



WOOLS OF NEW ZEALAND

NSF/ANSI 140 2007 Sustainable Carpet Assessment

Notes for Manufacturers of New Zealand Wool Carpets



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NOTES FOR WOOL CARPET MANUFACTURERS

NSF/ANSI 140-2007 SUSTAINABLE CARPET ASSESSMENT

NSF International Standard/American National Standard

INTRODUCTION

These notes examine the wool-specific aspects of the standard with a view to providing relevant information to assist with the submission of wool-based carpets for approval.

These notes relate to published standard NSF/ANSI 140 – 2007.

This standard is published by NSF International, P O Box 130140, Ann Arbor, Michigan 48113-0140 USA. www.nsf.org ***It is subject to revision.*** A review meeting was held in June 2009, where a revised performance table for wool carpets was adopted, along with some other changes. This guide includes the new wool table, which does not appear in the commonly available version of the standard. Please check the NSF web site for the latest version of the standard.

Compliance with the standard is necessary for obtaining credits from LEED (Leadership in Energy and Environmental Design) for commercial interiors. The relevant LEED sections are Indoor Environmental Quality Credit 4.3, materials and Resources Credit 4, Innovation and Design Credit 1.

The foreword to the Standard describes the purpose of the standard as follows:

‘The American National Standard for Trial Use, NSF 140 Sustainable Carpet Assessment Standard, has been developed as part of the ongoing efforts of a number of interested parties to document and improve the sustainability profile of carpet and rug products using established and/or advanced scientific principles, practices, materials and standards. Stakeholders involved in developing the Draft Standard included carpet and rug manufacturers, end users such as interior design professionals, state agencies responsible for environmentally preferable product procurement practices, academics and nongovernmental organizations.

The purpose of the Sustainable Carpet Assessment Standard is to establish consistent requirements for sustainable carpet products. These requirements are intended to form the basis of conformity assessment programs, such as third-party certification or registration.

The Sustainable Carpet Assessment Standard has been designed, in part, to satisfy the following criteria:

- Demonstrate how carpet and rug products can conform to the environmental, economic, and social principles of sustainability throughout the supply chain.
- Demonstrate conformance with ISO Type 1 (14024) and Type 2 (14021) environmental labelling and declaration requirements.
- Demonstrate conformance with the Federal Trade Commission (FTC) Guides for the Use of Environmental Marketing Claims.
- Engender confidence in the various stakeholders (manufacturers, suppliers, regulators and consumers) that products labelled with a third party certification mark consistently meet the requirements of this program.
- Encourage participation by all manufacturers of carpets and rugs to maximize impact reductions and enhance environmental accomplishments.’

WOOL SPECIFIC ASSESSMENTS

I. GENERAL REQUIREMENTS.

5. General Requirements

5.1 Life Cycle Assessment (LCA)

This requires an assessment over the products entire supply chain for multiple environmental benefits/impacts, which are required to be overall 'sustainable'. LCA is not mandatory to do this, but suggested as a framework.

5.2 Use of sustainably produced bio-based materials in carpet.

NSFI40 seems to differentiate between 'Bio-based materials' and 'Sustainable natural animal carpets' (See 5.2 and 5.2 under General Requirements). For additional information on either product, the user is referred to the same Appendix A.2. The following information follows the sequence of Appendix A.2 and could be included in an NSF140 application.

-Enhance environmental quality and natural resources including local watersheds, native vegetation, and habitat and forest ecosystems.

(A separate guide: 'New Zealand Wool Industry Existing Quality Systems and Codes' is available from Wools of New Zealand on application).

New Zealand wool growers are renowned for their responsible stewardship. Typical farms have been sustainably and economically producing wool for up to 100 years. Native forest 'bridges' and 'islands' are routinely maintained to facilitate bird and wildlife habitat. Waterways are protected to prevent stock access and contamination. New Zealand's Resource Management Act (RMA) strictly limits and controls all aspects of agriculture and forest management in New Zealand. The principle of the RMA is sustainable environmental management. Resource consents are required for air, water, land, sea, coastal and river development or change of use, and public submissions are legally considered. See www.mfe.govt.nz/rma/index.php

The New Zealand woolgrowers' official representative body Meat and Wool New Zealand operates a Land and Environment Planning program specifically for sheep farmers, which promotes best environmental practice and planning on a farm-by-farm basis. See: <http://www.meatandwoolnz.com/main.cfm?id=35>

- Reduce and eliminate toxic substances.

