programme which ensures that virgin raw materials do not come from environments that are protected for biological and/or social reasons.

- e Licence holders must have and implement an ongoing programme to review options to replace formaldehyde-containing binders in licensed products and report annually to the Trust on the progress of the programme.
- f Licence holders must have and implement an ongoing programme to review options to replace Borax (boron) in licensed products and report annually to the Trust on the progress of the programme.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. The statement shall be supported by documentation as follows:

- documentation including records from the previous 12-month period to demonstrate that the recycled content limits are being met;
- information about the recycled content review programme, including performance testing, if relevant and an annual report as required by b) iii);
- certificates or other evidence of a documented mine remediation programme;
- information about the virgin fibre procurement programme and records of the supplier, nature and geographical source of all raw material inputs;
- description of the raw material procurement management systems in place to ensure that the requirement a) and b) are consistently met;
- Safety data sheets (SDS) for all binders used; and
- Annual report to the Trust on replacement of formaldehyde-containing binders and procurement of recycled content.

5.4.3 Polyester/polyethylene terephthalate (PET)

Criteria

- a The product must meet contain a minimum of 45 % recycled content, when calculated on a 12-month rolling basis and measured by weight of the final product.
- b Licence holders must:
 - i maintain records of the types and percentages of recycled content used in licensed products;
 - ii have and implement an ongoing programme to review options and increase recycled content in licensed products until an optimal level is achieved, as determined by the required performance characteristics of the product or availability of recycled materials; and
 - iii report annually to the Trust on the progress of the programme
- c The amount of antimony in the virgin polyester fibres shall not exceed 260 ppm.
- d Licence holders must research and report annually on the feasibility of obtaining data on VOCs emitted during polymerisation and fibre production of virgin polyester.

If emissions data is obtained from virgin fibre manufacturers this should be submitted to the Trust. Emissions should be reported as g VOCs/kg of produced polyester resin and should include the test method used. (VOCs are any organic compound having, at 293.15 K, a vapour pressure of 0.01 kPa or having a corresponding volatility under the particular conditions of use.)

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. The statement shall be supported by:

- Documentation including records from the previous 12-month period to demonstrate that the recycled content limits are being met;
- Information about the recycled content review programme, including performance testing, if relevant and an annual report as required by b) iii);

- Either a declaration of non-use of antimony, production information showing the amount of antimony in the virgin polyester, or a test report using the following test method: direct determination by Atomic Adsorption (AA) Spectrometry. The test shall be carried out on the raw fibre;
- Annual report on VOC emissions from virgin fibre production.

5.4.4 Wool

Criteria

- Virgin wool fibre destined for an ECA licensed insulation product must meet the requirements set for scoured wool in EC-31 Textiles, Skins and Leather or EC-63 Carpets and Rugs; OR
- 100 % of the wool used in the insulation product must be recycled material.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by documentation as follows.

For a:

- A copy of the ECA certificate covering the scoured wool; OR
- An assessment report showing compliance with the requirements of EC-31 or EC-63, completed by an independent assessor from the ECA register and appointed by ECA; AND
- Production and quality control processes and records to demonstrate that the insulation product includes scoured wool meeting the applicable requirements in EC-31 or EC-63.

For b:

- Documentation, including records from the previous 12-month period to demonstrate that the recycled content limit is being met.

5.4.5 Cellulose

Criteria

- The product must contain 100 % recycled content with a minimum of 80 % post-consumer recycled content, when calculated on a 12-month rolling basis and measured by weight of the final product.
- Cellulose fibre must not be bleached for reuse. It is accepted that the fibre may have been bleached during its previous lifecycle.

Verification required

Conformance with this requirement shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. The statement shall be supported by documentation including records from the previous 12-month period to demonstrate that the recycled content limits are being met.

