ANNEX 15

Development of Code of Practice Standard on Sustainable Practices to be followed for Transformer Industry

Structure of the Standard	Applicability/ Non-Applicability of the elements of the structure of the Standard.	Aspects to be covered/focussed under various elements of the structure.	Provisions that may be added for meeting the defined objectives of the aspects identified	Any Challenges in meeting the objectives
Scope	Applicable	Improvement of Energy Efficiency in Power Transformers and Distribution Transformers , Environmental Compatibility and CO_2 emission reduction.		
References	Applicable	Details of the Literature Surveys		
Terminology	Applicable	a. Green House Gasses (GHG) b. Green House Gas emission c. Product Carbon Footprint (PCF) d. Global Warming Potential (GWP) e. Environmental Product Declaration (EPD) f. Life Cycle Assessment (LCA) f. Power Transformers g. Distribution Transformers h. Peak Efficiency Index (PEI) etc..		
Raw Materials	Applicable	a. Selection of Standard, Safe and Sustainable Raw Materials that have low CO_2 emission. b. Use of Recycled Materials without compromising on Quality.	a. Establishment of CO_2 emission factors for major raw materials i.e. Steel, Copper, Aluminium, Insulating Oils and Insulating materials to ensure compliance. b. Declaration from the suppliers with respect to their efforts put in	a. Obtaining Sustainable Raw Materials for the manufacturing of transformers since raw Materials falling under different

			place for CO_2 reduction in their manufacturing facility. c. Usage of Eco-Friendly Raw materials. d. Impose restrictions on the use of raw materials containing hazardous substances.	sectors are used to manufacture a transformer. Furthermore, these raw materials are not manufactured in-house but are sourced from outside. b. Establishment of CO_2 emission factors for major raw materials.
Process	Partially Applicable-Assembly	a. Improving Process Efficiency b. Waste Minimization, Prevention and Management c. ~~Establishment of in-process Controls for Pollution Prevention~~ d. ~~Lesser/Free of Ozone depleting chemicals, lesser/no Greenhouse gas emissions, no production of toxic compounds and by-products.~~ e. Enhanced energy efficiency and use of renewable energy sources	a. Improvement in the Energy consumption during manufacturing and fabrication of Transformer. b. Use of Renewable Energy Power Sources during manufacturing Process. c. Energy Efficient design of transformers. d. Determination of Peak Efficiency Index and CO_2 emission.	

		f. ~~Enhanced water efficiency~~ g. ~~Biodiversity impact~~		
Safety and Health	Safety-Applicable Health-Not Applicable	Process/Use safer conditions	1. Identification of the risks associated with the design of the Transformers to the environment and safety of humans and other living beings. Measures to be taken for mitigating the risks identified. Designing to be done considering all the safety aspects. 2. Identification of the Risks associated with the various stages of Manufacturing to the environment and the safety of the personnel and steps to be taken for mitigating the risks. 3. Measures for ensuring safety and protection of the transformer and environment during external influences eg. Faults to avoid failure.	
Packaging	Applicable	Use of safe/eco-friendly/biodegradable packaging materials.	Use of safe/eco-friendly/biodegradable packaging materials to be specified.	

Use/Operation	Applicable	Biodegradability/recyclability/reparability or reusability either in part or as a whole	1. Emphasis on Repairing of transformers for reducing carbon emissions. 2. Retro filing of Transformers with Esters. 3. Accessories/Fittings for online monitoring of health and diagnosis of the Transformer.	
End of Life	Applicable	a. Safe and sustainable disposal practices b. Waste generation and management	1.Recyclibility of various components of transformers after end of life. 2. Methods for safe disposal of components of transformer as per local regulations where reuse/recycling is not possible.	
Life Cycle Analysis	Applicable	Raw material sourcing and extraction Manufacturing processes Distribution and transportation Use phase impact End-of-life disposal or recycling	1. Analysis of the impact of various stages of life cycle of transformer on the environment from Raw Material Sourcing to disposal at the end of life and categorising the impact as High/medium/Low. 2. Sustainability Matrix for all the parameters for comparison and selection of transformers.	