

GP A2 Plastic Incineration- Additional Measures & Guidance

Caution:

Use of Incinerator in Port Limits and ECA is strictly prohibited.

Note:

Primary means of disposal of plastics must be to shore reception facilities. Use compactor if provided, to compact plastic to minimise the storing space.

In circumstances due to vessel's trade pattern & operational requirements whereby Plastic has accumulated and could not be landed due to port restrictions on landing plastics and/ or plastics accumulation during sailing/ anchorage and/ or any other operational requirements, plastic waste (Excluding PVC, PCB & PS) may be incinerated subject to compliance to all of the following:

1. The plastics are compacted.
2. The vessel must be in open Sea and not in port Limits and/or in ECA area.
3. Incinerators must have Type approval certification in accordance with MEPC 244(66) (applicable for Incinerators built Jan'2000 onwards) indicating the design is capable of incinerating plastic as well as indicating quantity of plastic to be charged with other garbage and designed to operate with a combustion temperature in the range of 850°C-1200°C.
4. Safe Incineration specific procedure to be made in line with Makers instructions for burning plastics and followed onboard. C/E is responsible for enforcing safe incineration operation procedure for Plastic Incineration and to be reviewed/ approved by office (TSI/TM). Such approved procedure will be guidance for future such incinerations.
5. Master/CE to carry out a training on safe incineration procedure (as approved by TD), adherence to safe incineration Poster xx and Makers instruction. Training to record in Form SAF26
6. Poster GP06 must be referred to each time prior such operation for ensuring no prohibited items are for incineration.
7. Correct records must be maintained in GRB for respective categories of garbage as incinerated. Note: Ashes generated from plastic waste incineration to be landed as plastics.
8. Any doubts on plastic material whether containing PVC, PCB or PS etc must be landed and not incinerated. In case of doubts Master to clarify with office.

9. Should other garbage be dosed along with the Plastics, amount of garbage dosed in the Incinerator must be as per Makers instruction (i.e. qty, temperature, loading door, interlocks etc)
10. Only Plastics mentioned in below table Sec A to be incinerated subject to compliance to all above.
11. Appropriate PPE must always be donned during Incineration.
12. Besides compliance to above, all measures mentioned in "Poster 43" must be additionally followed.

** Additional reference can be made to RA for safe incineration as available in Computerized management system Library.

1 PLASTIC CATEGORIES & INCINERATION CRITERIA FOR REFERENCE

Caution:

Plastics types as Green ticked are only allowed for Incineration subject to incinerator specific procedure approved from office. Below is for reference only and Poster GP06 to be referred. In case of doubts Master to land in port reception facility and clarify with office.

Incineration OK  Prohibited 	OK for Incineration	OK for Incineration	Incineration Prohibited	OK for Incineration	OK for Incineration	Incineration Prohibited	Incineration Prohibited	OK for Incineration
CODE	 PETE	 HDPE	 PVC	 LDPE	 PP	 PS	 PCB & OTHER	 NEW
PLASTIC TYPE	Polyethylene Terephthalate	High-Density Polyethylene	Vinyl	Low-Density Polyethylene	Polypropylene	Polystyrene	Other plastics	Biodegradable plastics
EXAMPLES	Water bottle, Soda bottle, Peanut butter container.	Cereal Box Liners, Detergent bottles, Grocery bags, shampoo bottle	Detergent container, Clear food packaging, Piping.	Bread Bags, Frozen Food bags, Squeezable tubes & Bottles, Dispensing bottles, Cling wraps (Non PVC type) Bubble wraps	Yogurt container, Ketchup bottle, Syrup bottle.	Plastic Buckets, Mop Buckets, Scoops, disposable plate cups & trays	Mooring ropes or any other Rope, PCB- Fluorescent bulbs/ cable insulation, adhesive & tapes, fibreglass, oil based paint	Bio based plastic bottle
IMAGES								
RECYCLABLE								
Emission Risks on Incineration	NO such emission risks	NO such emission risks	Releases 2 toxic gases	NO such emission risks	NO such emission risks	Releases Carcinogenic gases/substances when heated	Dangerous emission and most dangerous plastics	NO such emission risks

Note:

Below Table from MEPC 244(66) is for reference & indicates standards for shipboard incineration and guidance on calorific values as well as quantity of each garbage type which can be charged for burning. The Makers Manual must be referred to for further guidance.