5.4.6 EPS, XPS polyisocyanurate and polyurethane

Criteria

- Licence holders must:
 - maintain records of the types and percentages of recycled content used in licensed products;
 - have and implement an ongoing programme to review options and increase recycled content in licensed products until an optimal level is achieved, as determined by the required performance characteristics of the product or availability of recycled materials; and
 - report annually to the Trust on the progress of the programme.
- Insulants shall not be manufactured using blowing agents with a global warming potential (GWP) of more than 124, measured over a 100 year time frame.
- Blowing agents must have an ozone depleting potential (ODP) of zero.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. The statement shall be supported by:

- Information about the recycled content review programme, including performance testing, if relevant and an annual report as required by a) iii);
- Identifying the blowing agents used and their ODPs and GWPs.

GWP and ODP of common blowing agents are given in Appendix A. For determining the ODP and GWP of substances not included in Appendix A, reference should be made to one of the following:

- World Meteorological Organization Global Ozone Research and Monitoring Project—Report No. 55 Scientific Assessment of Ozone Depletion 2014. Halocarbon scenarios, ozone depletion potentials, and global warming potentials in Chapter 5.
https://www.wmo.int/pages/prog/arep/gaw/ozone_2014/full_report_TOC.html
- US EPA Ozone Depleting Substances website
<https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances>
- Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
<https://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf>

If alternative reference sources are used, the Trust will require full details of the reference source or a copy of the document, if it is not readily and freely available.

5.5 Hazardous substances

Trace levels (<0.1 % by weight) of substances reported in SDS to be potentially present as contaminants and impurities in raw materials or additives are exempt from Clause 5.5.

Criteria

- a The following substances shall not be added to the insulation product or used during the production process:
 - Polybrominated diphenyl ether flame retardants;
 - Brominated paraffin flame retardants;
 - Short-chained chlorinated paraffin flame retardants;
 - Tin, lead, mercury, cadmium or chromium-containing catalysts or additives.
- b Substances which are classified as carcinogenic, mutagenic or toxic to reproduction shall not be added to the insulation product.
 - Formaldehyde-containing binders are exempt from this criterion as they are specifically addressed in Clauses 5.4.2 e) and 5.9.
 - Antimony in polyester is excluded from this criterion as it is specifically addressed in Clause 5.4.3 c).
 - Borax/Boron used in glass wool insulation is exempt from this clause as it is specifically addressed in Clause 5.4.2 f).
 - Phenol-based resins (including phenol formaldehyde) and boric acid in specialist fire-resistant products are exempt from these requirements.
- c Any insect resist agent used must not be classified as toxic.
- d A publicly available document (example: safety data sheet or technical data sheet) which discloses all hazardous substances and chemicals of concern in accordance with the Globally Harmonized System (GHS).

Verification required

Conformance with this requirement shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be accompanied by documentation that:

- identifies all the flame retardants, catalysts, additives, insect resist treatments and other hazardous substances used; and
- includes Safety Data Sheets (SDS) for each substance or other information to confirm that the requirements in a) - c) are met.
- regarding criteria (d), a publicly available Safety Data Sheet (SDS) or Technical Data Sheet (TDS) may meet the requirements, provided all hazardous substances are identified in accordance with the New Zealand Health & Safety at Work Act and Hazardous Substances and New Organisms Act, or local equivalent legislation in the country where the product is manufactured. SDS for products sold in New Zealand must meet New Zealand legislative requirements. Hazardous substance classifications should be in accordance with the Globally Harmonised System (GHS).

NOTE: Compliance with the requirements in in b) and c) may be demonstrated by providing data indicating that the substance does not have any of the classifications (or combinations thereof) listed in Table 3 (Appendix B).

5.6 Waste management

Criteria

- a The licence applicant/holder and product manufacturer must have effective waste management policies and procedures and/or a waste management programme covering manufacturing operations. These policies should include:
 - use recycled materials in the insulant production, where practicable,
 - recycle waste materials from the production process.
- b Where an insulant product contains recycled materials, the percentage of recycled materials in the product shall be stated on the packaging. This should include the minimum recycled content.
- c Licence holders and product manufacturers must report annually to the Trust on waste management, including:
 - quantities and types of waste recovered for reuse internally and externally;
 - quantities and types of waste recycled internally and externally;
 - quantities and types of waste disposed of to landfill;
 - quantities and types of waste burned internally for energy recovery;
 - waste generation related to production; and
 - initiatives taken to reduce waste generation and improve recovery/recycling of waste.
 - initiatives or requirements for suppliers or contract manufacturers.
- d Licence holders must have continuous improvement objectives and targets relating to the reduction of waste generation, and the increase of reuse and recycling rates over time, year on year (when averaged over five years). Any divergence from objectives or targets should be explained in the annual report

