PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

UN environment programme

Development of Product Ecolabelling Criteria

(Comparative Evaluation with International Ecolabels)

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eds environmental design solutions

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1 Steel

Several ecolabels for steel products, which are used to indicate that the steel has been produced in an environmentally responsible manner. It has become imperative to transition steel production towards net-zero carbon emissions as the challenges presented by global climate change grow more evident and prominent. Some of the national and international ecolabels for steel include Associação Brasileira de Normas Técnicas (ABNT), Good environmental Choice Australia (GECA), Environmental Choice New Zealand (ECNZ), Green Pro, Cradle to Cradle (C2C), GreenTag GreenRate, The Nordic Ecolabel, and Blue Angel.

Good Environmental Choice Australia (GECA)	Environment Choice- New Zealand (ECNZ)	GreenPro
Australia, New Zealand, South Africa	New Zealand	India
2001	1990	2018
Good Environmental Choice Australia (GECA) Ltd	The New Zealand Ecolabelling Trust	Confederation of Indian Industry (CII)
Slabs, plates, hot rolled coil plates, cold rolled coil, billets, structural beams and columns, hollow pipes, rolled hollow sections, flat angles and channels, reinforcement bars, hot rolled coil round bar, steel wire, rails, galvanized steel products, coated steel products, assembled steel products.	Long steel for construction products (steel bar, wire rod), finished long steel for construction (steel reinforcing bar or rod, seamless pipe, tube, flats, angles, channels, wire mesh), and flat steel (plate, strip, hollow sections, welded pipe, beams)	Reinforcing rebar

1.1 Applicable IS Standards

During 2012-2020, Government notified 145 carbon steel, alloy steel and stainless-steel products to make available quality steel for the sectors mainly in construction, infrastructure, automobile, and engineering applications.[1] The Bureau of Indian Standards (BIS) has issued approximately 137 mandatory standards for steel and steel products manufactured in the country.[2] These standards form basic guidelines for the quality parameters to be adopted by the manufacturers.

The identified IS standards for ECO-Mark fall within the scope of equivalent products identified by international ecolabels. However, this IS standard list can be expanded provided the product fulfils the requirements of any relevant sections of these standards.

IS Standard	Product
IS 277	Mild Steel and Medium Tensile Steel Bars and Hard-Drawn Steel Wire for Concrete Reinforcement
IS 4923	Hollow steel sections for structural use
IS 808	Hot rolled steel beam column channel and angle sections
IS 12778	Hot rolled parallel flange steel sections for beams, columns and bearing piles
IS 1079	Hot rolled steel sheet, plate and strip
IS 16732	Galvanized structural steel
IS 277	Galvanized steel strips and sheets

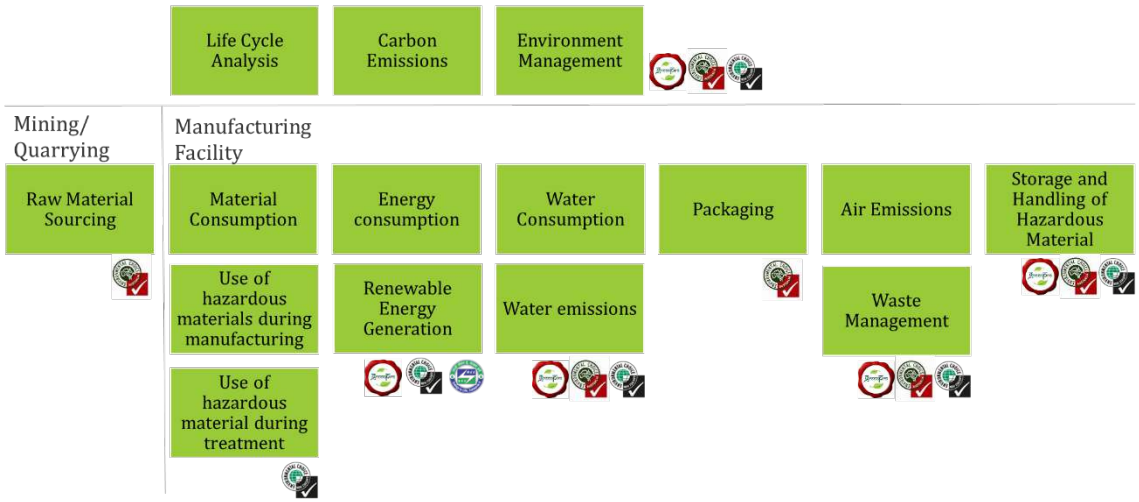
The final IS standard list eligible for ECO-Mark certification could be decided upon consultation with BIS.

[1] https://steel.gov.in/standardization-quality-control-iron-steel

[2] https://www.bis.gov.in/index.php/standards/standard-formulation/international-standardization-activity/

1.2 Environmental Criteria

The environmental criteria have been formulated on the following parameters across different ecolabels.



1.2.1 Life Cycle Analysis, Carbon Emissions and Environmental Management

GreenPro	GECA	ECNZ
Evaluate environmental impact at every stage of the life cycle of the product and initiate measures to reduce such impacts	1. Coating of the steel product must not make the product unusable for recycling in steel mills. 2. Compliance with relevant environmental legislation and government orders at the Local, State, and Commonwealth levels 3. Implement Environmental Management System (EMS) 4. Carbon emissions are below 1.6 t CO_2/t produced steel[1] or Annual reduction of carbon emissions is at least 0.04 t CO_2/t produced steel. [1] or Sourcing of steel or steel from sites verified under the current version of the Responsible Steel standard or Life cycle assessment including energy reduction processes fulfilling green building certification programme requirements.	1. Must not make the product prevent recycling due to impregnation, labelling, coating or otherwise treatment 2. Compliance with relevant environmental laws and regulations during product's life cycle.

1.2.2 Raw Material Sourcing (Quarrying / Mining) and Material Consumption during manufacturing

GreenPro	ECNZ
Mining/ quarrying operations must implement: 1. A management plan to minimize adverse effects from noise, vibration, dust, and discharges to water and land in accordance with ISO 14001:2015 2. Rehabilitation program to minimize adverse effects on biodiversity, its adverse effects, restoration of habitats, and offsets with at least equivalent measures Material Consumption during Manufacturing Overall material efficiency of the steel making site encouraging the use of landfill or incinerated waste (on-site and off-site), slags, residue by-products, etc.	Material Consumption during Manufacturing Overall material efficiency of the steel making site encouraging the use of landfill or incinerated waste (on-site and off-site), slags, residue by-products, etc.

1.2.3 Use of Hazardous Waste

GECA	ECNZ
During Manufacturing 1. Post-consumer scrap to not contain undesirable materials including radioactive materials and Polychlorinated Biphenyls (PCBs) 2. Banned substances during manufacturing excluding in residues a) Compounds or ingredients that are classified as a known or suspected endocrine disruptor, carcinogen, mutagen or teratogen. b) Substances of Very High Concern listed on the REACH Candidate list c) Toxic heavy metals, their compounds, or ingredients containing heavy metals and their compounds, including mercury (Hg), arsenic (As), selenium (Se), cobalt (Co), tin (Sn) and antimony (Sb) 3. Minimize undesirable heavy metals [lead (Pb), cadmium (Cd), chromium (Cr) and nickel concentrations]	**During Manufacturing** 1. Post-consumer scrap to not contain: Feedstock containing undesirable materials including radioactive materials and Polychlorinated Biphenyls (PCBs) 2. Minimize undesirable heavy metals (lead and cadmium concentrations)
During Treatment 1. The steel products shall not be treated with: i. Halogenated organic compounds, slushing oil, and	**During Treatment** 1. The steel products shall not be treated with: i. Compounds containing mercury, lead, cadmium,

GECA	ECNZ
any substances classified as hazardous as specified during manufacturing. ii. Hydrofluoric acid used for pickling of steel before galvanizing and coating iii. Chromium VI compounds used for passivating of zinc and zinc alloy coated steel products. 2. Paint used to coat the steel products shall not be formulated with chromium VI, mercury, lead, cadmium, arsenic, or their compounds. Total content of volatile organic compounds (VOCs) in the architectural coatings and paints of steel products must not exceed: 50g/l in coatings, 450 g/l in solvent-based coating and 50 g/l in water-based coatings	hexavalent chromium, arsenic or their compounds ii. Halogenated organic compounds iii. Any chemicals that are included in the International Agency for Research on Cancer (IARC) lists iv. Slushing oil v. Chromium VI compounds used for passivating of zinc and zinc alloy coated steel products
Handling of Hazardous Waste Environment management system (EMS) to include Storage and handling of hazardous raw materials and dangerous goods **Green Pro;** Compliance under the hazardous waste (management, handling & trans-boundary movement) rules	**Handling of Hazardous Waste** Effective management policies, procedures and systems covering the appropriate storage and handling of raw materials, including steel scrap, solid wastes, and environmentally hazardous materials.

1.2.4 Energy

GreenPro	GECA	BEE
Energy Consumption 1. Energy monitoring systems at the unit and plant level 2. Implementation of energy efficiency improvement measures with actual benefits achieved in annual production, energy consumption & specific energy consumption for the preceding 2 years to be > 0.25% - 3.5%. **Renewable Energy** 1. Use of renewable energy ≥ 2.5 %- 10%	**Energy Consumption** 1. Electricity consumption in the electric arc furnaces (EAF) must not exceed 500 kWh/tons of liquid steel, based on an annual average. 2. No external energy input (e.g., electrical energy) into the Basic Oxygen Process (BOP) during normal operations 3. Implement effective energy management policies and procedures and/or an energy management program which	PAT Scheme (Cycle VII) Applicable for all designated consumers. Target Specific Energy Consumption (MTOE/ton of steel) is provided by BEE for all designated consumers. (Manufacturing facility specific)

GreenPro	GECA	BEE
substitution in the electricity source 2. Source of energy for reheating billets >50% energy demand for reheating of coal, furnace oil, natural gas, waste head gases/ by-product gases/ biomass fuels	includes energy input and total energy use for ladle pre-heating, re-melting, production, distribution, measures to reduce, recover energy, and CO_2 emissions related to energy use.	

1.2.5 Water

GreenPro	GECA	ECNZ
1. Reduction in specific water consumption > 0.5- 4%. 2. Reduce freshwater consumption by implementing water-efficient measures & technologies and recycle wastewater generated from the plant. 3. Work towards achieving zero wastewater discharge and water positive status. **4.** Harvest or capture a minimum of 95% of rainwater runoff from roof & non-roof areas of the manufacturing facility**.** 5. Monitor COD, BOD, TSS, water consumption, discharge etc.	1. EMS addressing releases to water and land and water management 2. Systems to recover process waste sludge and sediment or disposal 3. Minimize emissions of oil and grease, suspended solids and metals in wastewater 4. Systems to recover process wastewater sludges and sediments, and discharges of contaminants to the natural environment (natural water bodies, ocean, or land) 5. Systems to recycle/reuse water (including stormwater) and initiatives to maximize the amount of water recycled including water from wet-debusting, treated process water, re-circulation of cooling water and water from vacuum generation. 6. Cooling water system for electric arc furnaces (EAF)	1. Procedures and systems (including an annual improvement plan) in place to minimize emissions of oil and grease, suspended solids and metals in wastewater (including cooling water and stormwater if these contaminants may be present) discharged to the natural environment (natural water bodies, ocean, or land) 2. Systems and procedures to recover and re-use process wastewater sludges and sediments.

1.2.6 Air

GreenPro	GECA	ECNZ
Compliance with Air (Prevention & Control of pollution) Act	Environment management system (EMS) to include emissions to air	1. Capturing off-gassing to control particulate matter of primary off gases from steelmaking (both EAF and BOP) and secondary off-gases (from scrap charging, steel tapping and secondary metallurgy) 2. Measuring of emissions of dioxins and PCBs from steelmaking via the EAF process 3. Control discharges to air from steelmaking and ancillary processes. 4. A dust management plan covering all areas of the Mill operation including outside stockpiles and non-point source process emissions

1.2.7 Waste Management & Recovery

GreenPro	GECA	ECNZ
Waste Management 1. Compliance from State Pollution Control Board on solid, liquid, and gaseous wastes discharged from the manufacturing location. 2. Waste sent for recycling >10% to 100% or waste recycled internally without any third-party vendor **Waste Recovery** Establish a system for take-back for recycling of products at the end of life & packaging materials after use	**Waste Management** 1. Systems to maximize the recovery of dedusting dusts and sludges 2. Uprising, and recycling of pre-consumer steel scrap and mills cape 3. Waste management policies and procedures and/or waste management program and improvement plan 4. Waste generation and management to include recovery and recycling of waste, disposal to landfill, waste burning for energy efficiency, waste generation	**Waste Management** 1. Systems to maximize the recovery of dedusting dusts and sludges 2. Uprising, and recycling of pre-consumer steel scrap and mills cape 3. Waste management policies and procedures and/or waste management program and improvement plan 4. Waste generation and management to include recovery and recycling of waste, disposal to landfill, waste burning for energy efficiency, waste generation

GreenPro	GECA	ECNZ
	related to production, diversion of ferrous waste from stream, recycling or re-using of slag generated.	related to production, diversion of ferrous waste from stream, recycling or re-using of slag generated.

1.2.8 Packaging

GECA

Packaging (at least one)

a. Sourcing: Paper and cardboard used in packaging to be certified under recognized forest certification scheme (e.g., FSC ad PEFC)
b. Recycled Content: >20% by weight of the total primary and secondary packaging used, must contain at least 50% recycled content by weight materials (e.g., Polylactic acid plastics)
c. Plant-based Material: >20% by weight of the total primary and secondary packaging used, must be derived from plant-based
d. Recyclability: >20% by weight of the total primary and secondary packaging, must be recyclable locally.

1.2.9 Recyclability

GECA	ECNZ
The coating of the steel product must not make the product unusable for recycling in steel mills.	Steel products must not be impregnated, labelled, coated or otherwise treated in a manner which would prevent recycling and in New Zealand or in the country where the product is used.

1.2.10 Handling and Use of Raw Materials

NZEC

Must implement effective management policies, procedures and systems covering the appropriate storage and handling of raw materials, including steel scrap, solid wastes and environmentally hazardous materials.

a. Ensure any storage of steel scrap and other environmentally hazardous materials is located and managed to prevent contamination of surface water or land, including ensuring potentially hazardous liquids are bunded; and
b. Include a Spill Response Plan detailing procedures to identify, contain and clean-up any spill of potentially hazardous substances

1.2.11 Information for Consumers

GECA

Provide written information to the consumer clearly stating:

a. The intended use of the product
b. Instructions for correct use and storage so as to maximise the product lifetime
c. Maintenance instructions, including cleaning instructions, if required. Maintenance instructions shall not specify the use of any chemical or coating limited by any part of this standard; and
d. Recycling instructions for the product end of life.

1.3 Recommendations from COP 27 – Long-Term Low-Carbon Development Strategy

Relevant guidelines for the Steel Sector

1. Build on existing PAT Scheme
2. Reference 'The Steel Scrap Recycling Policy"
3. Adoption of best available technologies
4. Enable **increased scale of hydrogen use** and **electrification of the secondary steel industry** through renewable energy and increase in the use of Alternate Fuels and Raw Materials (AFR) and Refuse-derived fuel (RDF).
5. Adoption of the following technologies by the Blast Furnace-Basic Oxygen Furnace route:
    a. H_2 based iron & steel making technologies.
    b. HISARNA Technology which is being developed under ULCOS (Ultra Low Carbon Dioxide Steel Plant) Programme
    c. Pilot projects for Carbon capture, utilization, and storage (CCUS) in this and other relevant sectors
    d. Injection of plastic waste in the blast furnace
6. R&D interventions to transition to non-coal-based technologies with alternate fuels like hydrogen.
7. Collaboration with multilateral platforms to **increasing access to low-carbon technology.**

2 Cement

The contribution of cement industry to the global carbon emissions caused due to human activity is more than five percent.[3] The Central Pollution Control Board (CPCB) has classified cement industry under RED category industries with a pollution index of 75 for its energy and water consumption, material and resource depletion, greenhouse gas (GHG) emissions and waste production.[4]

The two most important challenges the current industry needs to change are the pressing need to reduce CO^2 emissions and improve energy efficiency. Other challenges include increase in the demand of cement, depletion of fossil fuel reserves and scarcity of raw materials. A comparative study of the Confederation of Indian Industry's (CII) Green Pro, and three other international ecolabels viz Good Environmental Choice Australia (GECA), EU Ecolabel (EU Flower) managed by the European Commission and Environmental Choice New Zealand (ECNZ) is provided in the table below.

GreenPro	Confederation of Indian Industry (CII)	Cement and Supplementary Cementitious Materials (SCM) [5]	**GreenPro** Certification Standard for Cement, Version 1.0, Confederation of Indian Industry
Good Environmental Choice Australia (GECA)	Good Environmental Choice Australia (GECA) Ltd	Portland Pozzalona Cement (PPC), Portland Slag Cement	Cement, Concrete and Concrete Products, Environment Performance Standard, v1.0i, Good Environmental Choice Australia **(GECA)** Ltd., July 2017
Environment Choice-New Zealand (ECNZ)	The New Zealand Ecolabelling Trust	Portland cement and inter-ground or blended mixtures of Portland cement with other materials, which may include fly ash, slag or naturally occurring pozzolanic materials.	EC-42-19, Licence Criteria for Portland Cement and Portland Cement Blends, The New Zealand Ecolabelling Trust **(NZEC),** March 2019

[3] Emissions Gap Report 2020, UNEP, UNEP Copenhagen Climate Centre (UNEP-CCC)
[4] https://cpcb.nic.in/categorization-of-industrial-sectors/
[5] SCM: a by-product from other processes or natural materials (e.g. pozzolans, ground granulated blast furnace slag (GGBS), fly ash, amorphous silica)

2.1 Applicable IS Standards

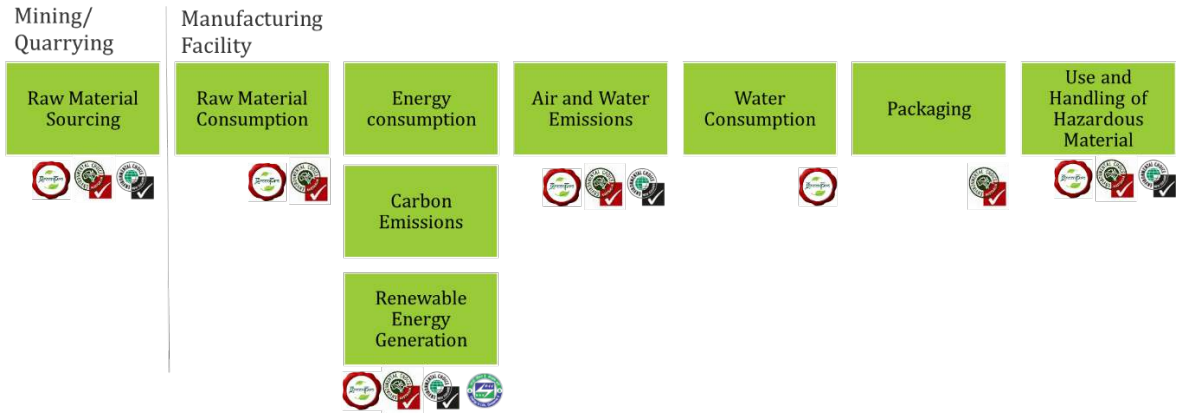
The identified IS standards for ECO-Mark fall within the scope of equivalent products identified by international ecolabels. However, this IS standard list can be expanded provided the product fulfils the requirements of any relevant sections of these standards.

