	<b>GUIDELINES</b>				PREPARED BY	APPROVED BY
	DOC NO.: TRM-043				SKH	SKH
	REVISION NO.	01	DATE	09/07/2014		

## ROHS and Asbestos Handling

### 1. PURPOSE:

- a. To provide a guidelines on considering ROHS and asbestos handling in ACG Engineering and Manufacturing.
- b. An increasing awareness of Environment, Health and Safety (EHS) issues domestically and internationally has led to a corresponding increase in the quantity of related legislation and rigor with which the associated regulations are enforced. As many of the regulations pertain to specific materials and processes employed in the manufacture, rework, maintenance and repair of the AC generator, which will have an increasingly significant impact on the business.

### 2. SCOPE:

This specification applies exclusively to AC Generators, for new design activity or major design modification activity. This specification provides the Engineering Requirements to ensure that the following materials are not specified for use in the design, manufacture, maintenance or repair of AC generators and disposal of listed hazardous substances under ROHS listed in 5.1.2.

Note : As per the directive 2011/65 EU , RoHS is applicable for all Electrical and Electronic Equipment(EEE),which is dependent on electric currents or electronic magnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and field and designed for use with a voltage rating not exceeding **1000 volts for alternating current and 1500 volts for direct current.**

RoHS is applicable for cable with rated voltage of below 250 V, that serve as a connection or an extension to connect EEE to the electrical outlet or to two or more EEE to each other.

This guideline is also applicable to 100% restrictions of use of asbestos in the product.

### 3. REFERENCE: European Union(EU) directives and Customer input documents


#### 3.1 Abbreviations

**ROHS –Restrictions of hazardous substances**

**CAS - Chemical abstract Service (Assigned by American chemical society)**

**EINECS - European Inventory of Existing Commercial chemical Substances**

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**REACH -Registration, Evaluation, Authorization and restrictions of chemicals**

**ECHA -European chemical agency**

**MSDS - Material Safety Data sheet**

### 4. RESPONSIBILITY:

Marketing is responsible for collecting the customer requirements on RoHS and asbestos contents.

Engineering is responsible for updating and communicating the changes in the requirements .

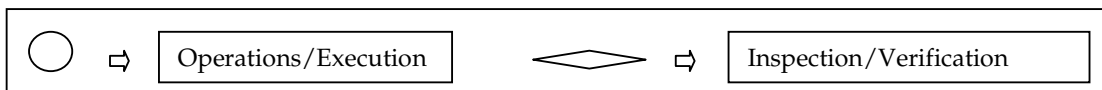
Manufacturing and PP&MM is responsible for implementing these requirements

Quality Assurance is responsible to ensure in meeting the requirements

Also Refer in Clause -5.0

### 5. PROCEDURE: A Process Flow of handling RoHS and asbestos at various stages is as below:


Flow	Activities	DOCUMENTS TO REFER	RESPONSIBLE FUNCTION
○	Customer Requirements	Customer PO/Purchase specification	Marketing
○	Engineering specification of RoHS requirements- Reviews	Bill Of material, Drawings and Specifications	Engineering
○	Supplier communication	PO, Training , Instructions, Audit Criteria on RoHS	PP & MM Supplier Quality development
◇	Verification Of RoHS materials/Asbestos	Test certificates, Independent Laboratory	Inward Material Inspection QA
○	Ensuring precautions on handling , storage and carry out activities	MSDS, Specifications, Work Instructions	Plant Engineering, Testing QA, Manufacturing and stores
○	Handling of Disposal Items	Disposal documents, PCB Directives	HR, Manufacturing, stores, Plant Engineering, Testing QA



**5.1.1** List of Substances under ROHS and other substances which needs attention as below, shall be revised from time to time based on national, international regulatory requirements and any other external requirements.