Wool production is very low in chemical use, primarily restricted to animal welfare remedies for sheep health and safety. New Zealand environmental and animal health legislation controls the use of animal remedies.

- Reduce release of greenhouse gases (nitrous oxide, methane and carbon dioxide).

New Zealand is the first country in the world to pass an Emissions Trading Scheme (ETS) which includes agriculture. Greenhouse gas mitigation by tree planting and carbon credit trading is required. While sheep produce methane as a product of their ruminant digestive system, the source of the methane is not fossil fuel, but plants. The role of methane as a greenhouse gas is not well understood. It has a short atmospheric lifespan, and is broken down ultimately to carbon dioxide. The major sources of global methane are wetlands and tundra, followed by flood-irrigation rice growing. Global methane concentrations are steady or declining.

Further, significant areas on New Zealand's farmland is on reclaimed wetlands which were previously significant emitters of methane.

- Reduce reliance on non-renewable resources and increase the use of renewable resources and energy.

New Zealand sheep farming is based on the conversion of grass to fibre. It capitalises on New Zealand's natural benign climate of regular sunshine, temperate weather and adequate rain. It is difficult to imagine a more sustainable fibre production system.

-Diversify crops (including livestock) and cultural practices to enhance the biological and economic stability of the farm.

Typical New Zealand sheep farms include sheep, cattle, cropping, forestry and sometimes deer. There is a trend to reduced sheep numbers and increased dairy cattle raising for economic reasons.

-Minimise reliance on purchased inputs (fertilisers, pesticides, irrigation water, energy, chemicals).

New Zealand's advanced agricultural systems and safe farming practices make it one of the most efficient in the world. Cost reduction and containment is an important part of farming business practice.

Fertiliser budgeting is an integral part of farm planning. Crop and animal grazing rotation within the farm allows natural regeneration and improves soil health, reducing the need for fertiliser use. Modern fertiliser formulations reduce leaching and allow accurate application, so no more than is necessary is applied.

-Develop biological systems which do not need high levels of material inputs.

New Zealand sheep farms have stocking rates of 5-12 sheep per hectare, without using artificial feeding or winter housing. Sheep are largely left unattended, except at crucial times such as lambing, inclement weather, and shearing.

-Increase (rather than decline) soil productivity through reduced topsoil erosion and compaction, replenishing soil organic matter, improving water holding capacity, biological activity and reduced salinisation of soils.

Achieved early in the history of New Zealand's farm development, and maintained by current practice.

- Reduce or eliminate non-point source of water pollutants including sediments, salts, fertilisers (nitrates and phosphorous), pesticides, manure.

New Zealand fertiliser manufacturers and applicators operate under a Code of Practice for the safe and responsible manufacture, transport and application of fertiliser. See www.fertresearch.org.nz

The previously mentioned RMA and good and economic farming practice also contribute to world-class performance in these areas.

-Minimize water quality impacts on surface water, groundwater, drinking water supplies, loss of wetlands, wildlife habitat and fishery production.

See above.

-Improve local market systems.

New Zealand woolgrowers typically run 3-10,000 sheep per family using modern management systems and technology. New Zealand produces about 500Tonnes of wool per day on average. It is not sold at a local market. Sophisticated collection and testing systems ensure farmers are paid fairly for the quantity and quality of their wool, and buyers have accurate information on the important technical and commercial properties of each wool lot. About 40% of New Zealand wool is sold by auction, the remainder is sold privately. Sales transactions are based on objective measurement of the wool. Developments are ongoing to improve and streamline the route to market for New Zealand wool.