The final IS standard list eligible for ECO-Mark certification could be decided upon consultation with BIS.

IS Standard	Product
IS 3466	Masonry Cement
IS 269	Ordinary Portland Cement (OPC)
IS 455	Portland Slag Cement (PSC)
IS 1489 (part 1)	Portland Pozzolana Cement (PPC)- Fly ash based
IS 1489 (Part 2)	Portland Pozzolana Cement (PPC)- Calcinated clay based
IS 12600	Portland Cement, low heat
IS 8042	White Portland Cement
IS 8043	Hydrophobic Portland Cement

2.2 Environmental Criteria

The environmental criteria have been formulated on the following parameters across different ecolabels.



2.2.1 Raw Material – Sourcing

GreenPro	GECA	ECNZ
1. Compliance to Central and State Pollution Control Board (SPCB and CPCB) norms. 2. Hydrological survey and improvement in water table by 5-10%. 3. Topsoil conservation (Overburden) 4. Restoration of spent mines and Green Belt development.	1. Rehabilitation program 2. Community engagement or cultural heritage plans 3. Environmental Management System (EMS) in accordance with ISO 14001.	1. Quarry restoration plan 2. Management Plans to minimize adverse effects from noise, vibration, dust and discharges to surface water, groundwater, oceans or land from potential impacts.

GreenPro	GECA	ECNZ
5. Enhancement of mines life OR 1. Details of the projects implemented, and the efforts taken to minimize emission reduction due to transportation.		

2.2.2 Raw Material – Consumption

GreenPro	ECNZ
1. Use of alternate raw materials ≥ 1-5% 2. Reduction in high quality limestone consumption ≥ 2 %- 5% 3. Minimum addition of industrial waste (Flyash) in PPC- 25% 4. Minimum addition of industrial waste (Slag) in PSC- 40%	At least 30% of Supplementary Cementitious Materials (SCM) in general purpose cement.

2.2.3 Energy

GreenPro	GECA	ECNZ	BEE
Energy consumption a. Min reduction in specific (electrical &thermal) ≥ 3%- 15% b. Min 1-5% of alternate fuels **Min energy generation** a. On-site RE ≥1.0%- 2% substitution b. Off-site RE ≥ 5%- 15% substitution c. Exemplary Performance > 40% of the annual energy		**Energy consumption** Min. 10% alternative fuels	PAT Scheme (Cycle VII) Applicable for all designated consumers. Target Specific Energy Consumption (MTOE/ tonne of cement) is provided by BEE for all designated consumers. (Manufacturing Facility specific)

GreenPro	GECA	ECNZ	BEE
requirement of the facility. **Max. allowable emissions for site power** a. 560 kg CO_2 /MT of PSC b. 770 kg CO_2 /MT of PCC **Max. allowable emissions for grid power** a. 520 kg CO_2 /MT of PPC b. 730 kg CO_2 /MT of PPC	**CO_2 emissions** Lower than 605 kg CO_2/tonne of cement.	**CO_2 emissions** Max emission rate of 940 kg CO_2e/ tonne of clinker manufactured excluding indirect CO_2 emissions, such as from electricity generation, mobile equipment and transport and CO_2 emissions from carbon neutral biomass alternate fuel.	

2.2.4 Air

GreenPro	GECA	ECNZ
Air Emissions 1. Environmental Management System (EMS) in accordance with ISO 14001. 2. Compliance to Central and State Pollution Control Board (SPCB and CPCB) norms 3. Facility to operate under the Air (Prevention & Control of pollution) Act and Water (Prevention & Control of pollution) Act.	**Air Emissions** Environmental Management System (EMS) addressing: Emissions to air (including but not limited to SO_2, dust/ PM)	**Air Emissions** from facility must not exceed: a. 0.046 kg/tonne of clinker of PM from kiln b. 2.4 kg/tonne of clinker of NOx (as NO_2) from kiln c. 1.38 kg/tonne of clinker of SO_2 from kiln d. 50 mg/Nm^3 of clinker of PM from non-kiln **Dust management plan** covering all areas of the operation including haul roads, cement plant and associated activities including quarries

2.2.5 Water

GreenPro	GECA	ECNZ
Water Emissions 1. Environmental Management System (EMS) in accordance with ISO 14001. 2. Compliance to Central and State Pollution Control Board (SPCB and CPCB) norms 3. Facility to operate under the Air (Prevention & Control of pollution) Act and Water (Prevention & Control of pollution) Act. **Water Consumption** 1. Reduction in freshwater consumption ≥ 5% 2. Harvest 95% rainwater runoff from roof & non roof areas and mining areas 3. Achieve the status of "Zero effluent Discharge"	**Water Emissions** Environmental Management System (EMS) addressing: 1. Emissions to air (including but not limited to SO_2, dust/ PM) 2. Releases to water and land	**Water Emissions** from facility **1. pH discharges** to the natural environment after reasonable mixing shall **not exceed 6-9** **2.** Implement management plan for discharges to natural resources

2.2.6 Packaging

GECA
Sourcing a. Paper and cardboard used in packaging to be certified under recognized forest certification scheme (e.g., FSC ad PEFC). or Recycled Content a. >20% by weight of the total primary and secondary packaging used, must contain at least 50% recycled content by weight materials (e.g., Polylactic acid plastics). or Plant-based Material a. >20% by weight of the total primary and secondary packaging used, must be derived from plant based. or Recyclability a. >20% by weight of the total primary and secondary packaging must be recyclable locally.

2.2.7 Handling and Use of Hazardous Material and Waste Recovery

GreenPro	GECA	ECNZ
1. Valid authorization under the hazardous waste (management, handling & trans boundary movement) rules 2. Factory license under the Factories Act 3. Valid licenses under the Petroleum Act, gas cylinder rules, static & mobile pressure vessels rules, explosives Act. 4. Establish a system for take-back for recycling of products at the end of life & packaging materials after use. 5. Waste: Establish a system for take-back for recycling of products at the end of life & packaging materials after use	Environment management system (EMS) to include Storage and handling of hazardous raw materials and dangerous goods.	1. Any storage of environmentally hazardous substances is located and managed to prevent contamination of surface water or land, (including ensuring potentially hazardous liquids are bunded) 2. Spill Response Plan to identify, contain and clean-up any spill of potentially hazardous substances.

2.3 Recommendations from COP 27 – Long-Term Low-Carbon Development Strategy

1. Build on existing PAT Scheme.
2. Enable **increased scale of hydrogen use** and **electrification of the secondary steel** industry **through** renewable energy and increase in the use of Alternate Fuels and Raw Materials (AFR) and Refuse-derived fuel (RDF).
3. R&D interventions to **transition to non-coal-based technologies** with alternate fuels like hydrogen.
4. Adoption of the following technologies by the Blast Furnace-Basic Oxygen Furnace route:
    a. Waste heat recovery technology.
    b. Cooler vents for co-generation of power.
    c. Grate cooler technology.
    d. Low-NOx multi-channel burners for combustion.
5. Collaboration for increasing access to low-carbon technologies.

3 Wood Substitutes

A total of 89 ecolabels are available around the globe classified under forest products/ paper section as per Ecolabel Index.[6] The two global forest certification systems FSC (Forest Stewardship Council), PEFC (Programme for the Endorsement of Forest Certification) are traditionally known in the wood industry. FSC and PEFC certifications mainly certifies raw wood or intermediate products like soft wood, hard wood, engineered wood, particle wood, construction wood, etc. FSC also certifies products like wooden furniture and handicrafts. Around twenty-five Indian manufacturers have registered products like wood panels and plywood. While more than 150 end-product (furniture and handicraft) manufacturers have attained the FSC certification.[7] Furniture manufacturers have also participated in other national and international ecolabels like GreenPro, Indoor Advantage, Greenguard and Environmental Product Declaration (EPD).

EU Ecolabel	Furniture	COMMISSION DECISION of 30 November 2009 on establishing the ecological criteria for the award of the Community eco-label for wooden furniture.
The Blue Angel	Doors and windows	DE-UZ 176, Low- emission floor coverings, panels and doors for interiors made of wood and wood-based materials, Jan 2013, Version 7, Blue Angel
	Indoor furniture	DE-UZ 38, Low-emission furniture and slatted frames made of wood and wood-based materials, Jan 2013, Version 7, Blue Angel
Korea Eco Label	Indoor furniture	EL172-2022, Furniture, Jan 2022, Korea Environmental Industry & Technology Institute (KEITI)
GreenPro	Indoor furniture	Green Pro Ecolabelling Standard for Furniture, Version 1.0, Confederation of Indian Industry
Greenguard	Organic emissions from finishes and furnishings.	UL 2818 GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings

[6] https://www.ecolabelindex.com/ecolabels/?st=category,forest_products_paper

[7] https://app.powerbi.com/view?r=eyJrIjoiN2U3NGMyNWEtZTAxNS00MzVhLWExNmMtOThhZjdiYjQ4MWNkIiwidCI6IjEyNGU2OWRiLWVmNjUtNDk2Yi05NmE5LTVkNTZiZWMxZDI5MSIsImMiOjl9

3.1 Applicable IS Standards

The identified IS standards for ECO-Mark fall within the scope of equivalent products identified by international ecolabels. However, this IS standard list can be expanded provided the product fulfils the requirements of any relevant sections of these standards.

3.1.1 Indoor furniture[8]

IS Standard	Product
IS 1829	Library furniture and fittings
IS 14116	Specification for wooden shelving
IS 4126	Wooden wardrobes
IS 5823	Dining tables
IS 5974	Divans and easy chairs
IS 6188	Wooden beside table
IS 6632	Wooden folding chairs
IS 7070	Wooden shelving racks
IS 7249 (part 1)	Adjustable and non-adjustable type wood beds
IS 11525	Wooden chairs for office purposes
IS 11679	Wooden tables for office use
IS 12680	Wooden sofa-cum-bed

3.1.2 Doors and windows

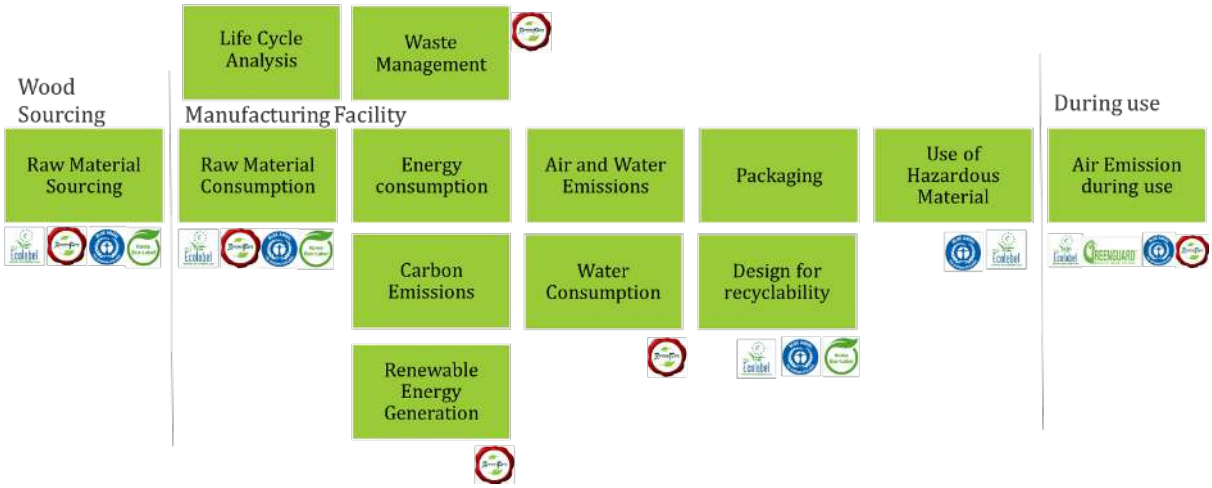
IS Standard	Product
IS 1003 (Part 3)	Timber paneled and glazed shutters
IS 2191 (Part 1 &2)	Wooden flush door shutters
IS 2202 (Part1&2)	Wooden flush door shutters
IS 4021	Timber door, window, and ventilator frames
IS 6198	Ledged braced battened timber door shutters
IS 12896	Indian timbers for door and window shutters and frames
IS 15380	Moulded raised high density fibre (HDF) panel doors

The final IS standard list eligible for ECO-Mark certification could be decided upon consultation with BIS.

[8] The highlighted rows represent the products under consideration for comparison with International Ecolabels

3.2 Environmental Criteria

The environmental criteria have been formulated on the following parameters across different ecolabels.



3.2.1 Raw Material - Sourcing

The raw materials used in wood manufacturing can include both virgin wood and recycled wood. Criteria for both Virgin Wood and Recycled Wood have been included below:

Virgin Wood

EU Ecolabel	The Blue Angel	Korea	Green Pro	ECO-Mark
1. Policy for sustainable wood procurement 2. Legal sourcing of wood covered by valid sustainable forest management certificates issued by an independent third-party certification scheme such	1. The use of woods from tropical, subtropical, and boreal forests is only permitted if they are 100% FSC or PEFC certified. 2. Prohibited use of wood found on the list of protected tree species in accordance	In conformity with the Detailed Criteria for Determination of Legal Logging of Imported Wood and Wood Products[9] verifying and certifying legal sourcing of timber.	1. Use of legal and verifiable source wood 2. Adopt green procurement guidelines	1. Environment (Protection) Act, 1986 with enforced Rules and Regulations of forest department 2. Only species of wood sources other than natural forests such as wood from rubber, coconut, cashew, industrial

[9] https://www.forest-trends.org/wp-content/uploads/2019/01/Forest-Trends-Korea-Brief-Final-2019.pdf

EU Ecolabel	The Blue Angel	Korea	Green Pro	ECO-Mark
as FSC, PEFC or equivalent. 3. Not originate from genetically modified organisms (GMO)	with CITES and EC 338/97 published by the Federal Agency for Nature Conservation (BfN).			and social forestry plantations, etc and shade trees from tea and coffee estates, wood residues or agricultural wastes. *(As specified in IS 710- Marine Plywood)*

Recycled wood fibres

EU Ecolabel	Blue Angel	Green Pro
1. Must be sustainable certified virgin materials and/or recycled material. 2. Post-consumer wood, chips or fibres shall at least comply with the provisions in the EPF Industry standard[10] and verify compliance with limit values in mg/kg elements and substances allowed in recycled wood fibres Arsenic- 25 Cadmium- 50 Chromium- 25 Copper- 40 Lead- 90 Mercury- 25 Fluorine- 100 Chlorine- 1000 Pentachlorophenol (PCP)- 5 Tar oils (benzo(a)pyrene)- 0.5	1. Must comply with the German Waste Wood Ordinance. 2. Must have tested to comply with: DE-UZ 076 confirming the legal sourcing, and prohibiting the use of any harmful substances or requirements in § 3 of the Chemicals Prohibition Ordinance (ChemVerbotsV)	1. Encourage use of Rapidly Renewable / Recycled Material (Rapidly renewable materials are agricultural products that take 10 years or less to harvest) to reduce deforestation. 2. Adopt green procurement guidelines

[10] EPF Standard for Delivery Conditions of Recycled Wood

3.2.2 Raw Material - Composition

EU Ecolabel	The Blue Angel	Green Pro	Korea Ecolabel
At least 70 % of any solid wood and 40 % wood-based materials must originate either from: sustainably managed forests which have been certified by independent third-party schemes fulfilling the criteria mentioned in Council Resolution.[11] or recycled materials	At least 70% of the wood or 70% of wood-based materials must be from certified sources or waste wood (in waste wood categories AI and AII according to the German Waste Wood Ordinance)	Recycled Material to be >5% - 25% of the product	Waste timber used should be ≥ 70%.

3.2.3 Energy

Green Pro
1. Reduction in specific energy consumption- ≥ 5% - ≥ 25% *or* National benchmarking among top 5 companies, international benchmarking – among top 10 companies 2. On-site renewable energy generation (Both electrical & thermal)- ≥2.5% - ≤ 5% substitution *or* Off-site Renewable Power- ≥10% - ≥30% substitution

3.2.4 Air Emissions

Green Pro	ECO-Mark
Compliance certificate from State Pollution Control Board	Compliance with Air (Prevention and Control Pollution) Act, 1981.

[11] Council Resolution of 15 December 1998 on a forestry strategy for the European Union

3.2.5 Water

Green Pro	ECO-Mark
Water Emissions Compliance certificate from State Pollution Control Board	**Water Emissions** Compliance with Water (Prevention and Control Pollution) Act, 1977.
Water Consumption Reduction in specific water consumption: ≥ 5% - ≥ 20%. or National benchmarking among top 5 companies, international benchmarking – among top 10 companies	

3.2.6 Use of Hazardous Substances, contaminants

Various hazardous substances are used in the mixing of raw materials and surface treatments during the manufacturing of wood products. Ecolabelling schemes have the purpose to minimize the use of these and other hazardous substances in wood products, which includes halogenated compounds, flame retardants, biocides used to protect from rotting, increasing the fire safety of wood products. VOC content and other toxic compounds in resins and binders too are prohibited in ecolabelling schemes.

Hazardous substances

EU Ecolabel	Korea
1. No substances or preparations containing risk phrases or combination of risk phrases (E.g., R23- toxic by inhalation, R24- toxic in contact with skin, etc.) as laid down in Council Directive 67/548/EEC[12] and its subsequent amendments. or Certain hazardous materials (such as H300, H301, H310, H311, H317 H330, H331, etc.) according to Regulation (EC) No 1272/2008 and its amendments. 2. From surface treatments: As specified above a. Hazardous substances (Point 1) b. Prohibit use of chemical substances as specified under Directive 1999/45/EC.	Content of lead (Pb) < 50mg/kg and cadmium (Cd) < 0.5 mg/kg in in a synthetic resin weighing 100g or more Prohibited use of substances made based on arsenic (As), chromium (Cr), organic tin compounds and creosote

[12] Council Directive 67/548/EEC

EU Ecolabel	Korea
and May contain up to 5% of VOC or harmful substances (in accordance with Directive 1999/45/EC) up to 14 g/m^2 and may contain up to 35 g/m^2 of VOC	

Plastics and other metals

EU Ecolabel	Korea
Up to 2% of the total weight of plastics and metals of the product is allowed.	Inorganic/non-ferrous metallic reinforced steel plates tin plated and copper plated steel sheets that affect the quality of recycled metallic materials should not be used.