5.1.1a. CAS Number for the items listed below. Also the substances and chemicals used in Manufacturing will be verified against the ECHA candidate list. It is to be noted that

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ECHA Lists wide verities of compound

Substances	CAS Number
<b>LEAD</b>	<b>7439-92-1</b>
<b>CADMIUM</b>	<b>7440-43-9</b>
<b>HEXAVALENT CHROMIUM</b>	<b>18540-29-9</b>
<b>MERCURY</b>	<b>7439-97-6</b>
<b>Poly Brominates Biphenyl</b>	_____
<b>Poly brominated Diphenyl</b>	_____
<b>Asbestos means the following fibrous silicates:</b> <ol style="list-style-type: none"> <li>1. Asbestos actinolite</li> <li>2. Asbestos Grunerite(amosite)</li> <li>3. Asbestos anthophyllite</li> <li>4. Chrysotile</li> <li>5. Crocidolite</li> <li>6. Asbestos tremolite</li> </ol>	<ol style="list-style-type: none"> <li>1. 77536-66-4(9)</li> <li>2. 12171-73-5(10)</li> <li>3. 77536-67-5(11)</li> <li>4. 12001-29-5(12)</li> <li>5. 12001-28-5(13)</li> <li>6. 77536-68-6(14)</li> </ol>

### 5.1.2: ROHS and asbestos list and exemption

S	Restricted substances	Restriction level	Exemption and other notes
			<b>As per Directive 2011/65/EU, Annex III and other inputs</b>
1	Lead	0.1 %	a. Lead in alloy of steel for machining purposes and galvanized steel upto 0.35% lead by weight b. Lead in high melting temperature type solders(i.e. lead based alloy containing 85% less by weight or more) and other exemptions for solders as applicable in Annexure III c. Copper alloy upto 4% and alluminium alloy 0.4% d. Electrical and electronics components containing lead in glass or ceramic other than dielectric ceramic in capacitors, e.g.piezoelectronic devices....
2	Mercury	0.1%	Mercury in lamps as specified in Annex III From SLN 1 TO 5
3	Cadmium	0.01%	a. Cadmium and its compounds in one shot pellet type thermal cut-offs Cadmium and its compounds in electrical contracts (8a and 8b of Annex III)
4	Hexavalent chromium	0.1%	Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0,75 % by weight in the cooling solution
5	Polybrominated		

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	biphenyls(PBB)	0.1%	No other notes on exemption
6	Polybrominated Diphenyl ethers-(PBDE)	0.1%	No other notes on exemption
7	Asbestos	Level not defined	To be considered fully prohibited and being exposed Refer 2009/148/EEC point 9
8	Ozone Depleting Substance	Level not defined	To be considered fully restricted
9	Radioactive substances	Level not defined	To be considered fully restricted


**5.1.3:** User may follow below table for ROHS from application point of view , which will be revised based on inputs as stated in 5.1.1 :

#### 5.1.4

Sl	Restricted substances	Application where restricted
1	Lead	Batteries , Paints , steel alloys and other alloys Also refer Table 5.1.2 for exemption
2	Mercury	Lighting applications, Fluorescent lamps, some types of switches, Temp. and other parameters measuring devices Also refer Table 5.1.2 for exemption
3	Cadmium	As pigment in plastics , Nickel-Cadmium batteries , Cadmium Sulphide photocells Also refer Table 5.1.2 for exemption
4	Hexavalent chromium	As in Chrome plating , Chromate coatings and primers, Chromic acid
5	Polybrominated biphenyls(PBB)	Flame retarded substances(Plastics)
6	Polybrominated Diphenyl ethers-(PBDE)	Flame retarded substances(Plastics)
7	Asbestos	100% restricted in any form

**The CAS No Or EINECS No. or REACH No. will be maintained in the “Chemical used” data bank as provided in the MSDS or test report.**

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**5.1.5: Following list gives the guidelines on materials which Confirms or needs Further checks to compliance with asbestos or RoHS**