ANNEX 3 RESOLUTION MEPC.244(66) Adopted on 4 April 2014 2014 STANDARD SPECIFICATION FOR SHIPBOARD INCINERATORS	5 Required emission standards to be verified by type approval test <table><tr><td>O₂ in combustion chamber</td><td>6 – 12%</td></tr><tr><td>CO in flue gas maximum average</td><td>200 mg/MJ</td></tr><tr><td>Soot number maximum average</td><td>BACHARACH 3 or RINGELMAN 1 (A higher soot number is acceptable only during very short periods such as starting up.)</td></tr><tr><td>Unburned components in ash residues</td><td>Max 10% by Weight</td></tr><tr><td>Combustion chamber flue gas outlet temperature range</td><td>850 – 1200 °C</td></tr></table> A high temperature in the actual combustion chamber/zone is an absolute requirement in order to obtain a complete and smoke free incineration, including that of plastic and other synthetic materials while minimizing dioxins, VOC (Volatile Organic Compounds), and emissions.	O ₂ in combustion chamber	6 – 12%	CO in flue gas maximum average	200 mg/MJ	Soot number maximum average	BACHARACH 3 or RINGELMAN 1 (A higher soot number is acceptable only during very short periods such as starting up.)	Unburned components in ash residues	Max 10% by Weight	Combustion chamber flue gas outlet temperature range	850 – 1200 °C																											
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MEPC 66/21 Annex 3, page 14 Classes of waste Reference: Waste classification from Incinerator Institute of America (information for type approval tests only). Class 2 Refuse, consisting of approximately even mixture of rubbish and garbage by weight. This type waste is common to passenger ships occupancy, consisting of up to 50% moisture, 7% incombustible solids and has a heating value of about 10,000 kJ/kg as fired. <table><tr><td>Calorific values</td><td>kJ/Kg</td><td>kcal/kg</td></tr><tr><td>Vegetable and putrescibles</td><td>5,700</td><td>1,360</td></tr><tr><td>Paper</td><td>14,300</td><td>3,415</td></tr><tr><td>Rag</td><td>15,500</td><td>3,700</td></tr><tr><td>Plastics</td><td>36,000</td><td>8,600</td></tr><tr><td>Oil sludge</td><td>36,000</td><td>8,600</td></tr><tr><td>Sewage sludge</td><td>3,000</td><td>716</td></tr></table> <table><tr><td>Densities</td><td>kg/m³</td></tr><tr><td>Paper (loose)</td><td>50</td></tr><tr><td>Refuse (75% wet)</td><td>720</td></tr><tr><td>Dry rubbish</td><td>110</td></tr><tr><td>Scrap wood</td><td>190</td></tr><tr><td>Wood sawdust</td><td>220</td></tr></table> Density of loose general waste generated on board ship will be about 130 kg/m³.	Calorific values	kJ/Kg	kcal/kg	Vegetable and putrescibles	5,700	1,360	Paper	14,300	3,415	Rag	15,500	3,700	Plastics	36,000	8,600	Oil sludge	36,000	8,600	Sewage sludge	3,000	716	Densities	kg/m ³	Paper (loose)	50	Refuse (75% wet)	720	Dry rubbish	110	Scrap wood	190	Wood sawdust	220	4 Fuel/waste specification for type approval test (% by weight) <table><tr><td>Oil residue (sludge) consisting of:</td><td>75% oil residue (sludge) from heavy fuel oil 5% waste lubricating oil 20% emulsified water</td></tr><tr><td>Solid waste (class 2) consisting of:</td><td>50% Food Waste 50% rubbish Containing Approx. 30% paper, " 40% cardboard, " 10% rags, " 20% plastic</td></tr></table> The mixture will have up to 50% moisture and 7% incombustible solids.	Oil residue (sludge) consisting of:	75% oil residue (sludge) from heavy fuel oil 5% waste lubricating oil 20% emulsified water	Solid waste (class 2) consisting of:	50% Food Waste 50% rubbish Containing Approx. 30% paper, " 40% cardboard, " 10% rags, " 20% plastic
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Note: Based on above, Refer Maker specific Instructions on garbage incineration wrt temperature, quantity and type

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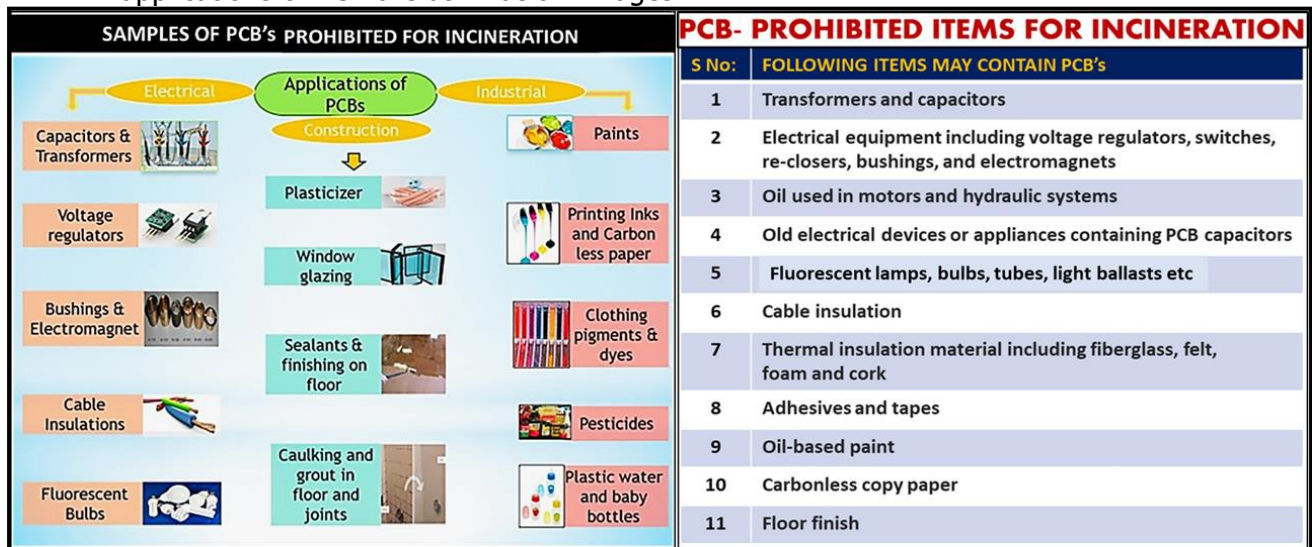
2 PROHIBITED PLASTICS FOR INCINERATION: PVC, PCB, PS (FOR REFERENCE)