Halogenated Organic Compounds

EU Ecolabel	Blue Angel
Halogenated organic binding agents, azidirin and polyaziridins as well as pigments and additives must not contain: lead, cadmium, chrome (VI), mercury and their compounds, arsenic, boron and copper, and organic tin.	No use of halogenated organic compounds is permitted (e.g. as binding agents, flame retardants)

Flame retardants

EU Ecolabel	Blue Angel	Korea
Permit use of chemically bound into the matrix/material or onto the matrix/material surface (reactive flame retardants excluding the ones containing certain R-phrases) and Prohibit use of physically mixed flame retardants (Additive) or Flame retardants (such as H351, H350, H340, H350i, H400, etc.) according to Regulation (EC) No 1272/2008**.**	Prohibit use of antimony oxides Permit use of Inorganic ammonium phosphates (diammonium phosphate, ammonium polyphosphate, etc.), other dehydrating minerals (aluminium hydroxide or similar) and expandable graphite.	1. Prohibit use of polybrominated biphenyls (PBBs), polybromodiphenyl ethers (PBDEs), tetrabromobisphenol A (TBBPA), and hexabromocyclododecane (HBCD) 2. Sum of contents of PBBs, PBDEs, TBBPA and HBCD < 100 mg/kg

Biocides

EU Ecolabel	EU Ecolabel	Korea
Permit only the use of biocides containing biocidal active substances included in Directive 98/8/EC.	No use of biocides is permitted. An exception is made for biocides that are exclusively designed for use as in-can preservatives.	Prohibited use of active substances in regard to biocides in preservatives under EU Regulation No. 528/2012

Preservatives

EU Ecolabel	Korea
1. No impregnation of substance and preservatives is allowed 2. Solid wood, after logging, shall not be treated with substances or preparations containing substances that are included in WHO recommended classification of pesticides by hazard classified as extremely and highly hazardous (class 1a and 1b)	Preservative under the H3 or H4 environment for use in accordance with the Act on the Sustainable Use of Timbers

Adhesives and glues

EU Ecolabel
1. Point (1) of Hazardous substances 2. May contain up to 5% of VOC in additives and glues VOC content of adhesives used in the assembly of furniture shall not exceed 5 % (w/w). **3.** Content of free formaldehyde in binding agents, adhesives, and glues for plywood panels or laminated wood panels shall not exceed 0.5 % (w/w).

Paints and primers

EU Ecolabel	Korea
Any paints, primers or varnishes shall not contain cadmium, lead, chromium VI, mercury, arsenic or selenium at concentrations exceeding 0.010 % (weight by weight) for each individual metal.	1. Paints to be ecolabelled in accordance with EL241 or Mass fraction of lead, cadmium, mercury (Hg) and hexavalent chromium (Cr6+) contained in the paint < 0.1% (1 000mg/kg) 2. Content (mg/kg) in non-volatile paints: Arsenic (As) ≤ 25 Antimony (Sb) ≤ 60 Barium (Ba) ≤ 500 Chromium (Cr) ≤ 60 Selenium (Se) ≤ 500

Plasticizers

EU Ecolabel
Prohibit use of DNOP (di-n-octyl phthalate), DINP (di-isononyl phthalate), DIDP (di-isodecyl phthalate)

Formaldehyde

EU Ecolabel
1. Content of free formaldehyde in products or preparations used in the panels shall not exceed 0,3 % (w/w) 2. Formaldehyde emission from particle boards and fibre boards in its raw state shall not exceed 50 % of the threshold value according to standard EN 312 and EN 622-1 respectively. **3.** Formaldehyde emissions liberating from surface treatment < 0.05 ppm.

3.2.7 Recycling and Waste Management

Green Pro
1. Increase the % of utilization of wood wastes to enhanced value addition by giving importance for converting wood waste into value added products or use as fuel 2. Reduce the % of non-wood & other wastes going to land fill 3. Wood waste shall be used as fuel or converted into value added products.

3.2.8 Design for Recyclability

EU Ecolabel	**Blue Angel**	**Korea**
Product must be designed to be easily recyclable	1. The principles for a recycling-friendly design (VDI 224330) must be observed. 2. Plastic parts > 50 g should not contain any additional materials that will hinder their recycling.	Metallic materials should be able to be easily separated by material using general tools

3.2.9 TVOCs, Formaldehydes (Wood products such as Furniture)

Parameters	**Emission Limits**			
	Blue Angel	**Green Pro**	**Korea**	**Greenguard**
TVOC within the retention range C_6- C_{16}	≤ 3.0 mg/m^3 (3rd day) ≤ 0.4 mg/m^3 (28th day/ final value)	< 0.5 mg/m^3 for furniture,	< 0.4 mg/m^2 ·h (7th day)	≤ 0.5 mg/m^3

Parameters	Emission Limits			
	Blue Angel	**Green Pro**	**Korea**	**Greenguard**
		< 0.25 mg/m³ for seating	≤ 0.1 mg/m² ·h (7 days later)	
TSVOC within the retention range C_{16}- C_{22} without LCI[13]	≤ 0.1 mg/m³ (final value)	N/A	N/A	N/A
Individual VOC	N/A	N/A	N/A	≤ 1/10 TLV
Carcinogenic substances	≤ 10 µg/m³ total ≤ 1 µg/m³ per single value	N/A	N/A	N/A
R value[14]	≤ 1	N/A	N/A	N/A
Formaldehyde	For furniture: ≤ 37 µg/m3 (0.030 ppm) For doors, windows and panels: < 0.05 ppm	< 50 ppb for furniture, < 25 ppb for seating	< 0.12 mg/m² ·h (7th day) ≤ 0.005 mg/m² ·h (7 days later)	≤ 0.05 ppm
Total Aldehyde	N/A	< 100 ppb for furniture, < 50 ppb for seating	N/A	≤ 0.1 ppm
Ammonia	0.1 mg/m³			
4 Phenyl cyclohexene	N/A	< 0.0065 mg/m³ for furniture, < 0.00325 mg/m³ for seating	N/A	≤ 0.0065 mg/m³
Toluene	N/A	N/A	< 0.080 mg/m2 ·h (7th day) < 0.02 mg/m2 ·h (7 days later)	N/A
Additional comments	Carry testing in accordance with ISO 16000-28, and the emission test with the above limits or	N/A	N/A	N/A

[13] LCI = Lowest Concentration of Interest
[14] R = total of all quotients (Ci / LCIi) < 1 (where Ci = substance concentration in the chamber air, LCIi = LCI value of the substance)

Parameters	Emission Limits			
	Blue Angel	Green Pro	Korea	Greenguard
	an odour test in accordance with RAL-GZ 430			

3.2.10 Life Cycle Analysis

Green Pro
1. The product manufacturer can carry out the life cycle analysis with the support of external service provider or with internal expertise using a LCA software tool. **2.** For life cycle analysis, implementation of at least one initiative with 2% - 10% impact reduction.

3.2.11 Packaging

EU Ecolabel	The Blue Angel	Korea
1. Packaging must be made from one of the following: a. easily recyclable material, b. materials taken from renewable resources, c. materials intended to be reusable, such as textile coverings **2.** All materials shall be easily separable by hand in recyclable parts consisting of one material (e.g., cardboard, paper, plastic, textiles)	1. Products should be packaged for sale so that the outgassing of volatile materials is possible after the manufacturing process. 2. The product packaging must be made from recyclable materials where possible.	Where practicable, packed for sale so as to allow post-manufacture outgassing of volatile elements

3.2.12 Waste Recovery

Green Pro
Establish a system for take-back for recycling of products at the end of life & packaging materials after use.

3.2.13 Information for Consumers

EU Ecolabel	The Blue Angel	Korea
1. Information on the packaging shall contain the following text: a. Wood from well managed forests b. Restricted hazardous substances c. Product tested for durability 2. The product shall fulfil the requirements on durability, strength, safety and stability in EN standards applicable to the usage of the product and contain this information on the user manual. 3. Maintenance of products shall be possible without organic based solvents. 4. Provide information on: a. Fitness for purpose b. Cleaning and care c. Indicate any treatments or preservatives that have been used on outdoor products (chemical, biological or physical) d. Recommendation that the consumer use EU Ecolabelled products for future preservation of the furniture	The following information should be made available to consumers: a. Information on wearing parts and their repair or replacement, as well as about a repair service where applicable. The provision of functionally compatible spare parts for these wearing parts must be guaranteed for at least 5 years b. Information on the type and origin of the predominant wood c. Information on other materials (proportion > 3 % by mass) d. Instructions on the assembly or installation of the products e. Instructions on disassembly for moving house and for the purpose of recycling the materials in the future f. Information on the fitness for use (field of application and results of the material tests where relevant) g. Information on the packaging made of recycled materials.	Provide the following information to customers: a. Reasons for certification of a product including contributions the product makes to reducing environmental impacts should be stated on a catalog, etc. b. Information on how to manage the product and on supply of replaceable parts should be provided. c. Information on how to prevent indoor air pollution by formaldehyde and VOCs emitted should be provided. d. Information on how much waste timber is used among raw materials used for woody materials in the product should be provided. e. Effect of the finished product on indoor air quality

3.3 Recommendations from COP27 - Long-term Low-carbon Development Strategy

1. Restoration, Conservation and Management of Trees Outside Forests (TOF), Green Cover
2. Improved protection and restoration of forest and green cover in biodiversity hotspots.
3. Promote Agro forestry to increase farming income and meet wood products demand.

4 Paper

A total of 89 ecolabels are available around the globe that certifies paper and forests products. The widely recognised ecolabels include Blue Angel, EU ecolabel, Korea Ecolabel, Green Seal and Green Label. A number of international forest certification have arisen to certify forest or plantation management practices, ecosystem conservation, quality of the forest and its produce are assessed against a set of predetermined principles and criteria or locally developed indicators. Some of the globally recognised ones are FSC (Forest Stewardship Council), PEFC (Programme for the Endorsement of Forest Certification) and Sustainable Forestry Initiative (SFI). These certifications are managed by self-governing certification bodies.

EU Ecolabel	Graphic paper made from pulp which including fit for writing, printing, or conversion purposes.	Establishing the EU Ecolabel criteria for graphic paper, tissue paper and tissue products, Commission Decision 2019/ 70, 11 January 2019, Official Journal of the European Union.
The Blue Angel	Recycled graphic paper which includes: paper used for printing books, newspapers, magazines, brochures, etc, Paper for printed matter primarily for use in offices and schools Office paper and writing paper	Graphic Paper and Cardboard Made from 100% Recovered Paper (recycled paper and cardboard), DE-UZ 14a, January 2020 Version 5, Blue Angel.
Korea Eco Label	1. Printing paper including newsprint paper, uncoated paper including wood-free paper and medium-quality paper 2. Office paper used for plain paper copier, coated papers for colour printer, and computer paper, thermal paper.	1. Printing Paper, EL 101, Korea Eco-label Standards, Revised 14. Mar. 2012, Ministry of Environment. 2. Office paper, EL 102, Korea Eco-label Standards, Revised 14. Mar. 2012, Ministry of Environment.
Environment Choice- New Zealand (ECNZ)	Office paper products including copier/printing paper and writing paper.	Licence Criteria for Paper products, EC-60-21, June 2021, The New Zealand Ecolabelling Trust.
Green Seal	Printing and writing paper- Papers for printed signs, bond paper, computer print-out paper, copy paper, cover paper, drawing paper, tablet paper, text paper, uncoated groundwood free papers, gift wrapping, other recycled printing and writing paper.	Green Seal Standard for Printing and Writing paper, GS-7, Edition 6.1 July 12, 2013, Green Seal.

4.1 Applicable IS Standards

The highlighted IS standards have been used to do the comparative evaluation.

IS 1848 (Part 1)	Writing and printing paper (Part 1)[15]
IS 1848 (Part 2)	Writing and printing paper (Part 2)
IS 12765	Printing paper map
IS 12766	Computer Paper
IS 14490	Plain Copier Paper
IS 6956	Cover Paper
IS 3413	Base paper for carbon paper
IS 11687	Base paper for tracing paper
IS 12808	Base paper for one time Carbon paper
IS 1774	Paper for permanent and semi - Permanent records

4.2 Environmental Criteria

The environmental criteria have been formulated on the following parameters across different ecolabels.

4.2.1 Raw Material - Sourcing

Paper can be made from a variety of basic resources, including virgin fibre, and recycled paper. Criteria for both Virgin and Recycled fibre have been included below:

Virgin Fibre

ECO-Mark	EU Ecolabel	ECNZ
The paper and paper boards manufactured out of pulp containing not less than 60 percent by weight of pulp made from materials other than	1. All virgin fibre must not originate from GMO species 2. All virgin fibre must be covered by valid chain of custody certificates issued	Wood based Fibre 1. If the pulp contains fibre from native forests, the forest sources used must have current Sustainable

[15] The highlighted rows represent the products under consideration for comparison with International Ecolabels

ECO-Mark	EU Ecolabel	ECNZ
bamboo, hardwoods, softwoods and reed.	by an independent third-party certification scheme such as the Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC) or equivalent. 3. At least 70 % of the fibre material shall originate from forests or areas managed according to sustainable forestry management principles 4. Any uncertified virgin material shall be covered by a verification system that ensures that it is legally sourced and meets any other requirement of the certification scheme with respect to uncertified material	Forest Management (SFM) certification. 2. If the pulp contains fibre from plantation forests, the plantations used must have current legal harvesting certification *and* at least 70% of the fibre in the pulp must be from sources that have current SFM certification. Bamboo 3. A minimum of 50 % by weight of the bamboo in the paper product must be from plantations or forests certified as SFM under the FSC or PEFC, or equivalent schemes 4. All uncertified bamboo comes from legal sources, and not harm natural woodland, biodiversity, and social and cultural preservation values. 5. Must not come from bamboo species that appear on the Convention on International Trade in Endangered Species (CITES) list 6. Companies must keep record of certification and review options and increase FSC or PEFC or equivalent SFM-certified content Other plant-based fibre 7. Ensure traceability of all raw fibre 8. Procedure regarding procurement of sustainable fibre raw material 9. all fibre raw materials come from legal sources 10. Must not be derived from protected areas, illegal harvested fibre and not harm natural woodland, biodiversity, and social and cultural preservation values.

Recycled Fibre

ECO- Mark	EU Ecolabel	Blue Angel	ECNZ	Green Seal
	1. All recycled fibre must be covered by valid chain of custody certificates issued by an independent third-party certification scheme such as FSC, PEFC or equivalent. 2. Reutilisation of waste materials that are capable of being reclaimed within the same process that generated them may be considered if covered by EN 643 delivery notes.	1. Must have been sourced 100% from recovered paper. 2. Not permitted to use certain grades of recovered paper to keep the content of diisopropylnaphthalene (DIPN) in paper as low as possible. or grades of recovered paper containing DIPN may be used if an efficient technical system (eg. Deinking) exists that largely removes the DIPN and the DIPN content in the finished paper does not exceed a maximum of 50 mg/kg.	If the pulp contains recycled content, at least 50% must be post-consumer recycled.	1. If recovered material is used, it shall be deinked using a solvent containing chlorine or one listed by EPA. 2. Use of chlorine nor any form of its derivates (such as hydro chlorite and chlorine dioxide) shall be used in the processing of recovered material.

4.2.2 Raw Material Composition

ECO- Mark	EU Ecolabel	Environmental Choice	Korea Ecolabel	Green Seal
Recycled paper and paper board must be made from 100% wastepaper or agricultural/ industrial wastes.	1. At least 70 % of the fibre material allocated to the product or production line shall originate from forests or areas managed	1. The pulp used for the paper product must be one or more of the raw materials	Mass percentage of wastepaper use rate for different types of printing paper and	1. Use of recovered material as stated in 3.1 or

ECO- Mark	EU Ecolabel	Environmental Choice	Korea Ecolabel	Green Seal
	according to sustainable forestry management principles that meet the requirements set out by the relevant independent chain of custody scheme and/or originate from recycled materials.	like wood, bamboo, other plant-fibres, or minerals. No other pulps can be used. 2. If the pulp furnish contains recycled content, at least 50 % of the recycled fibre must be post-consumer recycled. 3. A total of at least 70 % of the fibre in the pulp furnish must be from sources that have current SFM certification.	office paper to be complied. (Percentage of wastepaper use rate ranges from ≥ 10- 60% based on the type of paper.)	2. Product must contain at least 30% post-consumer materials. and Percentage of recovered and post-consumer material must be calculated (using a specific formula) based on the quantity of virgin pulp.

4.2.3 Energy

ECO- Mark	EU Ecolabel	ECNZ
No criteria currently mentioned	1. CO_2 emissions (in kg per tonne of paper) from fossil fuels used for the production of process heat and electricity (whether on-site or off-site) must not exceed the following limit values: a) De-inked/recycled pulp: 1,100 b) Chemical pulp: 1,000 c) Mechanical pulp: 1,600 2. The energy consumption for heat production shall not exceed 2.5 points which includes addition of relative electricity and fuel consumption points This calculation includes internally	1. Emissions of CO_2 (in kg per tonne of paper) from e emissions from purchased electricity and use of fossil fuels, but exclude emissions from renewable sources, shall not exceed for the following paper pulp: a) De-Inked Pulp (DIP)/recycled paper: 1,000 b) Other Chemical pulp paper: 900 c) Mechanical pulp paper: 1,500 2. Must have effective energy management policies and procedures and/or an energy management programme.

ECO- Mark	EU Ecolabel	ECNZ
	produced, purchased and sold electricity and fuel consumption.[16] 3. The manufacturing unit shall have established an energy management system addressing all energy consuming devices. (Including machinery, lighting, air conditioning, cooling).	3. Must report annually on energy management which includes total energy, breakdown of usage, types of energy used, energy used for production, initiatives to increase energy efficiency, etc. 4. Improvement objectives and targets for reduction of energy use and associated CO_2 emissions.

4.2.4 Air and Water Emissions during Manufacturing

ECO-Mark	EU Ecolabel
The product manufacturers must produce the consent clearance as per the provisions of Water (Prevention and control of pollution) Act,1974 and Air (Prevention and control of pollution) Act 1981	Pulp and paper production site must meet all respective legal requirements of the country in which it is located.