### 1. Mechanical parts

SL	Materials/ Process	Application examples	Methods to be used or used	Assessment status for compliance	Instruction to supplier/manuf acturing/ Engineering
1.1	Hot rolled , low, medium and High tensile structural steels like IS-2062, CRCA and others	Fabrication parts, Frames, End shields, Brackets Duct spacers ,vent fingers, liners, cabinets etc	Test certificates verification Standards review	Complied	Compliance not required
1.1	Steel alloys and stainless steels	Stampings Shafts Fly Wheels, Dowel Pins	Test certificates Standards review	Complied	Compliance not required
1.2	Steel alloys with additional assembly/Joining process/Lining	Bearings, Bearing bush Brake assembly parts	Test certificates Standards Review	Conditional	White metal lining to have compliance report from supplier
1.3	Copper	Stator and rotor copper , Copper sockets, Bus Bars etc	Test certificates	Complied	Compliance not required
1.4	Aluminum Parts and Aluminum alloys	Coil support, Bush, Rivet etc, plates for seal of bushing ,Gland plate etc	Test Certificates	Complied	Compliance not required
1.5	Rubber parts	Rubber gasket, rubber bushes, Rubber bellows	Test Certificates	Conditional	Compliance Required
1.6	Welding /Soldering/brazing consumables	Filler rod materials, anti spatter , etc	Test certificates, MSDS	Conditional	Compliance required
1.7	Coolers	Cooler parts , tubes , coal tar, Gasket etc	Test certificates, MSDS	Conditional	Compliance required
1.8	LOS and Pipe assembly	Pipes, Fasteners etc Pressure gauges etc	Test certificates	Conditional	Compliance required
1.9	Packing parts	Wood, VCI covers, powders	MSDS	Conditional	Compliance not required
1.10	Coating Process	Fasteners, washers etc	Standard Review	Conditional	Third party test as required
1.11	Gaskets-asbestos free	Gaskets	Test certificates	Conditional	Third party tests as required
1.12	Monitoring equipments	Thermometers, Pressure gauges Thermostats	Test certificates	Conditional	Compliance required

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### 2. Chemicals and Electrical Parts

SL	Materials/ Process	Application examples	Methods to be used or used	Assessment status for compliance	Instruction to supplier/manufacturing/ Engineering
2.1	Chemicals	Resins Paint Oils, Thinner, Hardeners	MSDS	Conditional	Compliance required
2.2	Epoxy Items	Wedges, Insulators, Seal Of Bushing etc	Test certificates	Conditional	Compliance Required
2.2	Tapes	Insulation tapes Semiconducting tapes , Glass cord with wool , Noise Modules and others	MSDS	Conditional	Compliance required
2.3	Temperature Detectors RTDS/BTDS		Test certificates	Conditional	Compliance Required
2.4	Cables	UNINYVIN CABLE, per TDS-07-073 Silicon cable, LV Cables	Test certificates	Conditional	Compliance Required
2.5	Sleeves	Heat shrink sleeves and others	Test certificates	Conditional	Compliance required
2.6	Brush Holders Silver carbon brush		Test Certificates	Conditional	Compliance Required
2.7	Connectors, switches breakers, contactors		Test Certificates	Conditional	Compliance Required
2.8	Discharge resistors, Silicon diodes, MOVs,Space heater parts		Test Certificates	Conditional	Compliance Required
2.9	AVR and parts, Relays and others		Test Certificates	Conditional	Compliance Required
2.10	Water leakage detectors, liquid sensors		Test Certificates	Conditional	Compliance Required

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## ROHS and Asbestos Handling

**6. RECORDS and Documents:** Supplier test reports , material data sheet, Drawings and specification as applicable, Engineering Guidelines TDM-05-0031

**7. REVISION DETAILS:**

Sl. No.	Rev. No.	Date	Brief Details of amendment	Basis for Amendment
1	00	2/APR/2014	First release.	NA
2	01	Under Review	Related parts details added	Feed backs

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