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be accompanied by documentation that:

- describes the waste management policies, procedures and programmes;
- supports the stated recycled content;
- includes procedures to ensure the stated level of recycled content is consistently achieved; and

- includes annual reports to the ECA on waste generation, minimisation and management.
- details the improvement objectives and targets relating to the reduction of waste generation and the increase of reuse and recycling rates (any divergence from objectives or targets should be explained in the annual report).

5.7 Energy management and greenhouse gas emissions

Criteria

The requirements below refer to the energy used, and greenhouse gas emissions generated for production of ECA-licensed products. Where the energy use and / or greenhouse gas emissions generated for ECA-licensed products cannot be separated from the whole manufacturing / warehousing facility or production line, the total energy use and / or greenhouse gas emissions generated can be used.

- The applicant/licence holder must have effective energy management policies and procedures and/or an energy management programme for their operations.
- Licence holders must report annually to the Trust on energy management, including:
 - total energy use.
 - breakdown of total energy use to types of energy used, including renewable energy.
 - energy use related to production (i.e. the embodied energy of a product).
 - energy use related to transport of raw materials*.
 - methodology for calculating and recording material GHG emissions.
 - initiatives taken to reduce energy use and CO₂ emissions and to improve energy efficiency.
 - initiatives taken to calculate CO₂ emissions per product (i.e. the embodied CO₂ of a product).
 - initiatives or requirements for suppliers or contract manufacturers.
 - information on energy use and management, including use of renewable energy, where that information is available to the licence holder.
- Licence holders must have improvement objectives and targets for reduction of energy use related to production of ECA-licensed products, and associated GHG emissions, year by year . Furthermore, licence holders must publicly disclose a commitment to decarbonise between now and 2050 on a 1.5°C trajectory, with a significant reduction prior to 2030. Any divergence from objectives or targets should be explained in the annual report.

*** The Climate Action Toolbox (Business.govt.nz | Tools and resources) is a free tool that can be used to calculate transportation emissions. Information required for the inputs include weight of the raw materials / products (in tonne), the estimated distance of freight and the mode of transportation (rail freight, air freight, ocean freight).**

Please note – an Environmental Product Declaration is **not** required to satisfy this clause.

Verification required

Conformance with these requirements shall be stated in writing and signed by the Chief Executive Officer, or other authorised representative, of the applicant/licence holder company. This statement shall be supported by documentation (as relevant) that:

- describes the energy management policies, procedures and programmes.
- details of performance against improvement objectives and targets relating to the reduction of energy use related to production of ECA-licensed products, and associated GHG emissions, over time.

- confirms the licence holder has publicly committed to decarbonise between now and 2050 on a 1.5°C trajectory, with incremental reduction up to 2030 (any divergence from objectives or targets should be explained in the annual report); and
- includes annual reports to the ECA on energy use and management.

5.8 Packaging requirements

Criteria

- All plastic packaging must be made of plastics that are able to be recycled in the country where the product is sold.
- Packaging must not be impregnated, labelled, coated or otherwise treated in a manner, which would prevent or significantly limit recycling (i.e. metallic labels).
- Chemical drums used to contain constituent spray-foam reactants shall be able to be reused (refilled). Where reuse is not possible, the drums shall be recycled at appropriate facilities.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported with the following documentation and evidence.

- Conformance with criteria (a) shall be supported by documentation verifying the packaging is recyclable.
- Conformance with criteria (b) shall be demonstrated by providing samples of all plastic containers and components.
- Conformance with criteria (c) shall be supported by documentation showing the reuse rates of the drums and the verifying all decommissioned drums were recycled or are intended on being recycled.

5.9 Emissions to indoor air

Criteria

The following maximum limits for concentrations of VOCs in air (based on the standard room calculation) must not be exceeded by the product when the emission rate is tested in a small-scale environmental chamber.