-Minimise monoculture commodities systems.

New Zealand sheep farms typically run other stock, crops and forestry, and use intelligent crop and pasture rotation and replacement to achieve sustainable, economic production.

-Improve rural prosperity.

Farmers depend on their farm outputs for income. Significant portion of farm income is spent locally on services and supplies.

-Increase farm profitability and competitiveness (e.g. reduced or optimised costs of inputs vs yield losses).

New Zealand sheep farmers constantly strive for these attributes, as any business operator would. National level R&D and local level application are producing steady improvements in efficiency in all New Zealand agriculture.

-Improve local economic development.

Profitable farms mean profitable local businesses and service providers.

- Reduce depopulation of farm communities

This is not necessary for sustainable bio-based fibre production. In fact increased flock-size per farm results in better sustainability, consistent with the attributes already covered. New Zealand rural communities are relatively stable and even growing in some areas.

-Provide healthy and humane care of livestock

New Zealand farmers must comply with the Animal Welfare Act 1999. Codes of practice also apply to the handling, shearing and transport of sheep. Surgical mulesing is not carried out on carpet wool sheep New Zealand. National response systems facilitate the relocation of sheep from one region to another for example in the case of droughts, floods or snowstorms.

I. PUBLIC HEALTH AND ENVIRONMENT (PHE) 30 Points

6.2 Supply chain feedstock inventory

6.2.1. Feedstock inventory documentation.

Wool is readily identified at the 1% precision level as a % of the incoming raw materials and finished product.

6.2.2 Input PBT chemicals and other chemicals of concern (prerequisite).

Wool is readily identified as having less than 0.1% PBTs.

None of the listed PBTs will be present in raw or scoured wool unless they arise from environmental contamination or from their presence in the environment (unlikely). The level should be well below the 0.1% threshold for declaration.

In dyed wool the matter may be slightly different as some metal complex dyes may contain traces of these heavy metals, which may add to the natural but small levels in wool. Chromium (IV) may be present in chrome dyed products. Normal chromium dyestuffs are trivalent, not hexavalent. They would not be at the 0.1% of total carpet weight level.

6.3 Manufacturing Emissions Inventory and credit for voluntary reduction beyond compliance.

This section relates to the manufacturers' own facility and operation. Some wool fibre related points are listed below:

6.3.1 PBDE Flame retardants

Not contained or used on wool or wool carpets.

6.3.2 Minimization of indoor volatile organic chemical (VOC) emissions (prerequisite for Gold/EP and for Platinum/EPP)

Compliance with CRI Green label plus easily obtained by wool carpets. Not related to wool fibre. Wool fibre absorbs VOCs.

6.3.3 Baselines for pollutant reductions and emissions.

6.3.3.1 Inventory of air, water and waste(media) pollutants

Relates to manufacturing process. Wool is an input raw material.

6.3.3.2 Output PBT Emissions and emissions of other chemicals of concern.

There are no PBT emissions related to wool production.

6.3.3.3.1 Voluntary pollutant reductions beyond compliance, 1986-99 –OR-

6.3.3.3.2 Pollutant and toxic chemical reduction through LCA (1986-1999) 8 points for either/or)

Criteria are:

- Solid and hazardous waste
- SARA Title III Toxic release inventory Emissions
- Climate change emissions
- Water use reduction; and/or
- Energy efficiency

Wool may be able to claim points relating to:

- Climate change:
Our LCA studies (not complete) are based on economic allocation of on-farm methane to sheep-meat and wool. This allocates 90% to meat and 10% to wool (approximately). Methane has a conversion ratio to CO₂ equivalent of 25. This means 1 kg of methane is counted as 25 kg of CO₂. Wool is very sensitive to how this is allocated. LCA methodology uses economic allocation as a least-preferred method. The alternatives for wool though are subject to significant scientific debate, as the metabolic processes of wool vs meat production are poorly understood and quite variable.

System boundary allocation methods could see zero allocation to wool.