Emissions	EU Ecolabel	Blue Angel	ECNZ
Adsorbable organic halides (AOX)	AOX shall not exceed 0.17 kg/ADt from the production of each pulp	AOX < 0.01 kg/Adt during production process	AOX must not exceed: a. 0.17 kg per tonne of paper produced b. 0.25 kg per tonne for each individual pulp.
Total Oxygen Demand (COD), phosphorus (P), sulphur (S) and nitrogen oxides (NOx)	Total Point Score (P)[17]= PCOD + PS + PNOx + PP) shall not exceed 4.0	Total P- 0.008 kg/Adt or 1.2 mg/l.[18]	Total Point Score (P) = PCOD + PS + PP + PNOx must not exceed 4.0
Individual Emissions	The individual point scores for PCOD, PS, PP, PNOx must not exceed 1.3	a. Volumetric flow rate of wastewater- 15 m^3/Adt. b. COD-3 kg/Adt c. BSB5-0.15 kg/Adt or 25 mg/l d. Total N (inorganic + organic N)-(TNb) 0.07 kg/Adt or 15 mg/l	The individual point scores for PCOD, PS, PP, PNOx must not exceed 1.5

[16] Detailed calculations and instruction are found in the Commission Decision EU 2019/70.
[17] Example: P total for COD emission is calculated as: The weighted COD emission for the pulp is added to the measured COD emission from the paper production to give the total COD emission
[18] Adt = air dried ton, TNb=total nitrogen bound.

4.2.5 Use of Hazardous Material and Contaminants

Brightening agent

Korea Eco-label	Blue Angel
Fluorescent brightening agent shall not be used excessively.	1. The use of optical brighteners is not permitted. Exemption: High weight paper (HWC)[19] > 110 g/m^2 Supercalendered (SC)[20] > 75 g/m^2 2. Not permitted for any of the products to exceed a maximum grade of whiteness of 100 % (including the UV proportion) according to ISO 2470 and a maximum CIE whiteness of 135 according to DIN ISO 11475.

Bleaching and complexing agents

EU Ecolabel	Blue Angel	Korea	ECNZ
Chlorine gas in bleaching agent shall not be used. (This requirement does not apply to chlorine gas related to the production and use of chlorine dioxide.)	Chlorine, halogenated bleaching agents and not readily biodegradable complexing agents such as e.g., EDTA and DTPA[21] shall not be used in the processing of recovered paper.	Chlorine bleaching agent (hypochlorite, chlorine dioxide etc.) shall not be used.	Chlorine gas in bleaching agent and EDTA shall not be used.

Surfactants used in de-inking, foam inhibitors and cleaning agents

EU Ecolabel	ECNZ
1. All surfactants used in de-inking processes shall demonstrate ready biodegradability or inherent ultimate biodegradability. **2.** APEOs or other alkylphenol derivatives shall not be added to de-inking chemicals, foam inhibitors or cleaning agents	1. APEOs or other alkylphenol derivatives must not be deliberately added to de-inking surfactants, foam inhibitors or cleaning agents 2. Surfactants used for de-inking recycled paper input shall be readily biodegradable. 3. Foam inhibitors: must not be assigned at the time of assessment any of the ecotoxicity classifications of hazardous materials or

[19] WC paper is high-quality roll printing paper, coated on both sides, containing either wood or recovered paper and with a basis weight of > 75g/m^2.
[20] SC paper is calendered paper that contains a filler, in versions containing wood or recovered paper
[21] ethylenediaminetetraacetic acid (EDTA) and diethylenetriaminepentaacetic acid (DTPA)

EU Ecolabel	ECNZ
	95 % by weight of the constituent substances that have a foam inhibiting or retarding effect must be either readily or ultimately biodegradable. 4. Solvents must not contain halogenated hydrocarbons

Biocidal products: Biocidal products are chemicals that are added to paper to prevent the growth of bacteria, fungi, and other slime-forming microorganisms. These products can help to extend the shelf life of the paper,

EU Ecolabel	Blue Angel	ECNZ
Active substances in biocidal products shall be approved to counter slime-forming organisms or under Regulation (EU) No 528/2012 and shall not be potentially bio-accumulative. [22]	1. Only those slimicides and material preservatives approved in accordance with the Biocidal Products Regulation 528/2012 (EU list of approved active substances) or are still being examined as part of the EU work programme examination of all existing active substances may be used. 2. Only those substances that are also listed in Recommendation XXXVI from the BfR are permitted. 3. The biocidal products in production aids and refining agents approved to protect against microbial deterioration may be used.	Active components in biocides or biostatic agents used to counter slime-forming shall not bioaccumulate or be potentially bio-accumulative.

Dyes and other pigments : Other pigments include colourants, coating materials, production aids and paper refining agents

EU Ecolabel	Blue Angel	Korea	ECNZ
1. Dyes or pigments based on aluminium, silver,	1. Prohibited to add: a. Substances of very high concern	Amount of pigment in plain copier paper	1. No dyes, pigments or coatings shall be used that

[22] A substance is considered to be potentially bioaccumulative if the Log Kow (log octanol/water partition coefficient) ≥3.0 (unless the experimentally determined BCF) ≤100

EU Ecolabel	Blue Angel	Korea	ECNZ
arsenic, barium, cadmium, cobalt, chromium, copper, mercury, manganese, nickel, lead, selenium, antimony, tin or zinc shall not be used. 2. The levels of ionic impurities in the dyestuffs used shall not exceed the following limits: silver 100 ppm; arsenic 50 ppm; barium 100 ppm; cadmium 20 ppm; cobalt 500 ppm; chromium 100 ppm; copper 250 ppm; mercury 4 ppm; nickel 200 ppm lead 100 ppm selenium 20 ppm antimony 50 ppm tin 250 ppm zinc 1500 ppm. 3. APEOs or other alkylphenol derivatives shall not be added to dispersants or coatings 4. Azo dyes, which may release one or more of the aromatic amines listed in Directive 2002/61/EC or Regulation (EC) No 1907/2006 shall not be used	(SVHC) in accordance to REACH[23] b. H Phrases as per Regulation (EC) No 1272/2008 or which are classified as carcinogenic, mutagenic or reprotoxic substances in of TRGS 905 2. Only those production aids and paper refining agents that are listed in Recommendation XXXVI from the BfR for "Paper and board for food contact" (positive list) in sections B and C may be added to the product. 3. No production aids containing glyoxal may be used 4. No azo dyes or pigments may be added in colourants that can cleave into one of the amines stated in Regulation (EC) No. 1907/2006 5. It is not permitted to add any colourants (pigments or	shall be uncoated or ≤ 12 g/m^2	contain phthalates, mercury, lead, copper, chromium, nickel, aluminium or cadmium as constituent parts. 2. The levels of ionic impurities in the dyes and pigments used shall not exceed the following: Ag 100 ppm As 50 ppm Ba 100 ppm Cd 20 ppm Co 500 ppm Cr 100 ppm Cu 250 ppm Fe 2,500 ppm Hg 4 ppm Mn 1,000 ppm Ni 200 ppm Pb 100 ppm Se 20 ppm Sb 50 ppm Zn 1,500 ppm 3. Acrylamide monomer must not be present as a constituent part of coatings 4. Azo dyes or pigments which may release one of the amines (as listed in the standard) must not be used. 5. Substances that have classifications of acute toxicity,

[23] Article 57, Paragraph 1, and so-called "candidate list" according to Article 59, Paragraph 1 of Regulation (EC) No 1907/2006 (REACH)

EU Ecolabel	Blue Angel	Korea	ECNZ
	dyes) containing mercury, lead, cadmium or chromium (VI) compounds as constituent ingredients.		environmental hazard, carcinogenicity, mutagenicity or reproductive toxicity, and any additives must not have a
5. Substances or mixture classified as Group 1, 2 & 3 hazards in accordance with Regulation (EC) No 1272/2008 shall not be used.	6. No mineral oil-based additives, colourants or base oils that contain aromatic hydrocarbons (with ≥ 10 carbon atoms) as a component may be added. However, plant-based substitutes for mineral oil should be free of genetic engineering and sourced from sustainable cultivation		classification of respiratory or skin sensitisation will not be added in paper product or used during the production process.

4.2.6 Waste Management

EU Ecolabel	ECNZ
Production sites shall have a system in place for the handling of waste arising from the production process and a waste management and minimisation plan that shall include: procedures in place for waste prevention, waste separation, reuse and recycling, safe handling of hazardous waste, continuous improvement objectives and targets relating to the reduction of waste generation and the increase of reuse and recycling rates.	Waste Management 1. Must have effective waste management policies and procedures and/or a waste management programme. 2. Must report annually to the Trust on their waste management, and this should include: 3. quantities and types of waste recovered, recycled for reuse internally and externally, waste of disposed of to landfill, waste burned internally for energy recovery, waste generation related to production initiatives taken to reduce waste generation and improve recovery/recycling of waste. 4. Must have improvement objectives and targets for reduction of waste generation, and the increase of reuse and recycling rates over time, where practical. Waste Recovery: **1.** Components of products which are reusable, or recyclable must be able to be separated from other materials/components without the use of special tools or techniques. **2.** The licence holder must confirm that appropriate recycling facilities are available nationwide in

EU Ecolabel	ECNZ
	New Zealand or widely available in the country where the product is sold. **3.** For ECNZ-licensed packaging products, licence holders must report annually to the Trust on product stewardship, including availability, feasibility, and involvement in product take back schemes; 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

4.2.7 Water Management

ECNZ
1. Must have effective water management policies and procedures and/or a water management programme. 2. Must report annually on water management during the paper making process including objectives and targets and initiatives taken to manage fresh water use better and improve water efficiency.

4.2.8 Environmental Management

ECNZ
1. Must have (or establish, if necessary) appropriate management processes or a management system, to obtain, record, verify and maintain relevant information to provide assurance that it consistently meets all the relevant requirements of EC-60. **2.** The paper manufacturing facility must have an ISO 14001-certified Environmental Management System (EMS), or equivalent certification, that includes the paper used for the ECNZ-licensed products.

4.2.9 Packaging

ECO-Mark	EU Ecolabel	ECNZ	Green Seal
Material used for product packaging shall be made from recyclable, reusable or biodegradable material and the parameters evolved for the packaging shall also apply	At least one of the following pieces of information shall appear on the product packaging: Please print double sided' (applicable for paper for office printing purposes) Or 'Please collect used paper for recycling'	1. Primary packaging must be able to be recycled in New Zealand (or the country to which the product is exported and sold). 2. Packaging must not be impregnated, labelled, coated or otherwise treated in a manner, which would prevent recycling (i.e. PVC sleeves, metallic labels).	The sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in any package or packaging component shall not exceed 100 ppm by weight.

ECO-Mark	EU Ecolabel	ECNZ	Green Seal
		3. Record of production records on PVC and/or phthalates used in the packaging. 4. Primary shall consist of any combination of recycled content and/ or waste wood or virgin fibre from native forests that are certified under FSC, PEFC as sustainably managed or equivalent, and/or has been legally harvested.	

4.2.10 Emissions from finished product (TVOCs, VOCs, etc)

Blue Angel

Recycled paper designed for use with electrophotographic printers or copiers (office paper/digital printing paper) must not exceed its emission potential for:

a) VOC: 60 micrograms per gram of paper (µg/g)
b) TVOC: 180 micrograms per gram of paper (µg/g)
c) DIPN: 20 micrograms per gram of paper (µg/g)

4.2.11 Information for Consumers

EU Ecolabel	ECNZ	Korea
Contain the following three statements: a. Low emissions to air and water during production b. Low energy use during production **c.** xx % sustainably sourced fibres/xx % recycled fibres (as appropriate).	If the paper is made from a raw material other than wood-pulp or has a special coating or finish, easy to understand information must be provided to customers about how it should be recycled and recycling routes which must be avoided, especially if the product cannot be recycled via the traditional paper recycling stream.	The reason for certification on the product and the matters contributing to the degradation of environment effect by the product shall be indicated.

5 Indoor Paints

Korea Ecolabel, EU Ecolabel, Blue Angel, Green Pro, and requirements captured under green building rating systems such as LEED, WELL, GRIHA have been considered for providing recommendations on Indoor Paints.

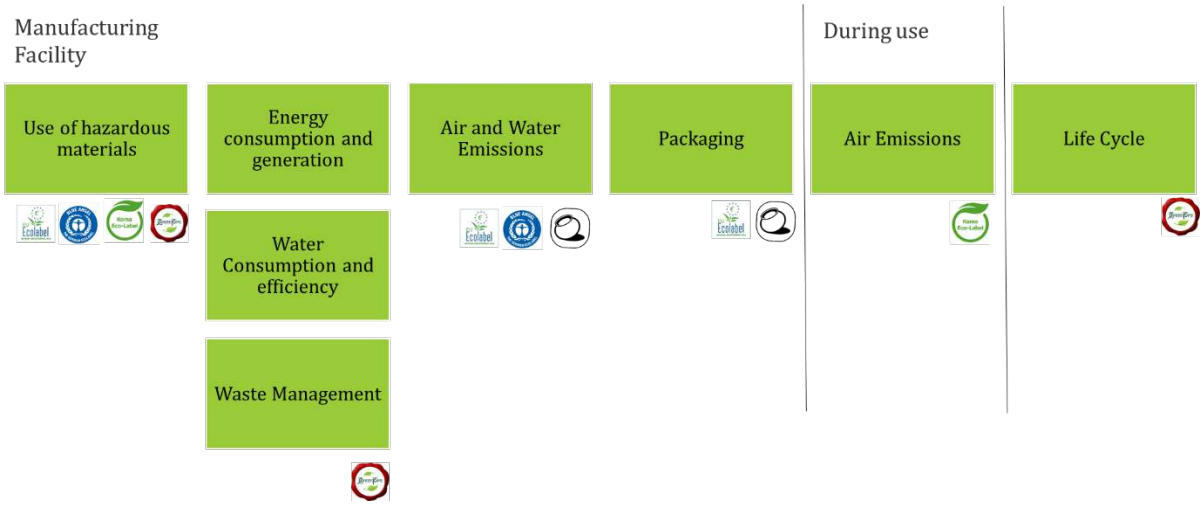
EU Ecolabel	Indoor and outdoor paints and varnishes.	Commission Decision establishing the ecological criteria for the award of the EU Ecolabel for indoor and outdoor paints and varnishes, of 28 May 2014, Official Journal of the European Union.
The Blue Angel	Emulsion paints according to VdL Guideline 11, also in powder form, Primers for wall paints, Silicate emulsion paints, Paint mixing systems (base paint and pigment pastes).	DE-UZ 102, Low-Emission Interior Wall Paints, January 2019 Version 4, Blue Angel.
Korea Eco Label	Paints Polish- finishing materials for the inside and outside of a building (floor decors and finishing materials for walls and ceilings, etc).	Paints, Eco- Label certification criteria, EL241 on January 3,2022, The Korea Environmental Industry & Technology Institute.
Green Pro	Paints	Green Product rating Standard for Paints, Pilot Version, Confederation of Indian Industry.

5.1 Applicable IS Standards

IS 109	Ready mixed paint, finishing, priming, plaster
IS 110	Ready mixed paint, brushing, grey filler, for enamels for use over primers-specification.
IS 133	Enamel, interior: (A) undercoating (B) finishing
IS 137	Ready mixed paint, brushing, matt or eggshell flat, finishing, interior to Indian standard colour as required Specification.

5.2 Environmental Criteria

The environmental criteria have been formulated on the following parameters across different ecolabels.



5.2.1 Energy

Green Pro
Credit points from 1 to 7 are awarded based on reduction in specific energy consumption between ≥ 5% - ≥ 25%. or Credit points of 5 or 7 are awarded for benchmarking in National Benchmarking – Among top 5 Companies or in International Benchmarking – Among top 10 Companies respectively.
Installation of on-site & off-site renewable (both electrical & thermal) energy system to reduce dependence on fossil fuels. On-site renewable energy generation: ≥2.5% - ≤ 5% substitution Off-site Renewable Power: ≥10-30% substitution

5.2.2 Air Emissions (During Manufacturing)

ECO-Mark
The manufacturer shall produce to BIS environmental consent clearance from the concerned State Pollution Control Board as per the provisions of Air (Prevention and Control of Pollution) Act, 1981.

5.2.3 Water (During Manufacturing)

Green Pro	ECO-Mark
1. Implement water efficient measures & technologies and recycle wastewater generated from the plant to reduce the freshwater consumption. 2. Harvest or Capture minimum of 95% of rainwater runoff from roof & non roof areas of the manufacturing facility 3. Implement measures for improving the availability of portable water beyond the fence for the benefit of the local community.	**Compliance to Regulations** The manufacturer shall produce to BIS environmental consent clearance from the concerned State Pollution Control Board as per the provisions of Water (Prevention and Control of Pollution) Act, 1974

5.2.4 Waste Management and Recovery

Green Pro

1. Compliance certificate from State Pollution Control Board.
2. Minimize wastes through 'reduce, reuse and recycle' techniques. Reduce waste disposal to landfill:
    a. Use of Non- Hazardous waste, 10-25% reduction in disposal of waste per unit of production.
    b. 5-20% reduction in hazardous waste going to landfill.

Waste Recovery:
Establish a system for take-back for recycling of products at the end of life & packaging materials after use.