Parameter	Concentration limit	Emission rate limit
TVOCs C6 – C16 (Total Volatile Organic Compounds)	≤ 0.5 mg/m ³ (after 7 days)	345 µg/m ² *hr (after 7 days)
Formaldehyde	< 0.05 ppm (after 7 days)	42.3 µg/m ² *hr (after 7 days)

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by an emissions test report and calculations demonstrating the limits are met.

Testing method

The testing method shall be in accordance with Greenguard UL2818 Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings or an equivalent method, such as ISO 16000-9:2006 with ISO 16000-11:2006, or ANSI/BIFMA M7.1-2011(R2016).

The laboratory carrying out the testing shall be accredited by IANZ or under ISO 17025:2005 (or an equivalent standard) to carry out the relevant method(s).

Explanatory notes

It is sufficient to test the highest density of each group of products as a worst-case scenario.

5.10 Product stewardship

Criteria

- a The insulation product must not be impregnated, labelled, coated or otherwise treated in a manner which would prevent recycling in New Zealand or in the country where the product is used.
- b Licence holders must report annually to the Trust on product stewardship, including:
 - availability, feasibility, and involvement in product take back schemes, including for
 - products which are currently installed;
 - initiatives taken to promote or implement take back schemes;
 - initiatives taken to make products more recyclable; and
 - initiatives or requirements for suppliers or contract manufacturers.

Verification Required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be accompanied by documentation that:

- includes information which demonstrates that the product can be recycled;
- describes the product stewardship initiatives, procedures and programmes; and
- includes annual reports on product stewardship initiatives.

6 Product characteristics

6.1 Thermal resistance and testing requirements (for thermal insulants only)

Criteria

- a All thermal insulant products must have a stated thermal resistance which has an appropriate statistical basis, derived from independent laboratory testing. Testing must determine the mean thermal performance of the product, the standard deviation and variations between batches of product.
- b All thermal insulant products must have reports or records demonstrating the product's stated thermal resistance is achieved.
 - i Initial test reports must be for independent sampling and testing completed no more than 12 months before the date of application for an ECA licence.
 - ii A programme for ongoing sampling and testing must be documented and implemented as part of the manufacturers quality management system that:
 - covers all licensed products;
 - commences within 6 months of an ECA licence being issued;
 - provides for regular sampling and testing for each licensed product manufactured and/or sold during that year;
 - is designed to take into account insulant products where the thermal performance of the insulant is dependent on its storage and re-loft behaviour; and
 - investigates any non-compliances with the stated R-value including those found through random market sampling by independent testing agencies.

- c All thermal insulant products must be reasonably expected to retain 90% of thermal performance for the service life.

Verification Required

Conformance with these requirements shall be demonstrated by providing a statement of thermal resistance for each product to be licensed. This statement must be supported by:

- reports from independent testing and sampling, completed by a laboratory or testing agency competent to complete the required tests;
records of quality checks which demonstrate on-going compliance with the stated R-value of the product;
- documentation from the quality management system on the statistical basis of sampling and relevant production and quality controls;
- results of any random market sampling by independent testing agencies; and
- documentation to support a reasonable expectation of durability as required by (c).

Test methods

Sampling and testing must be completed using equipment and procedures that meet the requirements of:

- Initial independent test:
 - For low density insulants (e.g. glass wool, wool and polyester): AS/NZS 4859.1:2002 Materials for the thermal insulation of buildings - General criteria and technical provisions.
 - For high density insulants: ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - On-going quality monitoring:
 - ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

6.2 Acoustic performance and testing requirements (for acoustic insulants only)

Criteria

- a All acoustic insulant products must have a stated nominal thickness (mm) and material density (kg/m^3).
- b All acoustic insulant products must have reports or records demonstrating the product's stated nominal thickness (mm) and material density (kg/m^3) is achieved.
- c A programme for ongoing sampling and testing must be documented and implemented as part of the manufacturers quality management system that:
- covers all licensed products;
 - commences within 6 months of an ECA licence being issued;
 - provides for regular sampling and testing for each licensed product manufactured and/or sold during that year;
 - is designed to take into account acoustic products where the acoustic performance of the insulant is dependent on its storage and re-loft behaviour; and
 - investigates any non-compliances including those found through random market sampling by independent testing agencies.
- d All acoustic insulant products must be reasonably expected to retain the stated nominal thickness (mm) and material density (kg/m^3) for the service life.