- PVC - Poly Vinyl chloride: Rigid (un-plasticized) PVC** is one of the most widely used plastic materials. Although PVC is flame resistant, PVC products release toxic hydrogen chloride gas when heated. These corrosive gases can spread faster than flames. PVC is highly flammable, and when burned as waste heaps it releases toxic fumes, dioxins, and hazardous chlorine gas. Hydrogen chloride gas is lethal when inhaled for clearer understanding Main applications of both types of PVC (rigid and flexible) are as in below

SAMPLES OF PVC ITEMS- PROHIBITED FOR INCINERATION				PVC- PROHIBITED ITEMS FOR INCINERATION		
Construction	Domestic	Packaging	Wires & Cables	Application	Rigid PVC	Flexible PVC
DOMESTIC	Medical	Toys	Clothing	Construction	Window Frames, Pipes, House Siding, Ports, Roofing	Waterproof Membranes, Cable Insulations, Roof Lining, Greenhouses
LEISURE	CABLES	PACKAGING	PIPES	Domestic	Curtain Rails, Drawer Sides, Laminates, Audio and Videotape Cases, Records	Flooring, Wall Coverings, Shower Curtains, Leather Cloth, Hosepipes
MEDICAL	TENSILE ROOFS	FLOORING	WINDOWS	Packaging	Bottles, Blister Packs, Transparent Packs and Punnets	Cling Film
TRANSPORT	MEDICAL	CLOTHING	ELECTRICAL	Transport	Car Seat Backs	Under Seal, Roof Linings, Leather Cloth Upholstery, Wiring Insulation, Window Seals, Decorative Trim
OTHERS	FLOPPY-DISK COVERS	CREDIT CARDS	TRAFFIC SIGNS	Medical	-	Oxygen Tents, Bags And Tubing For Blood Transfusions, Drips and Dialysis Liquids
ELECTRICAL	SAFETY EQUIPMENT	INSULATION PIPES	JACKETING	Clothing	Safety Equipment	Waterproofs for Fishermen and Emergency Services, Life-Jackets, Shoes, Wellington Boots Aprons and Baby Pants
ELECTRICAL	BOXES, SWITCHES	TRANSPARENT DISTRIBUTOR BOX HOUSINGS	PLUG HOUSINGS & BATTERY TERMINALS	Electrical	Insulation pipes, Jacketing, Electricity Distribution Boxes, Switches, Transparent Distributor Box Housings, Plug Housings & Battery Terminals	Cable & Wire insulation, plugs, cable jackets, sockets, Sable Heads and Distributors
OTHERS	CONVEYOR BELTS	INFLATABLES	SPORTS GOODS	Others	Floppy-Disk Covers, Credit Cards, Traffic Signs	Conveyor Belts, Inflatables, Sports Goods, Toys, Garden Hoses

- PCB (Polychlorinated Biphenyls):** PCB is prohibited for any incineration. PCB's have been demonstrated to cause a variety of adverse health effects. They have been shown to cause cancer in animals as well as several serious non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, endocrine system and other health effects. Studies in humans support evidence for potential

carcinogenic and non-carcinogenic effects of PCBs. For clearer understanding Main applications of PCB are as in below images



- Polystyrene (PS):** PS- Polystyrene is prohibited for any incineration. PS is a petroleum-based plastic made from styrene (vinyl benzene) and is used for a wide range of commercial, packaging and building purposes. Most PS is used to make rigid durable products, such as television and computer cabinets and appliances, and nearly all the rigid PS packaging made of Styrofoam is used for food packaging purposes such as disposable cutlery, plates, high-impact PS (HIPS) such as yoghurt containers, single-use cold drink cups, expanded PS (EPS) foam used as meat trays, coolers and cups. Styrene is carcinogenic to humans and is flammable. When burnt its releases toxins, carcinogen, suspected human mutagen and impacts human reproductive organs/systems.