	EU Ecolabel	Blue Angel
Sulphate process	1. SO_x calculated as SO_2: 7.0 kg/t of TiO_2 pigment 2. Sulphate waste: 500 kg/t of TiO_2 pigment	SOx calculated as SO_2: 7,0 kg/tonne TiO_2 pigment. Sulphate waste: 500 kg/tonne TiO_2 pigment.
Chloride process	1. If natural rutile ore is used, 103 kg chloride waste/t of TiO_2 pigment 2. If synthetic rutile ore is used: 179 kg chloride waste/t of TiO_2 pigment 3. If slag ore is used: 329 kg chloride waste/t of TiO_2 pigment	1. If natural rutile ore is used, 103 kg chloride waste/t of TiO_2 pigment 2. If synthetic rutile ore is used: 179 kg chloride waste/t of TiO_2 pigment 3. If slag ore is used: 329 kg chloride waste/t of TiO_2 pigment

5.2.5 Hazardous Substances, Surfactants, Pigments, Preservatives, Plasticizers

Hazardous Substances

EU Ecolabel	Blue Angel	Korea Ecolabel	Green Pro
1. Hazardous classification and risk phrases: The final product present at a concentration of greater than 0,010 %, shall not, unless expressly derogated, contain substances or mixtures classified as toxic, hazardous to the environment, respiratory or skin sensitisers, or carcinogenic, mutagenic or toxic for reproduction in accordance with Regulation (EC) No 1272/2008 or Council Directive 67/548/EC and as interpreted according to the hazard statements and risk phrases. 2. Derogations have been granted for defined groups of substances that may be contained within the final product.	1. May not contain any substances with the following properties as a constituent component: a. Substances which are identified as particularly alarming under the European Chemicals Regulation REACH (1906/2006/EC) and so-called "SVHC list of candidates" b. Classified hazard categories (e.g., acutely toxic, carcinogenic etc) according to the CLP Regulation (EC) No. 1272/2008 c. Classified in TRGS 905 as: carcinogenic, mutagenic, and reprotoxic.	1. The following substances should not be used: a. Organotin compounds [tributyl tins (TBT) and triphenyl tins (TPT)]. b. Halogenated hydrocarbons used as solvents (including oil). c. Formaldehyde and chemicals classified as pesticides. d. Ammonia with a mass fraction of 3% or higher. 2. Substances falling into Group 1, Group 2A and Group 2B of the carcinogenicity classification codes of the International Agency for Research on Cancer (IARC). However, carbon black and titanium dioxide (TiO2) shall be excluded. 3. The sum of Pb, Cd, Hg and Cr6+ should be 1000 mg/kg or less, and Pb should be 90 mg/kg or less	1. Following substances shall not be used during manufacturing process: a. Aromatic Hydrocarbons which affect the human reproductive system b. Halogenated Hydrocarbons which have Ozone depletion potential & toxic to human health

Surfactants

	EU Ecolabel	Blue Angel	Korea
General	1. Derogated classifications: H411 (R51/53),	-	-

	EU Ecolabel	Blue Angel	Korea
	H412 (R52/53), H413 (R53) 2. Sum of total surfactants in paints: 3. White and light coloured: 1.0% w/w 4. All other colours: 3.0% w/w		
Alkylphenol ethoxylates (APEO)	APEO and/or their derivatives may not be added to the wall paint and the raw substances.	APEO and/or their derivatives may not be added to the wall paint and the raw substances.	APEOs (Octylphenol ethoxylate, Nonylphenol ethoxylate) and APs (Octylphenol, Nonylpheno) shall not be used
Perfluorinated surfactants	1. Following long chain perfluorinated surfactants shall not be used: a. Perfluorocarboxylic acids with carbon chain lengths ≥ C8, b. Perfluoroalkyl sulfonates with carbon chain lengths ≥ C6, and related compounds that may degrade to these substances. 2. Other perfluorinated surfactants may only be used in paint that is required to be resistant or repellent to water and to have a spreading rate of greater than 8 m^2/l	It is not permitted for any perfluorinated or polyfluorinated chemicals (PFC), such as fluorocarbon resins and fluorocarbon emulsions, perfluorinated surfactants, perfluorinated sulfonic and carboxylic acids, and substances that could be broken down into these chemicals	-

White Pigments

EU Ecolabel	Blue Angel
1. Derogated metals in pigments- Barium sulphate, Antimony nickel within an insoluble TiO2 lattice, Cobalt aluminate blue spinel, Cobalt chromite blue-green spinel	1. Pigments containing lead compounds may not be added 2. The pigment may not contain more than 200 ppm of lead as process-related,

EU Ecolabel		Blue Angel
2. Pigments containing metals shall only be used where laboratory testing of the pigment shows that the metal chromophore is bonded within a crystal lattice and is insoluble.		technically unavoidable (natural or production-related) impurities.
3. Specific Requirements		
Indoor wall and ceiling paints	Class 1 WSR ≤ 40g/m² TiO2 Class 2 WSR ≤ 36g/m² TiO2	
limed paints, silicate paints, primers, anti-rust paints and facade paints	≤ 36 g/m²	
Indoor wall and ceiling paints (finishes)	≤ 25 g/m²	

Preservatives; Concentration limits for isothiazolinone compounds in any paint or varnish product.

Isothiazolinone Content	EU Ecolabel	Blue Angel	Korea Ecolabel
MIT[24]	0.0200 %	< 1.5 ppm.	≤200(mg/kg).
CMIT[25]	0.0015 %	N/A	≤15(mg/kg).
OIT[26]	0.0500 %	N/A	≤200(mg/kg
BIT[27]	0.0500 %	≤ 10 ppm.	≤500(mg/kg).
CIT	N/A	< 0.5 ppm.	N/A
All other Isothiazolinone	N/A	< 2 ppm	N/A
Formaldehyde	N/A	Free formaldehyde < 10 ppm	shall not be used as preservative
Additional Requirement	1. The sum of isothiazolinone compounds in any paint or varnish product shall not exceed 0.050 % (500 ppm) 2. **Specific requirements for in-can, tinning machine, dry film, and**	Preservative-free wall paint, all individual substances classified as preservatives including formaldehyde must not exceed a limit of 2 ppm, except for CIT < 0.5 ppm and MIT < 1.5 ppm	The total content of isothiazolinone shall be ≤500(mg/kg).

[24] MIT-2-methyl-2H-isothiazol-3-one
[25] CMIT-5-chloro-2-methyl-2H-isothiazol-3-one
[26] OIT-2-octyl-2H-isothiazol-3-one
[27] BIT-1,2-benzisothiazol-3(2H)-one

	preservative stabilizer.	

Plasticizers

EU Ecolabel	Blue Angel	Korea Ecolabel
1. The following phthalates shall not be intentionally added as plasticisers: DEHP, BBP, DBP, DMEP, DIBP, DIHP, DHNUP, and DHP. **2.** Concentration limit for any individual phthalate: 0.010 %	1. Products that contain plasticising substances from the group of phthalates or group of organophosphates or other comparable substances with a high boiling point may not be added. 2. Concentration limit of plasticisers in the final product: 1g/l	Banned phthalates: DBP, BBP, DEHP, DINP, DNOP, DIDP, DIBP

5.2.6 VOCs, VACs, SVOCs

VOC: The maximum content (in g/l) of Volatile Organic Compounds (VOCs) shall not exceed the following limits.

Type of Paint	EU Ecolabel	Blue Angel	Korea Ecolabel	Green Pro	IGBC	GRIHA	ECO Mark
Non-flat (glossy) (g/L)	40	N/A	65	150	150	150	N/A
Flat (Mat)(g/L)	10	N/A	30	50	50	50	N/A
Oil-based for interior	N/A	N/A	≤200	N/A	N/A	N/A	N/A
All paints	N/A	The VOC content shall not exceed a maximum value of 700 ppm.	N/A	N/A	The VOC content shall not exceed a maximum value of 700 ppm.[28]	N/A	The product shall contain not more than 5 percent, by mass, volatile organic

[28] 1g/L=1001.142303 part/million (ppm)

	compounds.[29]

SVOCs: The maximum content (in g/l) of Semi-Volatile Organic Compounds (SVOCs) shall not exceed the following limits.

Type of Paint	EU Ecolabel	Blue Angel
Interior matt (white / tinted)	≤30 / 40 (g/l including water)	N/A
Interior glossy (white / tinted)	≤30 / 40 (g/l including water)	N/A
Primers (white / tinted)	≤30 / 40 (g/l including water)	N/A
All paints	N/A	The SVOC content in its ready-to-use form may not exceed a maximum value of 500 ppm.

VAC: The VAC (Volatile aromatic hydrocarbons) content (mass fraction, %) in a product should meet the following limits. This criterion shall not apply to coating powder.

Type of Paint	Korea Ecolabel
Water-based paints	≤0.10
Oil-based paints	≤2.0

Additional Test Requirements:

Korea Ecolabel
Emissions of VOCs, toluene, and formaldehyde from paints for indoor use 7 days later should meet[30] 1. VOCs: a. Paints ≤1.0 b. Putty ≤4.0 2. Toluene ≤ 0.080 3. Formaldehyde ≤ 0.02 (mg/m^2 ·h)

5.2.7 Packaging

EU Ecolabel	ECO Mark
As per the use of hazardous substances stated above, except VOC limits	The ECO-Marked product shall be packed in such packages which shall be recyclable/reusable or biodegradable. It shall be accompanied with instructions for proper

[29] When tested according to the method prescribed in IS 101 (Part 2/Sec 1) and IS 101 (Part 2/Sec 2).
[30] Tests shall be conducted in accordance with ES 02131.1 of the Official Test Standards for Indoor Air Quality.

	use to maximize product performance and minimize wastage.

5.2.8 Life Cycle Approach

Green Pro
1. Carry out Life cycle analysis of the product for the boundary conditions, from the raw material sourcing to recycling / disposal of the manufactured products. 2. The product manufacturer can carry out the life cycle analysis with the support of external service provider or with internal expertise using a LCA software tool. **3.** Based on the Life Cycle impact analysis, implement measures for reducing the environmental impacts.

5.2.9 Information for Consumers

EU Ecolabel	**Blue Angel**	**Korea Ecolabel**
The following texts shall appear on or be attached to the packaging: a. Minimise paint wastage by estimating how much paint you will need' b. 'Recover unused paint for re-use'. c. 'Reuse of paint can effectively minimise the products' life cycle environmental impact' d. Safety measures for the user. e. The use of cleaning equipment and appropriate waste management (in order to limit water and soil pollution). f. Storage of the paint in appropriate conditions (before and after opening), including, where appropriate, safety advice. Optional: a. Minimised content of hazardous substances — Reduced content of volatile organic compounds (VOCs): x g/l b. Good performance for indoor use	The following texts shall appear on the container and the technical data sheet a. "Ensure good ventilation during application and drying." b. If the product can be applied by spraying: "Use an A2/P2 combination filter and protective goggles for the spray mist." c. "Do not eat, drink or smoke when handling the wall paint. " d. "Wear protective goggles if there is a risk of spraying." e. "In case of contact with skin or eyes, rinse immediately with plenty of water." f. "If the base paint or a wall paint is toned using a pigment paste or toning paste that does not conform to the requirements of the Blue Angel, the toned paint no longer complies with the criteria for the Blue Angel." g. If the product is not advertised as being preservative-free: "May contain traces of preservatives."	Reasons for certification of a product including contributions the product makes to reducing environmental impacts shall be stated on a catalog, etc.

EU Ecolabel	Blue Angel	Korea Ecolabel
	h. "Do not allow to enter drains, water bodies, ground or soil." i. "Clean tools with plenty of water and soap immediately after use."	

6 Textiles

Internationally, there are 107 ecolabels related to the textiles. According to the review conducted by accessing the Ecolabel Index (2021), 55 European ecolabels, 55 US ecolabels, 41 Asian ecolabels, 18 Latin American ecolabels, 19 Oceanian ecolabels, and 12 Africa ecolabels were identified.

Some of the popular international ecolabels are Blue Angel, Bluesign standard, Canada Organic, China Environmental Labelling, ECO-Mark India, EU Ecolabel, Green Choice: Philippines, Nordic Swan, Global Organic Textile Standard (GOTS), Made in Green by OEKO-TEX, OEKO TEX 100, and Better Cotton Initiative (BCI). The most popular ones in India are Better Cotton Initiative (BCI), India Organic, Fair Trade, GOTS, OCS (Organic Content Standard) Certified.

EU Ecolabel	Cotton and other natural cellulosic seed fibres, flax and other bast fibres, wool and other keratin fibres, acrylic, elastane, polyamide, polyester, polypropylene man-made cellulose fibres (lyocell, modal and viscose)	Commission Decision 2014/350/EU, Establishing the ecological criteria for the award of the EU Ecolabel for textile products, June 5, 2014.
Blue Angel Ecolabel	Textile clothing, fibres, yarn, fabric, knitted and crocheted items, nonwovens (including textile composites)	DE-UZ 154: Textiles, Basic Award Criteria, The German Ecolabel, Version 1.9, July 2017
Kore Eco Label	Clothing	EL311: Clothing, Eco-label Certification Criteria, The Ministry of Environment, Revision Jan 3, 2022.
BCI	Cotton	Better Cotton Principles and Criteria V2.1, Better Cotton Initiative, 1 March 2018
India Organic	Organic textiles covering organic fibres, including fibres, yarns, fabrics, made-up and garments.	Indian Standards for Organic Textiles (ISOT), India Organic, National Programme for Organic Production, Ministry of Commerce and Industry.
Fair Trade	Finished textiles, cotton and other responsible fibres,	Fairtrade Textile Standard, Fairtrade International, Version 1.2, March 22, 2016. Sustainable Fibre Criteria, Fairtrade International.

GOTS	Fibre products, yarns, fabrics, garments, fashion textile accessories (carried or worn)	Global Organic Textile Standard (GOTS) , Global Organic Textile Standard, Version 6.0, March 01, 2021.

Around 380 manufacturers and suppliers have participated in the Better Cotton Initiative (BCI).[31] In 2017-2018, Indian BCI farmers achieved 24% higher profits by using 19% less pesticide and 15% less synthetic fertilizers.[32] There are 301 Indian cotton and textile producers and businesses that are Fairtrade certified[33], 2479 with GOTS certification[34] and 42 with India Organic certification. Most of these manufactures have opted for multiple certifications. For example, Cotspin India Ltd, Adisankara Spinning Mills Private Ltd, and almost 180 others have both BCI and Fairtrade certifications.

6.1 Applicable IS Standards

ECO-Mark criteria are available for thirteen products within the textile department, including those for synthetic fibres, packaging material (Jute bags), fibres and yarn (viscose, polyester), cushioning (coir) and clothes (men knitted cotton t-shirt, baby clothing, close to skin, outwear). The identified IS standards for ECO-Mark fall within the scope of equivalent products identified by international ecolabels. However, this IS standard list can be expanded provided the product fulfils the requirements of any relevant sections of these standards.

6.1.1 Crop and other natural raw fibre and yarn

IS 171	Ring spun grey cotton yarn for weaving
IS 834	Ring Spun Grey Cotton Yarn for Hosiery

6.1.2 Synthetic and recycled raw fibre and yarn

IS 17266	Viscose staple fibres
IS 17265	100 percent polyester spun grey and white yarn
IS 17264	Polyester industrial yarn
IS 17263	Polyester staples fibres
IS 17262	Polyester partially oriented yarn (POY)
IS 17261	Polyester continuous filament fully drawn yarns

[31]https://bettercotton.org/membership/find-members/?_sft_member_country=india&_sft_member_categories=suppliers-and-manufacturers
[32] https://bettercotton.org/field-level-results-impact/demonstrating-results-and-impact/farmer-results/
[33] https://www.fairtrade.net/finder
[34]https://global-standard.org/find-suppliers-shops-and-inputs/certified-suppliers/database/search_results?total=2479

6.1.3 Textile and apparel products

IS 15651 Requirements for environmental labelling
IS 4375 Men's cotton knitted sports shirt/T-shirt

IS 15651, is an over-arching standard that outlines the requirements for environmental labelling. Each of the product standards also have product specific requirements.

The final IS standard list eligible for ECO-Mark certification could be decided upon consultation with BIS.

6.2 Environmental Criteria – Fibres & Yarns

6.2.1 Raw Materials – Sourcing and Concentration

General Requirements

EU Ecolabel	Blue Angel	India Organic	Fair Trade
With the exception of polyamide and polyester these criteria do not have to be met: a. By the whole product if it contains fibres that contain recycled content constituting at least 70 % by weight of all fibres in the product b. By individual fibres forming part of the ecolabelled product which contain at least 70 % by weight of recycled content.	Textile clothing and textile accessories consisting of at least 90% textile fibres by mass	The product contains 95% certified organic fibre and is subsequently treated as per this standard. Non-organic content of 5% could be composed of regenerated (synthetic) and man-made fibres. If fibre content is less than 95 per cent and more than 70 per cent in the final product, the textiles should be labelled as 'made with organic fibre'. The rest 30% of the composition shall be natural fibre devoid of GMO fibre and/ or synthetic regenerated fibre. <u>For accessories</u>: Natural/man-made fibres (Polyester, Viscose, Nylon, Polyurethane) are permitted but preferably natural materials should be	<u>For products sold, labelled or represented as "organic" or "organic-in conversion"</u> No less than 95% (≥95%) of the fibre content of the products - excluding accessories - shall be of certified organic origin and up to 5% (≤5%) of the fibre content of the products may be made of non-organic fibres that are specifically listed under 'additional fibre materials'. No fibres shall be used which originate from production projects with regard to which there is evidence of a persistent pattern of gross violations of the ILO core labour norms (as far as these are relevant for agriculture) and/or of animal welfare principles (including Mulesing) or

EU Ecolabel	Blue Angel	India Organic	Fair Trade
		used as much as possible.	irrefutable evidence of a persistent pattern of land grabbing methods. For products sold, labelled or represented as "made with x % organic materials" or "made with x % organic-in conversion materials" Same as above but with 70% (≥70%) and 30% (≤30%).

Specific Requirements have been provided for:

a) **Recycled Fibres**
b) **Man-made Cellulose fibres**
c) **Synthetic Fibres**
d) **Natural Fibres**
    i. **Legal Compliance**
    ii. **Raw Materials**
        - **Plant Based Fibres**
        - **Flax and other bast Fibres**
        - **Animal Husbandry**
    iii. **Crop Cultivation Practices**
        - **Pest Management**
        - **Water use and emissions**
        - **Soil Health**
        - **Biodiversity**

a) Recycled Fibres: Recycled fibres are fibres that contain a recycled content are defined as fibres originating from pre-consumer waste[35] and post-consumer waste[36].

EU Ecolabel	Blue Angel	GOTS
Recycled content shall be traceable back to the reprocessing of the feedstock and verified by independent third-party certification of the chain of custody or by documentation by suppliers and reprocessors.		Recycled synthetic (polymer) fibres from pre- or post-consumer waste: only polyester, polyamide,

[35] Pre-consumer waste includes polymer and fibre production waste, cuttings from textile and clothing manufacturers
[36] Post-consumer waste includes textile and all kind of fibre and textile products, as well as non-textile waste including PET drinking bottles and fishing nets

EU Ecolabel	Blue Angel	GOTS
		polypropylene, elastomultiester (elasterell-p) and polyurethane (elastane).

b) Man-made Cellulose Fibres: Staple, filament, viscose, lyocell and modal fibres

EU Ecolabel	GOTS
A minimum 25 % of pulp fibres shall be manufactured from wood that has been grown according to the principles of sustainable forestry management as defined by the UN FAO. The remaining proportion of pulp fibres shall be from pulp that is sourced from legal forestry and plantations.	Regenerated fibres like lyocell, viscose or modal: raw materials used shall be non-GMO. Lyocell or protein-based fibres derived from non-GMO sources and from certified organic raw materials or pre- or post-consumer waste or from raw materials certified according to a programme that verifies compliance with sustainable management principles
A minimum of 50 % of the pulp used to manufacture fibres shall be purchased from dissolving pulp mills that recover value from their spent process liquors either by: a. Generating on-site electricity and steam b. Manufacturing chemical co-products.	

c) Synthetic Fibres : Polyester, polyamide (or nylon), polyacrylic, elastane, polypropylene, elastolefin fibres

EU Ecolabel	Blue Angel	GOTS
Polyester: The level of antimony present in the polyester fibres shall not exceed 260 ppm (except fibres manufactured from recycled PET bottles). Fibres shall be manufactured using a minimum content of PET that has been recycled from pre-consumer and/or post-consumer waste. Staple fibres shall contain a minimum content of 50 % and filament fibres 20 %.	Polyamide: Fibres must be manufactured using a minimum content of 20% nylon that has been recycled from production and/or consumer waste.	Virgin synthetic (polymer) fibres: Only polyamide, polypropylene, elastomultiester (elasterell-p) and polyurethane (elastane) are used. PLA (polylactic acid) fibre produced from non-GMO bio-mass sources is allowed.

d) Natural Fibres

Legal Compliance: This section refers to compliance with equivalent ecolabels or third-party certification for crop cultivation and animal husbandry.