Verification Required

Conformance with these requirements shall be demonstrated by providing a statement of acoustic performance for each product to be licensed. This statement must be supported by:

- technical data sheets confirming product specifications;
- documentation from the quality management system on the statistical basis of sampling and relevant production and quality controls;
- results of any random market sampling by independent testing agencies; and
- documentation to support a reasonable expectation of durability of the products as required by (c).

6.3 Informative labelling (for All insulants)

Criteria

- a All thermal insulant products must carry a label meeting the requirements of AS/NZS 4859.1 Materials for the thermal insulation of buildings; Part 1: General criteria and technical provisions. In particular the label must state:
- Manufacturer and manufacturing date (or batch identification)
 - Weight (expressed as either weight per square metre or as bale weight and area)
 - The material the insulant is manufactured from, including, if relevant, the percentage recycled content
 - Maximum storage time or use-by date (if batch identification only is provided), for blanket and segment type only. If insulation products are provided direct to the user from the manufacturer, then written storage instructions must also be provided to the user
 - Thickness
 - R-value and the conditions under which it is achieved (including requirements on temperature or any settling or aging of the material)
 - Time after installation at which product will have re-lofted to its nominal thickness if installed before the use-by date (for blanket and segment type only)
 - Area of insulation before installation
 - Safety instructions.
- b All acoustic insulant products must carry a label stating:
- Manufacturer and manufacturing date (or batch identification)
 - Weight (expressed as either weight per square metre or as bale weight and area)
 - The material the insulant is manufactured from, including, if relevant, the percentage recycled content
 - Maximum storage time or use-by date (if batch identification only is provided), for blanket and segment type only. If insulation products are provided direct to the user from the manufacturer, then written storage instructions must also be provided to the user
 - Thickness
 - Area of insulation before installation
 - Safety instructions
 - Acoustic performance.
- c The building insulation material must not require labelling as toxic, corrosive or flammable, in accordance with the New Zealand Hazardous Substances and New Organisms (HSNO) regulations.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by:

- a copy of the label for each insulant product;
- relevant production and quality documentation covering labelling processes

6.4 Installation instructions (for ALL insulants)

Criteria

- a Installation instructions must be provided for all insulant products. The installation instructions must:
 - i clearly demonstrate the installation quality level required such as the maximum size of gaps, the allowable extent of folds etc. Clear illustrations identifying both acceptable and non-acceptable practice must be provided;
 - ii state where it is appropriate to use the product and where it is not appropriate to use it (if there is reasonable likelihood of a misunderstanding);
 - iii detail the proper storage, handling and installation requirements so as to minimise any health implications; and
 - iv recommend that the insulation be installed in accordance with NZS 4246:2006 “Energy efficiency - Installing insulation in residential buildings”, where applicable.
- b Details of training requirements for preferred installers and how training and competence is monitored must be provided.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by:

- a copy of the installation instructions for each insulant product: and
- details of training requirements and how training and competence of preferred installers is monitored.

Explanatory notes

All insulants must be accompanied by written instructions detailing the proper storage, handling and installation so as to: minimise health implications; achieve the thermal or acoustic performance stated on the product label; achieve the designed thermal or acoustic performance for the building component and ensure durability of the insulation material.