Using economic allocation, we have calculated approximately 13 CO₂ –eq kg/sq m for tufted carpet, of which about 7 kg is on-farm. On-farm would reduce to zero or negative under the system boundary allocation method.

Carpet manufacturers will have to demonstrate pollutant reductions for their own operations to claim the maximum 8 points.

6.3.3.3.2 Pollutant and toxic chemicals reduction through LCA (alternative to 6.3.3.3.1)

Requires LCA data for 1986-99 for comparison with current LCA data. Need to document 10-75% reduction in up to 10 categories, must include global warming. Wool could claim LCA related drop but not per unit of production. Efficiencies improvement in wool scouring could contribute, but individual wool scours would need to provide their data.

6.3.3.4 Reduction of specified life cycle impact categories (for the years 2000-present).

Of the 10 impact categories, need to show improvement up to 75%, including for global warming. A scan of the categories shows it is unlikely to find at least 6 for wool alone. As previously mentioned, reduction in total wool, and in energy use by scours (since 2000) may provide a small contribution to a manufacturer's overall assessment.

6.3.4 Minimisation of indoor air carcinogenic VOC emissions.

CRI Green Label Plus VOC testing data can provide 1 point. Carpet test not a fibre test. Wool inherently negative on VOC emissions.

6.3.5 Reduction in chemical pollutant emissions.

6.3.5.1 Minimization of indoor formaldehyde emissions.

Wool neutral or negative with respect to formaldehyde emissions. Wool carpets should pass.

6.3.5.2 Document restrictions on supply chain PBT chemicals and other chemicals of concern.

6.3.5.2.1 Suppliers material and process inputs present at 1%.

Wool can be documented as 100% wool.

6.3.5.2.2 PBTs released as process outputs.

Relates to 6.3.5.2.1. Unlikely to be any PBTs from wool, as none present in the first place.

6.3.5.2.3 PBTs used in materials or process inputs.

Consideration as above. Unlikely PBTs are used or present in wool fibre supply chain to dyed yarn. Some chrome in metal-complex dyestuff, but tri-valent not hexavalent.

2. ENERGY AND EFFICIENCY (EN) 20 points

7.2.1 Inventory of electrical and thermal energy

Applies to manufacturer's facility and energy use. Points for use of renewable energy or energy reduction. Does not seem to specify criteria for reduction.

7.2.2 Manufacturer's use of renewable energy and/or energy reduction

7.2.2.1 Documented percentage or renewable energy and/or energy reduction

Applies to the manufacturing facility only.

7.2.3 Suppliers' use of renewable energy

Renewable energy is defined by the Green-e standard, which applies to energy generated under renewable resource, non-legislated systems, built since 1997, and located in the USA.

A New Zealand wool exporter using a proportion of renewable energy to scour wool would have trouble meeting the criteria, which also seem to favour wind and solar power from private sources.

In fact, approximately 2/3rds of the electricity in New Zealand is hydro-generated (although in government mandated projects built before 1997), and wool scours have been known to use lanolin as boiler fuel depending on the market prices for diesel and lanolin.

Individual wool exporters would be able to supply more specific information pertinent to their own operations.

7.2.4 Greenhouse gas emissions inventory

Relates to the manufacturing facility.

3. BIO-BASED CONTENT, RECYCLED CONTENT AND EPP MATERIALS (MATLS) 22 points

8.2 Materials Content Inventory

Documentation of wool content of finished product. Test reports or purchase orders supplied by manufacturer.

8.2.1 Bio-based content, recycled content, and environmentally preferable product (EPP) materials.

Wool is bio-based. A concern here is that for Platinum /EPP 10% post-consumer recycled content is a prerequisite. Maybe this can be incorporated in the primary or secondary backing. 10% of product weight of waste wool in the pile could amount to 20% of the actual pile material, and would degrade appearance and performance of wool carpets. For 80/20 pile, a recycled content nylon may be an option, if available. Unlikely to be white or dyeable.

Jute and cotton backings should give additional points.

An environmentally preferred product (EPP) is defined in Executive order 13101 1998 as:

Sec. 201. "Environmentally preferable" means products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.