EU Ecolabel	Blue Angel	Fair Trade	India Organic	GOTS
A minimum of 10 % of the cotton shall be grown according to the requirements laid down in Council Regulation (EC) No 834/2007, the US National Organic Programme (NOP) or equivalent legal obligations set by trade partners of the EU. A minimum of 20 % of the cotton shall be grown according to IPM principles as defined by the UN Food and Agricultural Organisation (FAO) IPM programme, or Integrated Crop Management (ICM) systems incorporating IPM principles.	Cotton, kapok, linen, hemp, flax, wool and other plant-based raw materials must be sourced from controlled organic cultivation or biological animal husbandry or from fibres from the conversion phase and comply with the requirements of Regulation (EC) No 834/2007, or the US National Organic Programme (NOP). If cotton cannot be sourced from the controlled organic cultivation of cotton, an inspection can be conducted that follows a similar process to standards such as e.g., CmiA, BCI and Fairtrade.	The following schemes have been approved by Fairtrade International as certifiers of sustainable fibres 1. USDA: NOP 2. Cotton made in Africa (CmiA) 3. (EC) No 834/2007 (EC Organic Regulation)	Products that are produced and manufactured in compliance with this standard shall be certified under the APEDA National Programme for Organic Production (NPOP).	Any natural fibres that are approved in the IFOAM Family of Standards such as Regulation (EC) No 834/2007 (EC Organic Regulation), USDA NOP, APEDA NPOP, China Organic Standard GB/ T19630.

Raw Materials for Different Types of Natural Fibres

Type	Blue Angel	India Organic	GOTS
Plant-Based Raw Materials	Plant-based raw materials for the production of latex must be sourced from wood that has been cultivated in accordance with the principles of sustainable forestry management as defined by the FAO. The fibres used in the products must not be sourced from genetically modified organisms (GMO)		Non-GMO conventional natural vegetable fibres
Flax and other bast fibres	Retting of flax and other bast fibres from the farmers/ suppliers shall be under ambient conditions and without thermal energy inputs.		
Animal Husbandry	Verification of the traceability of the goods/filling, as well as verification that no feathers are extracted from living animals, must be provided in audit reports or certificates from qualified and accredited testing institutions, for example according to the Responsible Down Standard, Traceable Down Standard or the DOWNPASS standard	As per NPOP	Non-GMO conventional animal fibres

Crop Cultivation Practices

Pest Management

EU Ecolabel	BCI	ECO-Mark
1. All cotton, with the exception of organic cotton and cotton from IPM schemes, shall be grown without the use of any of the following substances: Alachlor, aldicarb, aldrin, campheclor (toxaphene), captafol, chlordane, 2,4,5-T, chlordimeform, chlorobenzilate, cypermethrin, DDT, etc. 2. Cotton shall not contain more than 0.5 ppm in total of the substances listed above. 3. All cotton grown according to the organic and IPM production standards shall be traceable from the point of verification of the production standard up until, as a minimum, greige fabric production.	1. The adoption of Integrated Pest Management (IPM) Programme 2. Use of nationally registered pesticides. 3. Phase out of pesticides classified as hazardous (acute toxicity), carcinogenic mutagenic or reprotoxic (CMR) substances. 4. Appropriate handle, storage and dispose of pesticides to avoid environmental harm and human exposure.	Specifies list of pesticides registered for use on cotton and jute cultivation, as well as during rearing of silkworm.

Water use and emissions

BCI
Crop Cultivation: : Prescribes the use of freshwater within limits and the reduction of pollution created by application of agrochemicals and farm runoffs Animal Husbandry: 1. The chemical oxygen demand (COD) of the cleaning water discharged into the sewerage system must not exceed 45 g/kg of greasy wool before mixing with other wastewater. 2. The chemical oxygen demand (COD) of the cleaning water treated on-site and discharged to surface waters must not exceed 150 mg/l (qualified random sample) or 1.5 mg/l (2-hour mixed sample) of greasy wool. 3. The pH value of the wastewater discharged to surface waters must be between 6 and 9 (unless the pH value of the receiving waters is outside this range) and the temperature must be below 35 °C (unless the temperature of the receiving waters is already above this limit).

Soil Health

BCI
Soil Management activities to maintain soil structure and fertility, such as: a. Accessing the availability of nutrients and the pH level of the soil, soil aspects such as pollutants (both organic and metallic) and humus levels. b. Maintaining and enhancing the soil structure and fertility. c. Continuously improving the nutrient cycle

Biodiversity

BCI
The conservation and enhancement of biodiversity on and around the farm which includes the following components: a. Identifying and mapping biodiversity resources b. Identifying and restoring degraded areas c. Enhancing populations of beneficial insects as per the Integrated Pest Management plan

6.2.2 Emissions during production, manufacturing, and processing

General Requirements

ECO-Mark	**India Organic**	**Fair Trade**	**GOTS**
The product manufacturers must produce the consent clearance as per the provisions of Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981, Water (Prevention and Control of Pollution) Cess Act, 1977, respectively, along with the authorization, if required under Environment (Protection) Act, 1986	The processing unit shall have policies and procedures in place for environmental management as per the norms of the respective State and Central Pollution Control Boards. The environmental management practices should cover the following: a. Effective Environment Management	Apply for appropriate emissions control techniques for any manufacturing operations that generate air pollutants. Control techniques include ventilation, absorption, physical and chemical scrubbing, closed-loop-systems for recovery of solvents, noise/odour and	Assure compliance with the applicable national and local legal environmental requirements applicable to their processing/ manufacturing stages (including those referring to emissions to air, wastewater discharge as well as disposal of waste and sludge).

ECO-Mark	India Organic	Fair Trade	GOTS
and the rules made thereunder to the Bureau of Indian Standards while applying for ECO-Mark.	System with a written Policy Statement b. Delegation of responsibilities c. Monitoring air and water pollution Wastewater, before discharge, shall be purified to the extent it meets the local standards as laid down by the Pollution Control Board. Wastewater analyses and treatment details should be documented. The effluent treatment plants for the wastewater processing must have an approval as per the norms laid by the State or Central Pollution Control Boards.	vibration reduction equipment. Significant sources of air pollutants are coating and dyeing operations, printing, drying (fabrics, yarns and prints), fibre processing generating dust (bale breakers, automatic feeders, separators and openers, mechanical conveyors, pickers, cards).	

Specific Requirements

Type of fibre	EU Ecolabel	Blue Angel
Recycled Fibre	Recycled content shall be traceable back to the reprocessing of the feedstock and verified by independent third-party certification of the chain of custody or by documentation by suppliers and processors.	
Man-made Cellulose fibres	In the case of **viscose and modal fibres**, the sulphur content of the emissions of sulphur compounds to air, must not exceed: 30 g/kg of staple fibres produced 40 g/kg of filament fibres for batch washing 170 g/kg of filament fibres for integrated washing. If both types of fibres are produced at a particular site, the total emissions must not exceed the corresponding weighted average value.	
	The resulting total amount of chlorine and organically bound chlorine in the wastewater from pulp manufacturing (AOX) shall not exceed 0.170 kg/ADt pulp.	The waste-water from the production of **viscose fibres** must not exceed the following values (expressed as annual averages) when discharged to surface waters: 0.3 g zinc /kg filament fibres produced 0.16 g zinc /kg staple fibres produced 0.04 g AOX /kg viscose fibres produced, *Adsorbable organic halogens (AOX)* 20 g COD /kg viscose fibres produced 0.3 mg sulphide/l.

Type of fibre	EU Ecolabel	Blue Angel
	The sulphur content of the emissions of sulphur compounds to air from fibre production processes shall not exceed: 30 g/kg for Staple fibre 40 g/kg for filament fibre from batch washing 170 g/kg for filament fibre from integrated washing	Same as EU. In addition, if both types of fibres are produced at a particular site, the total emissions must not exceed the corresponding weighted average value.
Synthetic Fibres	Polyester Fibre: **VOC emissions** in the sense of the Industrial Emissions Directive (2010/75/EU) during polymerisation and the production of polyester fibres, expressed as an annual average, must not exceed: a. 1.2 g/kg for PET chips b. 10.3 g/kg for filament fibres or 0.2 g/kg for produced polyester resin	
	Polyamide fibre: **N_2O emissions** to air during the monomer production, expressed as an annual average, must not exceed: 9 g/kg of polyamide 6 fibre produced, or 9 g/kg of polyamide 6.6 fibre produced.	
	Acrylic: The emissions to air of acrylonitrile (during polymerisation and up to the solution ready for spinning), expressed as an annual average, shall be less than 1 g/kg of fibre produced. The workplace emissions to air of the following substances during polymerisation and spinning shall not exceed the following indicative occupational exposure limit values (IOELV): a. diphenylmethane-4,4'-diisocyanate (101-68-8) 0,005 ppm b. toluene-2,4-diisocyanate (584-84-9) 0,005 ppm c. N,N-dimethylacetamide (127-19-5) 10,0 ppm	Polyacrylic fibres: The emissions to air of acrylonitrile (during polymerisation and up to the solution ready for spinning), expressed as an annual average, must be less than 1 g/kg of fibre produced.
		Elastane fibre: The concentration of aromatic diisocyanates to air from the polymerisation and the spinning processes must not exceed a value of 0.05 mg/m^3 (corresponds to 0.005 ml/m^3) at the workplaces in which the relevant process steps occur, expressed as an 8-hour average.
Natural Fibres	Hemp, flax, and other blast fibres: Water used in the aid of water retting process must be treated to reduce the chemical oxygen demand (COD) or the total organic carbon by at least 75% (hemp) - 95% (flax and other bast fibres). The COD is tested as per ISO 6060.	
	Greasy wool: The COD limits for greasy wool scouring: coarse wool ≤ 5 g/kg fine wool ≤ 45 g/kg	Greasy wool: 1. The COD limit for greasy wool scouring before mixing to the sewerage system ≤ 45 g/kg

Type of fibre	EU Ecolabel	Blue Angel
		2. The COD limit for greasy wool scouring discharged to surface water ≤ 150 mg/l 3. The pH value of the waste water discharged to surface waters must be between 6 and 9 (unless the pH value of the receiving waters is outside this range) and the temperature must be below 35 °C.
		Wastewater from the wet processing of down and feathers (geese and ducks) must not exceed the following values (in mg/l) when discharged to surface water: COD: 160 mg/l (expressed as an average yearly value) BSB5: 30 mg/l TSS: 30 mg/l Ammonium nitrogen: 10 mg/l Total nitrogen: 20 mg/l Phosphorous, total 2 mg/l Copper: 1 mg/l Nickel: 0.5 mg/l Total chromium: 0.5 mg/l Chromium (VI): 0.1 mg/l Tin: 2 mg/l Zinc: 2 mg/l Persistent foam at the discharge point pH value between 6 to 9

6.2.3 Use of chemical / toxins during production, manufacturing, and processing

General Requirements:

India Organic	Fair Trade	GOTS	ECO-Mark
Policies and procedures to optimise the utilisation of dyes/ chemicals/ auxiliaries in use with plans and strategy to minimise further usage.	No use substances and preparations for application in its processes as per the specified prohibited material list. The list includes substances classified by the EU as endocrine disruptors, chemicals with specific hazard statements (risk phrases) related to health and environmental hazards, and disperse dyestuffs classified as allergenic. Fairtrade does not apply the processes that are highly hazardous for the environment and the human health such as: a. chlorine bleaching b. cross-linking agents with high formaldehyde levels	Lists chemical inputs that may (potentially) be used in conventional textile processing but that are explicitly banned or restricted for environmental and/or toxicological reasons in all. List of prohibited or restricted substance groups or individual substances related to hazards and toxicity'.	The product manufacturers must produce the consent clearance as per the provisions of Environment (Protection) Act, 1986 and the rules made thereunder to the Bureau of Indian Standards while applying for ECO-Mark. Additionally, the manufacturer shall produce documentary evidence on compliance of the provisions related to noise level and

India Organic	Fair Trade	GOTS	ECO-Mark
	(see Oeko Tex 100 limits for free formaldehyde) c. Toxic and persistent organic and inorganic textile preservation chemicals (e.g.,organic tin compounds, brominated compounds, chlorinated benzenes and toluene, dieldrin, arsenic, and mercury) d. Use of chrom-salts for colour fastness e. Sandblasting and Potassium Permanganate spray for finishing f. Nano-materials (as per GOTS V.4 definition of nano-particles: particles with a size < 100 nm) Replace the following substances with ecological alternatives: a. biological active products b. PFOS, PFOA c. non-biodegradable and non-bio eliminable complexing agents, tensides and surfactants d. PVC in prints and accessories		occupational health under the provisions of Factories Act, 1948 and rules made - thereunder.

Specific Requirements:

Type of fibre	EU Ecolabel	Blue Angel
Man-made cellulose fibres	Pulp used to manufacture fibres shall be bleached without the use of elemental chlorine. The resulting total amount of chlorine and organically bound chlorine in the finished fibres (OX) shall not exceed 150 ppm or in the wastewater from pulp manufacturing (AOX) shall not exceed 0.170 kg/ADt pulp.	The halogen content of the fibres must not exceed 150 mg/kg.
Synthetic fibres	Polyester: The level of antimony present in the polyester fibres shall not exceed 260 ppm (except fibres manufactured from recycled PET bottles). Fibres shall be manufactured using a minimum content of PET that has been recycled from pre-consumer and/or post-consumer waste. Staple fibres shall contain a minimum	Elastane fibre: The use of organotin compounds is not permitted. Polypropylene fibres: It is not permitted to use lead-based pigments

Type of fibre	EU Ecolabel	Blue Angel
	content of 50 % and filament fibres 20 %.	Elastolefin: The spinning oils used in the production of elastolefin may not contain the following substances: a. Octamethylcyclotetrasiloxane D4 CAS 556-67-2 b. Decamethylcyclopentasiloxane D5 CAS541-02-6 c. DodecamethylcyclohexasiloxaneD6C AS540-97-6

6.2.4 Energy

India Organic	Fair Trade	GOTS
1. Policies and procedures as per the norms of the respective State and Central Pollution Control Boards 2. Environmental Management Plans to optimise utilization of energy in use and plans and strategy to minimise further usage.	Measure energy consumption and develop a plan for reduction and recovery.	Environmental policy and procedures in place to monitor data on energy resources and their consumption and to reduce energy per kg of textile output.

6.2.5 Water Consumption

India Organic	Fair Trade	GOTS
Policies and procedures as per the norms of the respective State and Central Pollution Control Boards to optimise the utilisation of water in use with plans and strategy to minimise further usage	State measures to reduce water consumption and/ or water reuse during wet processing.	Environmental policy and procedures in place to monitor data on water resources and their consumption and to reduce energy per kg of textile output.

6.2.6 Waste Management

India Organic	Fair Trade	GOTS
Policies and procedures as per the norms of the respective State and Central Pollution Control Boards Environmental Management Plans to cover a waste management plan and a waste disposal programme.	Requires companies to develop measures for waste reduction and documents the reduction of the waste. Waste should be collected and separated according to local requirements. The reuse of empty hazardous chemical containers for food	Compliance to applicable national and local legal environmental requirements referring to disposal of waste and sludge. Environmental policy and procedures in place to allow monitoring of waste and discharges and improving

India Organic	Fair Trade	GOTS
	and water storage is prohibited. These containers and all equipment that have been in touch are disposed or stored in a proper way. Companies are also required to have a waste management plan that includes strategies in waste reduction, recycling, reuse and disposal alternatives. The hazardous waste generated, or waste classified as special waste are to follow national and local legislation to avoid any pollution to ground water and air. This hazardous waste should not be stored on site and requires designated areas for storage and disposal exist.	relevant environmental performances in their facilities. On-site waste burning or uncontrolled waste landfilling shall not be undertaken.

6.3 Environmental Criteria – Apparels

6.3.1 Use of Chemicals and hazardous substances

EU Ecolabel	Blue Angel	India Organic
1. Prohibited use of Quaternary ammonium compounds, and nanomaterials with the listed H-phrases. 2. Substances in accordance with Regulation (EC) No 1272/2008 or Council Directive 67/548/EC, meeting the criteria for classification for phrases and risks (by EU ecolabel) shall not be used. 3. Derogation conditions (as classified by EU ecolabel) in accordance with Article 6(7) of Regulation (EC) No 66/2010 are provided for specific hazardous substances. 4. SVHC's that have been identified according to	1. Prohibited use of Quaternary ammonium compounds, and nanomaterials with the listed H-phrases. 2. Siliconquats, esterquats and fastness enhancers must not contain certain properties which are identified as particularly alarming under the European Chemicals Regulation REACH, and substances that are classified as H Phrases according to the European Commission. These properties must also comply with the limit values of the	India Organic ecolabel prohibits the use of solvents, phenols, chlorophenols, formaldehyde, GMOs and their derivatives (enzymes), fluorocarbons, organotin compounds, quaternary ammonium compounds, plastisol, flame proofing chemicals and inputs containing heavy metals such as antimony, arsenic, cadmium, chromium, cobalt, lead, mercury, nickel, selenium, zinc, copper and tin.

EU Ecolabel	Blue Angel	India Organic
Regulation (EC) No 1907/2006 (REACH) in shall not be present in any production stage unless a derogation has been approved. 5. At least 95 % by weight of fabric softeners, complexing agents and surfactants shall be readily biodegradable under aerobic conditions or inherently biodegradable and/or eliminable in wastewater treatment plants. 6. All non-ionic and cationic surfactants must also be readily biodegradable under anaerobic condition.	Manufacturing Restricted Substance List (MRSL).[37] 3. Monomers or additives that turn into polymers during the manufacture of plastics or are chemically (covalently) bound to the plastic if their residual concentrations below the classification thresholds for mixtures are exempted.	
Spinning: At least 95 % (by dry weight) of the component substances during preparations shall be readily biodegradable. At least 90 % (by dry weight) of the component substances in Spinning solution additives, spinning additives and preparation agents (including carding oils, spin finishes and lubricants) shall be readily biodegradable, inherently biodegradable or eliminable in wastewater treatment plant.	N/A	Spinning: Use of products is restricted to: Paraffin, Paraffin oils, natural waxes and substances derived from natural raw materials.
<u>Pre-treatment process</u>: Chlorine agents shall not be used for the bleaching of any yarns, fabrics, knitted panels or	<u>Pre-treatment process</u>:	<u>Pre-treatment process</u>:

[37] http://www.roadmaptozero.com/programme/manufacturing-restricted-substances-list-mrsl-conformity-guidance/

EU Ecolabel	Blue Angel	India Organic
end-products with the exception of man-made cellulose fibres.	Use of chlorinated bleaching agents during pre-treatment is not permitted.	Restricted to oxygen-based bleaches (peroxide, ozone, etc.) during bleaching.
Dyeing phase: Halogenated dyeing accelerants (carriers) shall not be used to dye synthetic fibres and fabrics or polyester-wool blends. Azo dyes shall not be used that may cleave to aromatic amines that are known to be carcinogenic. CMR dyes shall not be used that are carcinogenic, mutagenic or toxic to reproduction. Potentially sensitising dyes shall not be used that are potentially sensitising. Chrome mordant dyes shall not be used. Metal complex dyes based on copper, chrome and nickel shall only be permitted for dyeing in wool fibres, polyamide fibres, blends of wool and/or polyamide with man-made cellulose fibres.	Dyeing phase: It is not permitted to use mordant dyes containing chromium salts and metal dyes made from copper, chromium or nickel in the dyeing phase.	Dyeing phase: Requires dyes to meet ETAD limits and the use is restricted to dyes free of objectionable amines.
Finishing process: Biocide finishes shall not be incorporated into fibres, fabrics or the final product in order to impart biocidal properties. Halogenated substances or preparations shall only be applied to wool slivers and loose scoured wool. Fluorinated water, stain and oil repellent treatments shall not be used. These shall include Perfluorinated and	Finishing process: Biocidal products, as defined in the Biocidal Directive (EU) 528/201222, and biostatic products is not permitted in the finishing process.	Finishing process: Restricts the use of GMO enzymes.