6.5 Installation instructions (for LOOSE FILL only)

Criteria

Suppliers of loose-fill thermal insulants must have an ISO 9001 certified quality management system (or equivalent) that meets the following requirements:

- a it must ensure manufacturing activities meet the requirements of ISO 12574 Thermal Insulation – Loose-fill for horizontal applications in ventilated roof spaces – Part 1: Material.
- b it must cover all insulation installers and require all installers to:
 - i meet the requirements of ISO 12574 Thermal Insulation – Loose-fill for horizontal applications in ventilated roof spaces – Part 2: Installer’s responsibilities;
 - ii have been on an installer training programme;
 - iii have an installation schedule, comprised of a table showing settled R-value versus installation weight and thickness;
 - iv have a calibrated blowing machine to ensure proper density control and maintain calibration records for the blowing machine;
 - v determine the total amount of insulant going into a building space;
 - vi calculate the installation area, with provision for framing;
 - vii determine, using a documented sampling procedure and suitable equipment (e.g. an ASTM C167 thickness probe), the thickness, weight (per unit area) and therefore the theoretical thermal resistance value of the installed insulant;
 - viii provide a signed installation certificate to the client, showing details iv) through vi) above; and
 - ix keep records (preferably photographic) of all installations.

- c it must include processes to demonstrate, using independent follow-ups of installers, that training and installation procedures are being adhered to and are effective.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by:

- relevant production and quality control documentation and records; and
- copies of the installation schedules and installation certificates.

6.6 Installation instructions (for SPRAY-ON only)

Criteria

Suppliers of spray-on thermal insulants must have an ISO 9001 certified quality management system (or equivalent) that meets the following requirements:

- e it must ensure manufacturing activities meet the requirements of ISO 8873 Rigid cellular plastics – Spray-applied polyurethane foam for thermal insulation – Part 1: Material specifications.
- f it must cover all insulation installers and require all installers to:
- i meet the requirements of ISO 8873 Rigid cellular plastics – Spray-applied polyurethane foam for thermal insulation – Part 2: Application;
 - ii have been on an installer training programme that includes:
 - o chemical health and safety;
 - o basics of spray polyurethane foam;
 - o substrate preparation;
 - o installation methodology;
 - o troubleshooting and repair; and
 - o equipment.
 - iii have all appropriate equipment to protect installers such as respiratory protection, and skin and eye protection;
 - iv have checked the product for quality immediately prior to commencing operations by spraying a small amount of material to verify machine control and insulation quality;
 - v determine the total amount of insulant going into a building space;
 - vi calculate the installation area, with provision for framing;
 - vii determine, using a documented sampling procedure and suitable equipment (e.g. an ASTM C167 thickness probe), the thickness, weight (per unit area) and therefore the theoretical thermal resistance value of the installed insulant;
 - viii provide a signed installation certificate to the client, showing details iv) through vi) above; and
 - ix keep records (preferably photographic) of all installations.
- g it must include processes to demonstrate, using independent follow-ups of installers, that training and installation procedures are being adhered to and are effective.

Verification required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by:

- relevant production and quality control documentation and records; and
- copies of installation certificates.

7 Requirements and notes for licence holders

Monitoring compliance

Prior to granting a licence, The Trust will prepare a supervision plan for monitoring ongoing compliance with these requirements. This plan will reflect the number and type of products covered by the licence and the level of sampling appropriate to provide confidence in ongoing compliance with criteria. This plan will be discussed with the licence applicant and when agreed will be a condition of the licence.

As part of the plan, The Trust will require access to relevant quality control and production records and the right of access to production facilities. Relevant records may include formal quality management or environmental management system documentation (for example, ISO 9001 or ISO 14001 or similar).

Licence holders are required to advise The Trust immediately of any non-compliance with any requirements of this specification which may occur during the term of the licence. If a non-compliance occurs, the licence may be suspended or terminated as stipulated in the Licence Conditions. The licensee may appeal any such suspension.

The Trust will maintain the confidentiality of identified confidential information provided and accessed during verification and monitoring of licences.

Use of the Eco Choice Aotearoa Label

The Licence holder shall supply information on the proposed use of the label on products and promotional material.

The Label may appear on the wholesale and retail packaging for the product, provided that the product meets requirements in this specification and the Licence conditions.

Wherever it appears, the label must be accompanied by the licence number e.g. 'licence No.1234'. It is optional to include the spec name.

The Label must be reproduced in accordance with:

- The Licence Conditions; and
- The Eco Choice Aotearoa programme's brand kit which includes examples of keyline art for reproduction of the label.

Any advertising must conform to the relevant requirements in this specification, in the Licence Conditions and in the keyline art.