NSF 140 requires 'an ISO 14040 compliant LCA or other reasonable method' for proof.

It seems acceptable that bio-based materials such as wool get the points without having prove EPP.

3. MANUFACTURING (MFG) 17 points

9.2.1 Policy, EMS, and publicly available targets. 1 point

Default requirement is ISO 14001 for the manufacturer.

9.2.2 Manufacturer's social indicator reporting (prerequisite). 1 point

Manufacturer must declare policies and practices such as labour practices, human rights (including child labour) and society/community impacts.

9.3 Performance durability (prerequisite) 1 point

The following table was accepted during the June 2009 review meeting for wool and wool-rich (at least 80% wool) carpet.

Table 9.2A – Performance testing for wool rich carpet

Characteristic	Commercial performance standard		Residential performance standard	
	Value	Method	Value	Method
Appearance retention rating (ARR)				
Light use	≥ 3	ASTM D55252 – Hexapod drum test (1500 & 8000 cycles) CRI TM 101 - ARR grading assessment Value calculated combining ARR at both test durations	Not applicable	ASTM D55252 – Hexapod drum test (1500 & 8000 cycles) CRI TM 101 - ARR grading assessment Value calculated combining ARR at both test durations
Moderate use	≥ 3			
Heavy use	≥ 3-4			
Severe use	≥ 3-4			
Tuft bind				
Tufted carpets: loop pile	≥ 4.4 lbs	ASTM D1335	≥ 4.4 lbs	ASTM D1335
cut pile	≥ 2.2 lbs			
Woven carpets (cut or loop)	≥ 0.77 lbs			
Delamination strength	Minimum average value of 2.5 lbs/in	ASTM D3936	Minimum average value of 2.5 lbs/in	ASTM D3936
Soiling resistance	$\Delta E \leq 3$	ASTM D6540 Drum Soiling Test using AATCC standard soil	$\Delta E \leq 3$	ASTM D6540 Drum Soiling Test using AATCC standard soil
Flammability (Pill test)	Must meet federal requirements	DOC FF 1-70	Must meet federal requirements	DOC FF 1-70
Flammability (Radiant panel test)	Must meet local building/fire code regulations Class 1- minimum 0.45 watts/cm ²	ASTM E648	Not applicable	
Flammability (Smoke density)	Must meet local building/fire code regulations Maximum specific optical density not exceeding 450 (flaming exposure)	ASTM E662	Not applicable	
Electrostatic propensity	≤ 3.5 kV	AATCC – 134 Step test	Not applicable	
Colorfastness to light	Minimum grade 4 at 40 AFU	AATCC 16E	Minimum grade 4 at 40 AFU	AATCC 16E

The Wools of New Zealand Product Standards are as follows:

Location Suitability			Stairs ?
Grading	p^2/t (Density factor)	Minimum Hexapod Overall Grade (combines short and long term results) TM251	Stair rating available?
Medium Duty Residential	70,000	2-3	
Heavy Duty Residential	90,000	3	✓ <input type="checkbox"/>
Extra Heavy Duty Residential	125,000	3-4	✓ <input type="checkbox"/>
Light Duty Contract	80,000	3	
Medium Duty Contract	115,000	3	✓ <input type="checkbox"/>
Heavy Duty Contract	150,000	3-4	✓ <input type="checkbox"/>
Extra Heavy Duty Contract	200,000	3-4	✓ <input type="checkbox"/>

p = surface pile weight, t = surface pile thickness

9.4 LCA for product platform undergoing assessment (prerequisite for Platinum/EPP) 3 points

Manufacturer to provide LCA for carpet manufacture.

9.5 EMS Certification 2 points

Manufacturer to provide external verification of ITS EMS meeting ISO 14001 or USEPA. No wool implications.