EU Ecolabel	Blue Angel	India Organic
polyfluorinated treatments. Non-fluorinated treatments shall be readily biodegradable and non-bio accumulative in the aquatic environment including in aquatic sediment. Specific (as per EU ecolabel) flame retardants shall not be used.		

Korea Ecolabel	Fair Trade	GOTS	ECO-Mark
Halogenated synthetic resins including PVC should not be used for fabric of a product or a part weighing at least 25g.	No use substances and preparations for application in its processes as per the specified prohibited material list. The list includes substances classified by the EU as endocrine disruptors, chemicals with specific hazard statements (risk phrases) related to health and environmental hazards, and disperse dyestuffs classified as allergenic. Fairtrade does not apply the processes that are highly hazardous for the environment and the human health such as: a. cross-linking agents with high formaldehyde levels (see Oeko Tex 100 limits for free formaldehyde) b. Toxic and persistent organic and inorganic textile preservation chemicals (e.g.,organic tin compounds,	Lists chemical inputs that may (potentially) be used in conventional textile processing but that are explicitly banned or restricted for environmental and/or toxicological reasons in all. List of prohibited or restricted substance groups or individual substances related to hazards and toxicity'.	The product manufacturers must produce the consent clearance as per the provisions of Environment (Protection) Act, 1986 and the rules made thereunder to the Bureau of Indian Standards while applying for ECO-Mark. Additionally, the manufacturer shall produce documentary evidence on compliance of the provisions related to noise level and occupational health under the provisions of Factories Act, 1948 and rules made - thereunder.

Korea Ecolabel	Fair Trade	GOTS	ECO-Mark
	brominated compounds, chlorinated benzenes and toluene, dieldrin, arsenic, and mercury) c. Nano-materials (as per GOTS V.4 definition of nano-particles: particles with a size < 100 nm)		
N/A	N/A	<u>Spinning:</u> Any paraffin products used shall be fully refined with a limited value for residual oil of 0.5%. Machine oils shall be heavy metal-free. Synthetic fibres, which are to be dissolved at a later processing stage, are not allowed to be used	
<u>Pre-treatment process</u>: Chlorine bleach shall not be used.	<u>Pre-treatment process</u>: Chlorine bleaching shall not be used	<u>Pre-treatment process</u>: Ammonia treatment- Prohibited Beaches- On basis of oxygen only (peroxides, ozone, etc.). Exceptions for non-cotton fibre products where oxygen bleaches are not sufficiently functional, provided they meet the basic requirements as set above. Boiling, kiering, washing- Allowed provided they meet the basic requirements	N/A

Korea Ecolabel	Fair Trade	GOTS	ECO-Mark
		as set above. Washing detergents shall not contain phosphates. Chlorination of wools- Prohibited Desizing- Allowed are GMO free enzymatic desizing. Mechanical/thermal treatments- Allowed Mercerization- Allowed provided they meet the basic requirements as set above. Alkali shall be recycled. Optical brightening- Allowed are optical brightening agents (OBAs) that meet all criteria for the selection of dyes below. Dyeing only. Other, not explicitly listed pre-treatment methods- Allowed are mechanical / thermal pre-treatment methods and such with the use of substances on basis of natural materials.	
Dyeing Phase: Dyestuffs classified as carcinogenic under KS K 0735 and dyestuffs classified as allergenic under KS K 0736	Dyeing Phase: No use of chrom-salts for colour fastness	Dyeing Phase: Allowed are natural dyes, synthetic dyes, pigments and auxiliaries provided they meet the basic requirements as set above. Prohibited are: a. (disperse) dyes classified as	N/A

Korea Ecolabel	Fair Trade	GOTS	ECO-Mark
		sensitizing / allergenic. b. colourants classified as carcinogenic or suspected carcinogenic (H350 / H351). c. dyes containing heavy metals as an integral part of the dye molecule (e.g. heavy metal dyes, certain reactive dyes) under consideration of the following exceptions: - General exception for Iron - Specific exception for copper: permitted up to 5% by weight in blue, green and turquoise dyestuffs. d. The use of natural dyes and auxiliaries that are derived from a threatened species listed on the Red List of the IUCN.	
<u>Finishing process:</u> Nanomaterials and flame retardants (as listed in Annex A of Korea ecolabel) for fluorescent whitening agents, fragrances, additives for product processing or chemicals shall not be used.	<u>Finishing process:</u> Sandblasting and Potassium Permanganate spray for finishing shall not be used. Replace the following substances with ecological alternatives: e. biological active products f. PFOS, PFOA	<u>Finishing process:</u> Allowed are mechanical, thermal and other physical finishing methods and natural and synthetic inputs that meet the basic requirements as mentioned above. Prohibited in general is the use of: a. synthetic inputs for anti-microbial	N/A

Korea Ecolabel	Fair Trade	GOTS	ECO-Mark
	g. non-biodegradable and non-bio eliminable complexing agents, tensides and surfactants PVC in prints and accessories	finishing (including biocides), coating, filling and stiffening, lustring and matting as well as weighting b. garment finishing methods that are considered to be harmful to the workers (such as sand blasting of denim). Machine oils shall be heavy metal-free.	

6.3.2 Air emissions

EU Ecolabel	Blue Angel	India Organic
Total emissions of organic compounds, as defined in Council Directive 1999/13/EC, shall not exceed: a. 100.0 mg C/Nm from textile printing and finishing production sites b. 150.0 mg C/Nm3 where textile coating and drying processes allow for the recovery and reuse of solvents	Sum of the organic substances as total carbon must not exceed 0.8 g C per kg of textiles in the thermosetting, thermosoling, coating, impregnating or finishing of textiles, and drying facilities. Maximum of 0.4 g C per kg of textiles may be emitted from carry-overs from upstream processes and from residual preparations in each case.	The processing unit shall have policies and procedures in place for environmental management as per the norms of the respective State and Central Pollution Control Boards. The environmental management practices should cover the following: a. Effective Environment Management System with a written Policy Statement b. Delegation of responsibilities c. Monitoring air pollution

Fair Trade	GOTS	ECO-Mark
Appropriate emissions control techniques for any manufacturing operations that generate air pollutants. Control techniques include ventilation, absorption, physical and chemical scrubbing, closed-loop-systems	Assure compliance with the applicable national and local legal environmental requirements applicable to their processing/ manufacturing stages (including those referring to emissions to air, wastewater	The product manufacturers must produce the consent clearance as per the provisions of Air (Prevention & Control of Pollution) Act, 1981, along with the authorization, if required under Environment (Protection) Act, 1986 and the rules made thereunder to the

Fair Trade	GOTS	ECO-Mark
for recovery of solvents, noise/odour and vibration reduction equipment. Significant sources of air pollutants are coating and dyeing operations, printing, drying (fabrics, yarns and prints), fibre processing generating dust (bale breakers, automatic feeders, separators and openers, mechanical conveyors, pickers, cards) and spinning, combustion sources for power generation and process heating, weaving	discharge as well as disposal of waste and sludge).	Bureau of Indian Standards while applying for ECO-Mark.

6.3.3 Water emissions

EU Ecolabel	Blue Angel	India Organic
Wastewater discharges to the environment shall not exceed 20 g COD/kg textiles processed in weaving, dyeing, printing and finishing processes used to manufacture the product(s). If the effluent is treated on site and discharged directly to surface waters, it shall also meet the following requirements: a. pH between 6.0 and 9.0 (unless the pH of the receiving water is outside this range) b. temperature of less than 35 degree C (unless the temperature of the receiving water is above this value) If colour removal is required by a derogation condition in criterion 14 then the following spectral absorption coefficients shall be met: a. 436 nm (yellow sector) 7 m-1	Wastewater from wet-processing sites (except wastewater from water retting of flax and other bast fibres) shall, when discharged to surface waters, not exceed the following limits: a. COD: 160 mg/l b. BSB5: 30 mg/l c. Sulphite: 1 mg/l d. Ammonium nitrogen: 10 mg/l e. Total nitrogen: 20 mg/l f. Phosphorous: total 2 mg/l g. The dye must comply with the following values: Spectral absorption coefficient at: i. 436 nm (yellow spectral region) 7 m-1 ii. 525 nm (red spectral region) 5 m-1 iii. 620 nm (blue spectral region) 3 m-1 h. Toxicity to fish eggs GEI: 2. i. The pH value of the wastewater discharged to surface waters must be between 6 and 9. The wastewater shall not exceed the following values	Wastewater, before discharge, shall be purified to the extent it meets the local standards as laid down by the Pollution Control Board. Wastewater analyses and treatment details should be documented. The effluent treatment plants for the wastewater processing must have an approval as per the norms laid by the State or Central Pollution Control Boards. The processing unit shall have policies and procedures in place for environmental management as per the norms of the respective State and Central Pollution Control Boards. The environmental management practices should cover the following: a. Effective Environment Management System with a written Policy Statement b. Delegation of responsibilities c. Monitoring water pollution

b. 525 nm (red sector) 5 m-1 c. 620 nm (blue sector) 3 m-1	before it is mixed with the other wastewater: a. AOX: 0.5 mg/l b. Sulphide: 1 mg/l c. Copper: 0.5 mg/l d. Nickel: 0.5 mg/l e. Total chromium: 0.5 mg/l f. Tin: 2 mg/l g. Zinc: 2 mg/l	

Fair Trade	GOTS	ECO-Mark
Wastewater from all wet processing units shall be treated in an internal or external functional wastewater treatment plant before discharged to environment. The applicable national and local legal requirements for wastewater treatment - including limit values with regard to pH, temperature, TOC, BOD, COD, colour removal, residues of (chemical) pollutants and discharge routes - shall be fulfilled. Minimum criteria is local / national law if GOTS requirements are lower. Wastewater discharges to the environment shall not exceed 20 g COD/kg of processed textile (output). For scouring greasy wool an exceptional limit of 45 g COD/kg applies. Treatment of wastewater from water retting of bast fibres shall achieve a reduction of COD (or TOC) of at least 95% for hemp fibres and 75% for all other bast fibres.	Assure compliance with the applicable national and local legal environmental requirements applicable to their processing/ manufacturing stages (including those referring to emissions to air, wastewater discharge as well as disposal of waste and sludge).	The product manufacturers must produce the consent clearance as per the provisions of Water (Prevention and Control of Pollution) Act, 1974 and Water (Prevention and Control of Pollution) Cess Act, 1977, respectively, along with the authorization, if required under Environment (Protection) Act, 1986 and the rules made thereunder to the Bureau of Indian Standards while applying for ECO-Mark.

6.3.4 Energy

EU Ecolabel	India Organic	Fair Trade	GOTS
Energy used in washing, drying and curing steps associated with dyeing, printing	Policies and procedures as per the norms of the respective State and	Measure energy consumption and develop a plan for	Environmental policy and procedures in place to monitor data on energy resources

EU Ecolabel	India Organic	Fair Trade	GOTS
and finishing steps for ecolabelled products is measured and benchmarked as part of an energy or carbon dioxide emissions management system. Furthermore, production sites should implement a minimum number of Best Available Techniques (BAT) energy efficiency techniques as specified in the ecolabel.	Central Pollution Control Boards Environmental Management Plans to optimise utilization of energy in use and plans and strategy to minimise further usage.	reduction and recovery.	and their consumption and to reduce energy per kg of textile output.

6.3.5 Waste Management

India Organic	Fair Trade	GOTS	ECO-Mark
Policies and procedures as per the norms of the respective State and Central Pollution Control Boards Environmental Management Plans to cover a waste management plan and a waste disposal programme.	Requires companies to develop measures for waste reduction and documents the reduction of the waste. Waste should be collected and separated according to local requirements. The reuse of empty hazardous chemical containers for food and water storage is prohibited. These containers and all equipment that have been in touch are disposed or stored in a proper way. Companies are also required to have a waste management plan that includes strategies in waste reduction, recycling,	Compliance to applicable national and local legal environmental requirements referring to disposal of waste and sludge. Environmental policy and procedures in place to allow monitoring of waste and discharges and improving relevant environmental performances in their facilities. On-site waste burning or uncontrolled waste landfilling shall not be undertaken.	The product manufacturers must produce the consent clearance as per the provisions of Environment (Protection) Act, 1986 and the rules made thereunder to the Bureau of Indian Standards while applying for ECO-Mark. Additionally, the manufacturer shall produce documentary evidence on compliance of the provisions related to noise level and occupational health under the provisions of Factories Act, 1948 and rules made - thereunder.

India Organic	Fair Trade	GOTS	ECO-Mark
	reuse and disposal alternatives. The hazardous waste generated, or waste classified as special waste are to follow national and local legislation to avoid any pollution to ground water and air. This hazardous waste should not be stored on site and requires designated areas for storage and disposal exist.		

6.3.6 Substances in end products

EU Ecolabel	Blue Angel	India Organic
Specified limit values for elastane and acrylic, formaldehyde, biocides, extractable metals. Coatings, laminates and membranes and dyes.	Specified limit values for formaldehyde, extractable heavy metals, nickle and its compounds, chlorophenols, phthalates and plasticizers, organotin compounds, dyes, chlorinated benzenes and toluenes, polycyclic aromatic hydrocarbons, dimethylformamide (DMF), dimethylacetamide (DMAc) and N-methylpyrrolidone (NMP).	Must comply with the chemical quality parameters such as chlorophenols PCP, o-Phenylphenol, Amines, etc. against its limits per mg/kg.

Korea Ecolabel	GOTS	ECO-Mark
Compliance with set maximum limits (mg/ kg) for textile products (baby clothing, close to skin and outwear). Some of the parameters include free and releasable formaldehyde, extractable heavy metals by artificial acidic sweat (Antimony, Arsenic, Lead, Cadmium, Mercury, Chromium, Cobalt, Copper, Nickel), chlorophenols (Pentachlorophenol, 2,3,5,6 Tetra-cholorophenol,	Compliance with set maximum limits (mg/ kg) for textile products. Some of the parameters include alkylphenol, AOX, arylamines, disperse dyes, formaldehyde glyoxal, pH, OPP, pesticides, extractable heavy metals, organotin compounds, per- and polyfluorinated compounds (PFC), phthalates, Polycyclic Aromatic Hydrocarbons (PAH), chlorinated paraffins, etc.	Compliance with set maximum limits (mg/ kg) for textile products (baby clothing, close to skin and outwear). Some of the parameters include free and releasable formaldehyde, extractable heavy metals by artificial acidic sweat (Antimony, Arsenic, Lead, Cadmium, Mercury, Chromium, Cobalt, Copper, Nickel), chlorophenols (Pentachlorophenol, 2,3,5,6 Tetra-cholorophenol,

Korea Ecolabel	GOTS	ECO-Mark
Orthophenyl phenol), OrganO-tincompound, pesticides, banned pesticides, pH of aqueous extract and banned aryl amines from azo dyes, alkylphenols and alkylphenol ethoxylate, chlorinated benzene, chlorinated toluene, phthalates, Allylamine, DMF (dimethylformamide), and Dimethylfumarate.		Orthophenyl phenol), OrganO-tincompound, pesticides, banned pesticides, pH of aqueous extract and banned aryl amines from azo dyes

6.3.7 Packaging

Blue Ecolabel	India Organic	GOTS	ECO-Mark
The plastics used are not permitted to contain any halogenated polymers. If the packaging is made out of paper or cardboard, it must contain at least 80% recycled materials. Packaging materials are considered recycled if product waste (post-consumer waste) has been subjected to a material recycling process.	The packaging materials must be free from PVC and external treatment such as biocide or pesticides. Requires segregation from conventional products during transport	Single use virgin plastic hangers are prohibited. Recycled plastic hangers may be used. Final products with complete GOTS labelling can be stored / transported together with conventional products of similar type with positive assurance that there can be no substitution of products. Synthetic packaging material shall not contain chlorinated plastics (e.g. PVC). The use of plastic packaging materials should be minimized. Paper or cardboard shall be recycled from pre- or post-consumer waste or certified according to a program that verifies compliance with sustainable forestry management principles. Textile fibre materials used for packaging, shall follow the same fibre requirements and use of chemicals as specified above.	Considers the use of recyclable or bio-degradable packaging materials.

6.3.8 Information for Consumers

EU Ecolabel	Blue Angel	Korea Ecolabel
The optional label with text box may contain wording selected from the following: a. More sustainable fibre production (or product specification of fibres) b. Less polluting production processes c. Restrictions on hazardous substances d. Tested for durability	1. In addition, care and cleaning information must be provided in the form of textile care symbols in accordance with the guidelines of GINETEX or ISO EN DIN 3758.	Reasons for certification of a product including reduction in harmful substances shall be stated on a catalogue, etc.

7. Room Air Conditioners

The ecolabels studied for Room Air Conditioners are Green Label Thailand, Korea Ecolabel, Hong Kong Green Label Scheme. United Nation Environment Programme (UNEP)'s United for Efficiency (U4E) is referred for energy efficiency regulation guidelines.