Failure to meet these requirements for using the Eco Choice Aotearoa Label and advertising could result in the Licence being withdrawn

Appendix A : Physical and environmental properties of major blowing agents

Table 1: Fluorinated blowing agents^{7, 8, 9}

	HCFC-22	HCFC-142b	HCFC-141b	HFC-134a	HFC-152a	HFC-245fa	HFC-365mfc	HFC-227ea	HFO-1234ze ¹⁰	HFO-1336mzz(Z) ¹¹	HFO-1233zd ¹²
Chemical formula	CHClF ₂	CH ₃ CClF ₂	CCl ₂ FCH ₃	CH ₂ FCF ₃	CHF ₂ CH ₃	CF ₃ CH ₂ CHF ₂	CF ₃ CH ₂ CF ₂ CH ₃	CF ₃ CHFCF ₃	CH ₃ CH=CHF	CF ₃ CH=CHCF ₃ (Z)	(E)CF ₃ -CH=CClH
Molecular weight	86	100	117	102	66	134	148	170	114	164	130
Boiling point (°C)	-41	-9	32	-26	-25	15.3	10.2	-16.5	-18.95	33.4	19
Gas conductivity (mW/mK at 10 °C)	9.9	8.4	8.8	12.4	14.3''	12.5*	10.6*	11.6	13.6''	+	10.2
Flammable units in air (vol %)	None	6.2 – 17.9	7.6 – 17.7	None	3.9 – 16.9	None	3.8 – 13.3	None	None	None	None
TVL or OEL (ppm) (USA)	1000	1000	500	1000	1000	n/a	n/a	1000	5000	+	800
GWP (100 year) **	1810	2310	725	1430	124	103	840	3220	7	9	1
ODP	0.055	0.065	0.11	0	0	0	0	0	0	0	0

'' measured at 25 °C * measured at 24 °C + no data available

Table 2: Non-fluorinated blowing agents^{7, 8, 9}

	Methylal	Dimethyl ether	Isopentane	Cyclopentane	N-pentane	Carbon dioxide	Isobutane	n-butane	Methyl formate (Ecomate®)
Chemical formula	CH ₂ (OCH ₃) ₂	CH ₃ O CH ₃	CH ₃ CH(CH ₃)CH ₂ CH ₃	(CH ₂) ₅	CH ₃ (CH ₂) ₃ CH ₃	CO ₂	C ₄ H ₁₀	C ₄ H ₁₀	CH ₃ (HCO)
Molecular weight	76.1	46.1	72.1	70.1	72.1	44	58.1	58.1	60
Boiling point (°C)	42	-24.8	28	49	36	-139	-11.7	-0.45	31.5

⁷ UNEP, Report of the Rigid and Flexible Foams Technical Options Committee, 2010 Assessment

⁸ UNEP, Report of the Rigid and Flexible Foams Technical Options Committee, 2014 Assessment Report

⁹ UNEP Ozone Secretariat, *Fact Sheet 13: Insulating Foam*, 2015

¹⁰ Honeywell, *Solstice® ze Refrigerant (HFO-1234ze)*, 2015

¹¹ OARS Weel, *cis-1,1,1,4,4,4-Hexafluoro-2-butene (1336mzz-Z)*, 2014

¹² Honeywell, *Solstice® Liquid Blowing Agent (HFO-1233zd)*, 2017

Gas conductivity (mW/mK at 10 °C)	+	15.5	13.0	11.0	14.0	14.5	15.9	13.6***	10.7"
Flammable units in air (vol %)	2.2 – 19.9	3.0 – 18.6	1.4 – 8.3	1.5 – 8.7	1.4 – 8.0	None	1.8 – 8.4	1.8 – 8.5	5.0 – 23.0
TVL or OEL (ppm) (USA)	1000	1000	1000	600	610	n/a	800	800	100
GWP (100 year) **	< 25	1	< 25	< 25	< 25	1	< 25	< 25	< 25
ODP	0	0	0	0	0	0	0	0	0