9.6 Suppliers' social indicator reporting.

May require the wool exporter to declare social indicator compliance according to the NSF 140 table. A general summary is acceptable. The exporter may wish to describe the woolgrower social indicators as follows:

I. Labour practices and decent work.

New Zealand woolgrowers are either family-owned businesses or use employed and/or contract labour and services such as shearers, shepherds, fencing contractors, etc. They are all required to comply with New Zealand's labour, occupational health and safety and environmental laws. In particular they must comply with the New Zealand Health and Safety in Employment Act (1992).

2. Human rights.

New Zealand is a signatory to the UN Human Rights convention. Child labour is illegal and non-existent.

3. Society.

New Zealand woolgrowers form an important and highly productive part of New Zealand's rural communities. They are well represented at all levels of society including local and national government.

9.7 Quality Management System (QMS)

Manufacturer required to show ISO 90001 certification.

9.8 DfE and/or LCA process

Qualitative requirement for manufacturer to show it incorporates environmental components into product design.

9.9 Waste minimisation or waste reduction

Applies to manufacturer's operation. Improvements are measured over a 3 year period. New Zealand wool is high-yielding and increasing % use of New Zealand wool would show higher processing yields and less waste.

4. Reclamation and end of life management (EOL) 25 points

To quote:

'This section encourages product reuse, recycling and reclamation, thereby reducing waste to landfill and incineration. It requires extended life of the system including proper installation and maintenance. A manufacturer or supplier shall have its own materials management system or demonstrate financial or contractual instruments whereby it takes materials that start as carpet and are reclaimed and/or recycled. This category accounts for recycling materials from their highest to lowest use after production, encouraging reuse and avoiding disposal in landfills.'

This section helps further Carpet America Recovery Effort (CARE) goals and documents carpet reclamation over the supply chain, avoiding land-filling and incineration. CARE is an industry-government effort established as a result of a Memorandum of Understanding (MOU) for Carpet Stewardship to increase the amount of recycling and reuse of post-consumer carpet and reduce the amount of carpet waste going to landfills.'

10.2 Reclamation and recycling program

Manufacturer must make reclamation available to >50% of its customer base.

10.2.1 Operational reclamation program (prerequisite)

Requires the carpet to be recyclable. The quoted definition of recyclable (FTC Guide 16 CFR 260.7 (d)) includes the requirement:

A product or package should not be marketed as recyclable unless it can be collected, separated or otherwise recovered from the solid waste stream for reuse, or in the manufacture or assembly of another package or product, through an established recycling program.

At present there are no established systems for recycling wool carpets. Manufacturers would have to demonstrate they have developed or organised their own systems. This is a pre-requisite for NSF acceptance.

10.2.2 Extended product life (pre-requisite for platinum/EPP).

Requires documented advice to customers regarding correct installation and maintenance. CRI 104 or manufacturers recommended procedures are acceptable. Wools of New Zealand has well-documented recommendations for installation and maintenance of wool carpets, available to manufacturers and consumers.

10.2.3 Product reclamation 17 points

Points are awarded for the % of annual production which is reclaimed for the purposes of reclamation. Threshold is 2% (1 point) up to >80% (17 points).

For wool carpet manufacturer, they would require both a system for reclaiming carpet, and a method of recycling. Simply reclaiming the carpet and storing it for example would not qualify.

Reclaiming a carpet, restoring or processing it in a manner suitable for reuse probably would qualify, as the definitions state that reuse is preferable to recycling. This may be an option for some manufacturers, who could establish a contract with carpet resellers.

10.3 Transparent secondary materials reclamation systems

Applies to recycled carpet that becomes non-carpet. For example, ground up wool carpet that becomes soil mulch would need to be documented.

10.4 Transparent materials reclamation system

Applies to the documentation of reclamation. Encourages recycling of material back into the carpet system. Ground up carpet for mulch may miss out on a point here, unless it went to a sheep farm perhaps, to grow grass to be turned back into carpet fibre.

10.5 Transparent repurposed materials reclamation system

2 points for documenting materials that start as carpet and are reclaimed/repurposed/reused as equivalent carpet products.

Some wool carpets and rugs would be sold again as second-hand carpets, possibly after trimming and cleaning. This system, formalised, may be the only current option for wool carpets at present.

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