Green Label Thailand	Korea Ecolabel	Hong Kong Green Label Scheme	United for Efficiency
TGL- 7- R3 – 14, Green Label Product Room Air Conditioner, Thailand Environment Institute (TEI), Revision 1 February 2016.	EL401 Air Conditioners, Korea Eco-label Standards, The Ministry of Environment, Revised Jan 3, 2022	GL-007-006, Product Environmental Criteria for Air Conditioners, Hong Kong Green Label Scheme, Rev 3, 26 March 2010	Energy-Efficient and Climate-Friendly Air Conditioners, Model Regulation Guidelines, United Nations Environment Programme – Global Environment Facility | United for Efficiency (U4E), Sept 2019

6.4 Applicable IS Standards

IS Code	IS Standard
IS 1391 (Part 1)	Room air conditioners - Specification: Part 1 unitary air conditioners
IS 1391 (Part 2)	Room air conditioners: Part 2 Split air conditioners

6.5 Environmental Criteria

6.5.1 Energy Efficiency

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme	E4U
Energy efficiency of product shall comply with EGAT Label No.5. for air conditioners. According to label no. 5, the Energy efficiency	A product should meet Grade 1 of Energy Efficiency specified in the Regulations on Operation of Energy Efficient Appliances.	The Energy Consumption Index of the product shall meet the HKSAR EMSD Code of Practice on Energy Labelling of Product	1. Minimum requirements for Cooling Seasonal Performance Factor (CSPF) a. CC[39] ≤ 4.5 kW, CSPF= 6.10

[39] CC- Cooling Capacity

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme	E4U
ratio (EER) is the following: 1. Fixed speed a. cooling capacity =27.296 Label n.5: SEER[38]: 12.85 – 13.84 Label n.5 star: SEER 13.85 – 14.84 Label n. 5 2 stars: SEER 14.85 – 15.84 Label n. 5 3 stars: SEER =15.85 b. cooling capacity >27.296 - 40,944 Label n.5: SEER: 12.40 – 13.39 Label n.5 star: SEER 13.40 – 14.39 Label n. 5 2 stars: SEER 14.40 – 15.39 Label n. 5 3 stars: SEER =15.40 2. Variable speed (inverter) a. cooling capacity =27.296 Label n.5: SEER: 15.00-17.49 Label n.5 star: SEER 17.50-19.99 Label n. 5 2 stars: SEER 20.00-22.49 Label n. 3 stars: SEER = 22.50 b. cooling capacity >27.296 – 40.944 Label n.5: SEER: 14.00 – 16.49 Label n.5 star: SEER 16.50 – 19.99 Label n. 5 2 stars: SEER 19.00 – 21.49		grade 3 requirement or better.	b. 4.5 kW < CC ≤ 9.5 kW, CSPF = 5.10 c. 9.5 kW < CC ≤ 16.0 kW, CSPF = 4.50 2. Minimum requirements for EER of portable air conditioners= 3.10 3. All units shall be tested at a test alternating current (AC) voltage and rated frequency, as described in ISO 5151. All units shall operate appropriately with the rated voltage with surge protection +/- 15%.

[38] SEER- Seasonal Energy Efficiency Ratio

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme	E4U
Label n. 5 3 stars: SEER = 21.50			

6.5.2 Refrigerant Use

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme	E4U
a. Ozone Depletion Potential (OPD) = 0 b. Global Warming Potential (GWP_{100a}) ≤ 2500 (CO_2 equivalent on 100 years)	a. ODP of refrigerant = 0 b. GWP = 1000 or less For Mix Refrigerants, GWP value obtained through weighted average, 1000 or less.	The product and its manufacturing process shall not contain or use substances controlled by the Montreal Protocol.	Self-Contained System a. ODP= 0 b. GWP≤150 Ductless Split System a. ODP= 0 b. GWP≤ 750

6.5.3 Noise

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme
Sound pressure level for an air conditioner shall comply with the following requirements: **Single pack, All capacity** a. Indoor ≤55 dB(A) b. Outdoor ≤60 dB(A) **Split, ≤ 8,000 Watts** c. Indoor ≤50 dB(A) d. Outdoor ≤57 dB(A) **Split, > 8,000 - 12,000 Watts** e. Indoor ≤57 dB(A) f. Outdoor ≤63 dB(A)	Noise generated when running an air conditioner for cooling For all in-one type: a. Indoor ≤55 dB(A) b. Outdoor ≤60 dB(A) For Split-system type: Rated cooling capacity ≤ 4kW a. Indoor ≤45 dB(A) b. Outdoor ≤55 dB(A) Rated cooling capacity 4 - 10 kW a. Indoor ≤50 dB(A) b. Outdoor ≤60 dB(A) Rated cooling capacity 10 - 35 kW a. Indoor ≤55 dB(A) b. Outdoor ≤65 dB(A) Rated cooling capacity ≥ 35 kW a. Indoor ≤55 dB(A) b. Outdoor ≤70 dB(A)	Noise emission: For cooling capacity less than 2240 kcal/h: a. Indoor ≤50 dB(A) b. Outdoor ≤53 dB(A) For cooling capacity between 2500 and 3500 kcal/h: a. Indoor ≤53 dB(A) b. Outdoor ≤57 dB(A) For cooling capacity above 4000 kcal/h: a. Indoor ≤58 dB(A) b. Outdoor ≤62 dB(A)

6.5.4 Use of Heavy Metals in Plastics, Paints & Coating

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme
Each plastic component of an air conditioner which weighs more than 25g shall contain heavy metals or their compounds and	The following materials may not be used for the product. Lead (Pb), cadmium (Cd), mercury (Hg) and hexavalent chrome (Cr6+) compound.	The product and its manufacturing process shall not contain or use substances controlled by the Montreal Protocol.

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme
flame retardants as the following requirements; a. Lead(Pb) ≤ 1000 mg/kg b. Cadmium(Cd) ≤ 100 mg/kg c. Mercury(Hg) ≤ 1000 mg/kg d. Hexavalent Chrome(Cr^{6+}) ≤ 1000 mg/kg e. Flame retardant PBB & PBDE ≤ 1000 mg/kg	PBBs, polybrominated biphenyls, PBDEs, polybromodiphenyl ethers, more than 50% chlorine concentration SCCP, short-chain chlorinated paraffins(C=10~13) Compound contained in product components be: Lead(Pb) ≤ 1000 mg/kg Cadmium(Cd) ≤ 100 mg/kg Mercury(Hg) ≤ 1000 mg/kg Hexavalent Chrome(Cr^{6+}) ≤ 1000 mg/kg	
Paints used in product shall not contain heavy metals or their compounds include mercury (Hg), lead (Pb), cadmium (Cd) and hexavelent chromium (Cr6+). The sum of heavy metal concentrations of mercury, lead, cadmium and hexavelent chromium due to impurities and contamination shall not exceed 0.1% (1,000 ppm) by weight.	Synthetic resins used in products should be suitable for following standards. When synthetic resigns which are more than 25g of mass fraction and more than 200 mm^2 of plain parts are wasted, there should be marked with the classification of materials on each part separated in order to be collectable. Synthetic resin parts of 25 g or higher composing the housing shall not use halogenated synthetic resin such as PVC (polyvinyl chloride), etc., and shall not contain halogenated compound within the synthetic resin. However, organic fluori-additives of 0.5% or less in mass fraction are permitted. But it permits organic fluoro-additives of less than 0.5% as mass fraction.	Coating material used on the product shall not contain mercury, mercury compounds or mixed with dyes stuff containing lead, cadmium, hexavalent chromium and their oxides. Paints shall not contain pigments or additives based on cadmium, lead, chromium, mercury or their compounds. Metals shall not be coated with cadmium, chromium, nickel or their compounds.

6.5.5 Use of Plastics

Green Label Thailand

Each plastic component which weighs more than 25g or has surface area of more than 200mm^2, the notification symbol is required. This notification symbol shall notify the type of plastic use according to Thai Industrial Standard: recycling plastics (TIS 131012) or ISO 104313 or ISO 1146914

6.5.6 Recycled Component

Green Label Thailand	Korea Ecolabel
Product shall be designed to promote recycling, which by means of supplying recyclable plastic components at least 80% by weight of plastic components in product	Recycling rate in accordance with the Act on Resource Circulation of Electrical and Electronic Equipment and Vehicles should be 80 % or higher in terms of mass fraction.

6.5.7 Waste Recovery

Green Label Thailand	Korea Ecolabel
Production, transportation, and post-industrials waste disposal shall comply with the government laws.	1. Establish and implement a collecting and recycling system for waste products (including shock-absorbing material for packaging). 2. Construct collection & recycling system of the disposed products (including the packing buffer material), and this shall be implemented and operated. However, this is considered to be satisfied when the specialized company is designated for management, and when detailed performances are provided.

6.5.8 Packaging

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme
1. Paper packaging shall be made from 100% recycled pulp in which using corrugating medium paper and shall be made from at least 85% recycled pulp in which using Kraft liner board, reported on a dry weight basis or an 'as received' basis. 2. Plastic packaging shall be symbolized according to Thai Industrial Standard: recycling plastics, TIS 1310 or ISO 1043 or ISO 11469. 3. Plastic packaging shall not contain halogenated hydrocarbon. 4. Foam materials such as EPS (Expanded polystyrene), EPE (expanded polyethylene) and EPP (expanded	Requirements for packaging materials and shock-absorbing packing materials: 1. Halogenated plastics such as polyvinyl chloride (PVC) shall not be used. 2. Individual shock-absorbing packing materials should consist of a single material including one of the following requirements. a. Recycled paper and pulp materials such as pulp mold b. Shock-absorbing packing materials certified with Eco-Mark according to EL606 c. Shock-absorbing packing materials manufactured using more than 50 % of wasted synthetic resigns as mass fraction	1. Packaging materials shall not contain chlorine-based plastics 2. General packaging requirements (refer to criteria for packaging materials: GL-Packaging).

Green Label Thailand	Korea Ecolabel	HK Green Label Scheme
polypropylene) shall be zero of Ozone depleting potential (ODP) of blowing agents. 5. Paints or pigments used for printing on packaging or for labelling on packaging are permitted to have the sum of concentrations of mercury, lead, cadmium and hexavelent chromium due to impurities and contamination not exceeding 0.01% (100 ppm) by weight	d. Foaming synthetic resin [EPE (expanded polyethylene), EPP (expanded polypropylene) and EPS (expandable polystyrene)] packing buffer material manufactured by using the substance with 0 ODP as the foaming agent e. Air-cell shock-absorbing packing materials inserted by air in the synthetic resigns	

7 Refrigerators

The ecolabels studied for Room Air Conditioners are EU Ecolabel, Korea Ecolabel, Hong Kong Green Label Scheme. United Nation Environment Programme (UNEP)'s United for Efficiency (U4E) is referred for energy efficiency regulation guidelines.

EU Ecolabel	Korea Ecolabel	Hong Kong Green Label Scheme	United for Efficiency
Commission Decision of 6 April 2004 establishing revised ecological criteria for the award of the Community eco-label to refrigerators and amending Decision 2000/40/EC published in the Official Journal L 306/16 on 2 October 2004.	EL404 Refrigerators, Korea Eco-label Standards, The Ministry of Environment, Revised 25. Feb. 2013.	GL-007-005, Product Environmental Criteria for Refrigeration Appliances, Hong Kong Green Label Scheme, Rev 3, 26 March 2010	Energy-Efficient and Climate-Friendly Refrigerators, Model Regulation Guidelines, United Nations Environment Programme – Global Environment Facility | United for Efficiency (U4E), Sept 2019

7.1 Applicable IS Standards

IS Code	IS Standard
IS 17550 (Part 1)	Household Refrigerating Appliances- Characteristics and Test Methods

7.2 Environmental Criteria

7.2.1 Energy Efficiency

EU Ecolabel	Korea Ecolabel	HK Green Label Scheme	E4U
The appliance must have an energy efficiency class of A+ or A++ as defined in Directive 94/2/EC, and	Level criteria of energy consumption efficiency a. In the case of that it has a dispenser or a home-bar as a	The Energy Consumption Index of the product shall meet the HKSAR EMSD Code of Practice on Energy	Maximum Annual Energy Consumption[40] (AEC_{Max}) at 24°C ambient temperature:

[40] Annual Energy Consumption (AEC) is calculated as: $AEC = EC_T \times (365/1000)$ in kWh per year, where $EC_T = \boldsymbol{a} \times EC_{16} + \boldsymbol{b} \times EC_{32}$ in Wh per day, EC16 is energy consumption measured at ambient temperature 16°C and EC32 is energy consumption measured at ambient temperature 32°C, in accordance with IEC 62552-3: 2015, coefficient a= 0.5 and coefficient b= 0.5.

amended by Directive 2003/66/EC	refrigerator-freezer over AV (Adjusted Volume) 500ℓ should be Grade 1 b. Others ≥ Grade 3	Labelling of Product grade 3 requirement or better.	a. Refrigerators≤ 0.163×AV+102 (kWh/year) b. Refrigerator-Freezers ≤ 0.222×AV+161(kWh/year) c. Freezers ≤ 0.206×AV+190(kWh/year)

7.2.2 Refrigerant and Foaming Agents

EU Ecolabel	Korea Ecolabel	HK Green Label Scheme	E4U
Refrigerant and foaming agent: • Ozone Depletion Potential (OPD) = 0 • Global Warming Potential (GWP) ≤ 15 (CO_2 equivalent on 100 years)	Refrigerant and foaming agent: The ODP of refrigerant and foaming agent shall be 0.	The product and its manufacturing process shall not contain or use substances controlled by the Montreal Protocol.	OPD= 0 GWP≤ 20 over a 100-year time horizon Refrigerant Charge Size Limits for Hydrocarbons (HCs)- 0.15 kg

7.2.3 Noise

EU Ecolabel	Korea Ecolabel	HK Green Label Scheme
1. Noise ≤ 40dB(A) 2. Information about the noise level of the appliance provided in a clearly visible way to the consumer	1. Sound pressure level or sound power level a. Sound pressure level ≤ 32 dB(A) b. Sound pressure level ≤ 42 dB(A) 2. When both the sound pressure level and sound power level measurement values exist, the measurement result of the sound power level shall be applied in priority.	Airborne noise emission from the appliance, measured as sound power level, shall not exceed 42 dB(A).

7.2.4 Use of Heavy Metals, Substances Harmful to the Environment

EU Ecolabel	Korea Ecolabel	HK Green Label Scheme
Plastic parts heavier than 25 g shall not contain flame retardant substances or preparations that are assigned any of the following risk phrases: R45, R46, R60, R61, R50, R50/53, R51/53 as defined	Prohibited Materials: The following materials may not be used for the product. Lead (Pb), cadmium (Cd), mercury (Hg) and hexavalent chrome (Cr6+) compound	Plastic parts shall have no lead or cadmium added by the manufacturer Plastic parts weighing over 25g shall not contain flame retardants containing

EU Ecolabel	Korea Ecolabel	HK Green Label Scheme
in Council Directive 67/548/EEC and its amendments. Plastic parts shall not contain PBB or PBDE flame retardants, nor chloroparaffin flame retardants with chain length 10-13 carbon atoms and chlorine content >50% by weight.	PBBs, polybrominated biphenyls, PBDEs, polybromodiphenyl ethers, more than 50% chlorine concentration SCCP, short-chain chlorinated paraffins(C=10~13) Limitation on compound contained in product components be: Lead(Pb) ≤ 1000 mg/kg Cadmium(Cd) ≤ 100 mg/kg Mercury(Hg) ≤ 1000 mg/kg Hexavalent Chrome(Cr^{6+}) ≤ 1000 mg/kg	polybrominated biphenyls (PBBs), polybrominated diphenylethers (PBDEs) and chloroparaffins with 10-13 carbon atoms per molecule and chlorine content of greater than 50% by weight.
	Synthetic resins used in products should be suitable for following standards. a. When synthetic resigns which are more than 25g of mass fraction and more than 200 mm^2 of plain parts are wasted, there should be marked with the classification of materials on each part separated in order to be collectable. Synthetic resin parts of 25 g or higher composing the housing shall not use halogenated synthetic resin such as PVC (polyvinyl chloride), etc., and shall not contain halogenated compound within the synthetic resin. However, organic fluoro-additives of 0.5% or less in mass fraction are permitted. But it permits organic fluoro-additives of less than 0.5% as mass fraction.	Paints shall not contain pigments or additives based on cadmium, lead, chromium, mercury or their compounds. Metals shall not be coated with cadmium, chromium, nickel or their compounds.

7.2.5 Use of Plastics

EU Ecolabel

Plastic parts heavier than 50 g: permanent marking identifying the material, in conformity with ISO 11469 standard.

7.2.6 Recycled Component

Korea Ecolabel
According to the act on material recycling of electrical, electronic products and automobiles, recycling rate of the product shall be over 70 % of its weight.

7.2.7 Waste Recovery

EU Ecolabel	Korea Ecolabel
1. Easy disassembly of the machine taken into account in the design. 2. A disassembly report shall be provided. 3. Plastic parts heavier than 50 g: permanent marking identifying the material, in conformity with ISO 11469 standard. 4. Clear indication of the type of refrigerant and foaming agent used in order to facilitate the recovery. 5. Take-back for recycling free of charge. 6. Information on take-back policy.	1. Establish and implement a collecting and recycling system for waste products (including shock-absorbing material for packaging). 2. Construct collection & recycling system of the disposed products (including the packing buffer material), and this shall be implemented and operated. However, this is considered to be satisfied when the specialized company is designated for management, and when detailed performances are provided.

7.2.8 Packaging

EU Ecolabel	Korea Ecolabel	HK Green Label Scheme
All packaging components shall be easily separable by hand into individual materials to facilitate recycling. Cardboard packaging shall consist of at least 80% recycled material.	Packaging materials and shock absorbing packing materials should be suitable for following standards. Halogenated plastics such as polyvinyl chloride (PVC) shall not be used. Individual s hock absorbing materials should consist of a single material including one of the following requirements. 1) Recycled paper and pulp materials such as pulp mold 2) Shock absorbing packing materials certified with Eco Mark according to EL606 3) Shock absorbing packing materials manufactured using more than 50 % of wasted synthetic resigns as mass fraction 4) Foaming synthetic resin [EPE (expanded polyethylene), EPP (expanded polypropylene) and EPS (expandable polystyrene)] packing buffer material manufactured by using the substance with 0 ODP as the foaming agent 5) Air cell shock absorbing packing materials inserted by air in the synthetic resigns	Packaging materials shall not contain chlorine-based Plastics. General packaging requirements (refer to criteria for packaging materials: GL-Packaging).

7.2.9 Information for Consumers

EU Ecolabel

The following information shall come with the product:

1. Guidelines on optimal installation of the appliance.
2. The consumer should avoid placing the appliance next to any heat source or in direct sunlight.
3. Thermostat setting dependant on the ambient temperature.
4. Hot foodstuffs shall be allowed to cool down before placing in the appliance.
5. Evaporator unit should be kept clean from thick ice layers and frequently defrosted.
6. Door seal to be replaced when deficient.
7. When moving the appliance, sufficient time should be allowed before switching it on again.
8. Condenser and appliance to be kept clean.
9. Information that ignoring the above-mentioned instructions will lead to higher energy consumption.
10. Damage to the condenser (with sharp objects) to be avoided because of environmental and health risks.
11. Presence of fluids and materials that are reusable and/or recyclable.

7.2.10 Durability

EU Ecolabel

Lifetime extension: the availability of compatible replacement parts and service shall be guaranteed for 12 years from the time that production ceases.