" measured at 25 °C ** IPCC Report 1996 *** measured at 0 °C + no data available

Appendix B: Hazardous substances classifications

Table 3: Hazardous substances classifications

New Zealand HSNO Classes	Globally Harmonised System
Carcinogens, Mutagens and Reproductive Toxins	
6.7B	Carc. 2, H351
6.7A	Carc. 1A and 1B, H350
6.6A	Muta. 1B, H340
6.7A	Carc. 1A and 1B, H350
6.8A	Repr. 1A and 1B, H360
6.8A	Repr. 1A and 1B, H360
6.8B	Repr 2, H361
6.8B	Repr 2, H361d
6.6B	Muta. 2, H341
Toxins	
6.1B or 6.1C	Acute Tox. 2 and 3, H330, H331
6.1B	Acute Tox. 3, H311
6.1B	Acute Tox. 3, H301
6.1A	Acute Tox. 2 and 3, H330
6.1A	Acute Tox. 1, H310
6.1A	Acute Tox. 2, H300

NOTE: The United Nations' Globally Harmonised System of Classification and Labelling of Chemicals (GHS) aims to provide a single, international hazardous property classification system. The table above shows the (broadly) equivalent New Zealand HSNO Classifications and the United Nations' Globally Harmonised System (GHS) classifications.

It is important to note that the HSNO Classifications and GHS are classification frameworks and the particular classifications applied to a substance may be different. Differences between classifications can be due to the weight placed on particular toxicity studies (i.e. a jurisdiction may consider that a study is flawed) or in the event that new information becomes available (i.e. differences in the timing of the classification or re-classification of a substance). Where there is a discrepancy between the classifications applied to specific substances in the different schemes, The Trust's appointed technical advisors will review supporting information regarding the classifications on a case-by-case basis to determine and recommend to The Trust how these discrepancies should be managed within the life cycle context of the relevant product category. Where appropriate, technical clarifications and changes, with accompanying explanation, will be included in the relevant specification.

C1 International Bill of Human Rights

In December 1948, the United Nations General Assembly adopted the Universal Declaration of Human Rights (UDHR). In December 1966, the UN General Assembly adopted two international treaties that would further shape international human rights: the International Covenant on Economic Social and Cultural Rights (ICESCR), and the International Covenant on Civil and Political Rights (ICCPR). These are often referred to as “the International Covenants.” Together, the UDHR and these two Covenants are known as the International Bill of Human Rights.

The ICESCR and the ICCPR set out the civil, political, economic, social and cultural rights that everyone is entitled to:

ICESCR	ICCPR
<ul style="list-style-type: none"> • Freedom from discrimination • Right to equality between men and women • Right to life • Freedom from torture • Freedom from slavery • Right to liberty and security of person • Right to be treated with humanity in detention • Freedom of movement • Freedom of non-citizens from arbitrary expulsion • Right to fair trial • Right to recognition before the law • Right to privacy • Freedom of religion and belief • Freedom of expression • Right of peaceful assembly • Freedom of association • Right to marry and found a family • Right of children to birth registration and a nationality • Right to participate in public affairs • Right to equality before the law • Minority rights 	<ul style="list-style-type: none"> • Freedom from discrimination • Right to equality between men and women • Right to work • Freedom to choose and accept work • Right to just and favourable conditions at work • Right to form trade unions • Right to strike • Right to social security • Right of mothers to special protection before and after birth • Freedom of children from social and economic exploitation • Right to an adequate standard of living • Freedom from hunger • Right to health • Right to education • Freedom of parents to choose schooling for their children • Right to take part in cultural life • Right to enjoy benefits of science • Right of authors to moral and material interests from works • Freedom to undertake scientific research and creative activity

C2 ILO Declaration

From the ILO Declaration on the Fundamental Principles and Rights at Work, there are the following core labour standards:

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
- Right to Organise and Collective Bargaining Convention, 1949 (No. 98)
- Forced Labour Convention, 1930 (No. 29)
- Abolition of Forced Labour Convention, 1957 (No. 105)
- Minimum Age Convention, 1973 (No. 138)
- Worst Forms of Child Labour Convention, 1999 (No. 182)
- Equal Remuneration Convention, 1951 (No. 100)
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111)