

Guidelines: General Environmental Guidelines for Manufacturing / Assembly / Service Industries

Issued by: Inspection Department – Operations Section

1.0 Introduction

PCFC applies specific environmental guidelines for specific projects on a case-by-case basis. With respect to subject types of industries the general environmental guideline outline here can be used but, depending on the project, the requirements may need to be supplemented by additional requirements.

Projects must comply with PCFC policies and guidelines, which emphasize pollution prevention, reuse, recovery, recycle (RRR) options, waste minimization, including the use of cleaner production technologies. The intent of the guidelines is to minimize resource consumption, including energy use, and to eliminate or reduce pollutants at the source. For ease of monitoring, maximum permitted emissions limits are often expressed in concentration terms – for example, milligrams per liter (mg/l) for liquid effluents and, for air emissions, milligrams per normal cubic meter (mg/Nm³), where “normal” is measured at one atmosphere and 25 Celcius. The focus, however, should continue to be on reducing the mass of pollutants emitted to the environment. Dilution of effluents and air emissions to achieve maximum permitted values is unacceptable. Occasionally, emissions limits are specified in mass of pollutants per unit of production or other process parameter. In such cases, the limits include leaks and fugitive emissions.

Pollution control systems may be required in order to meet specified emissions limits. These systems must be well maintained and operated and must not be fitted with overflow or bypass devices unless such devices are required for emergencies or for safety purposes.

The following sections contain requirements for air emissions, liquid effluents, hazardous wastes, and solid wastes. Sections on ambient noise and monitoring requirements are included. The final section summarizes the key steps that will contribute to minimizing the impact of the project on the environment.

2.0 Emission Guidelines

Emission levels for the design and operation of each project is established through the Environmental Impact Assessment (EIA) process.

The guidelines given below present emissions levels acceptable to PCFC. All of the maximum levels should be achieved at all the time that the plant or unit is operating.



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2.1 Air Emissions

Most of the air emissions from subject types of industrial facilities originate with the fuel used for heating purposes or for generating steam for process purposes. Particular emissions that may originate in the process are addressed case by case. Concentration of contaminants emitted from the stacks of significant sources including boilers, furnaces, etc., should not exceed the limits presented in Annex 25.1.

The plant owner is required to demonstrate full compliance with the emissions limits specified in Annex 25.1. The following methods may be used to demonstrate compliance.

For point sources compliance with the guidelines for particulate matter may be demonstrated by maintaining the stack emissions opacity below 20%. Opacity can be determined visually by a qualified observer, with a continuous opacity meter, or with a mobile light detection and ranging (LIDAR) system.

The sulfur content of fuels may be used to demonstrate compliance with the sulfur dioxide (SO₂) emissions guidelines. The guidelines are met by the use of liquid fuels with sulfur content of 0.005% (50 ppm) or less. The client must maintain records of fuel analyses to demonstrate that the sulfur content of the fuel is at or below the specified levels.

Manufacturers' performance guarantees can be used to demonstrate that the emissions guidelines for nitrogen oxides (NO_x) are met. The performance guarantees must be verified by conducting an initial performance test after the equipment has been commissioned. The sponsor must maintain record to demonstrate that the equipment is operated within manufacturers specifications.

Alternatively, stack emissions can be monitored for specified contaminants. The monitoring must be sufficiently frequent to demonstrate continued compliance with the guidelines.

To ensure that ambient air conditions are not compromised, concentration of contaminants measured immediately outside the project property boundary should not exceed the limits shown in Annex 25.2

2.2 Liquid Effluents

Process wastewater, domestic sewage and contaminated storm water and runoff must meet the maximum limits shown in Annex 25.3. Pollutants of concern that are not included in Annex 25.3 will be specified by the PCFC separately.

Liquid effluent may be discharged to central waste water treatment system, Dubai Municipality (DM). The company is to confirm that the waste treatment system has the capacity and is managed adequately to treat the project's liquid effluents. Such proper treatment is required prior to discharge to the Harbour based on which PCFC approves Harbour disposal.



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2.3 Hazardous Materials and Industrial Wastes

Free Zone companies shall, whenever possible, use non-hazardous materials instead of hazardous materials. All industrial wastes, process residues, solvents, oils and sludge must be properly disposed of to DM.

The following management measures for handling industrial waste and materials should be implemented:

- a. All hazardous (ignitable, reactive, flammable, radioactive, corrosive and toxic) materials must be stored in clearly labeled containers or vessels.
- b. Storage and handling of hazardous materials must be in accordance with local regulation or international standards and appropriate to their hazard characteristics. Storage and liquid impoundment areas for fuels, raw and in process materials solvents, wastes and finished products should be designed with secondary containment (e.g., dikes and berms) to prevent spills and the contamination of soil, groundwater, etc.
- c. Fire prevention systems and secondary containment should be provided for storage facilities, where necessary or required by regulations, to prevent fires or the release of hazardous materials to the environment.
- d. Formulations containing chromates should not be used in water treatment processes.
- e. Transformers or equipment containing polychlorinated biphenyls (PCBs) or PCB-contaminated oil should not be installed. Existing equipment containing PCBs or PCB-contaminated oil should be phased out and disposed of in a manner consistent with the relevant requirements.
- f. Several chemicals classified as ozone- depleting substances (ODSs) are scheduled for phase out under Montreal Protocol on Substances That Deplete the Ozone Layer. They include chlorofluorocarbons (CFCs); halons; 1, 1, 1-trichloroethane (methyl chloroform); carbon tetrachloride; hydrochlorofluorocarbons (HCFCs); hydrobromofluorocarbons (HBFCs); and ethyl bromide. These chemicals are currently used in a variety of applications, including domestic, commercial, and process refrigeration (CFCs and HCFCs); domestic, commercial, and motor vehicle air conditioning (CFCs and HCFCs); manufacturing of foam products (CFCs); solvent cleaning applications (CFCs, HCFs, methyl chloroform, and carbontetrachloride); aerosol propellants (CFCs) fire protection systems (halons and HBFCs); and crop fumigants (methyl bromide). No systems or processes are to be installed using CFCs, halons, 1, 1, 1-trichloroethane, carbon tetrachloride, methyl bromide, or HBFCs. HCFCs should be considered only as interim or bridging alternatives, since they too are to be phased out.

2.4 General Wastes



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Free Zone companies are to implement the following practices for managing solid wastes generated in the course of operating the facility.

- a. Recycle or reclaim materials where possible.
- b. If recycling or reclamation is not practical, wastes must be disposed of in an environmentally acceptable manner and in compliance with DM/PCFC regulations.

3.0 Ambient Noise

Noise abatement measures should comply with maximum allowable noise level as per the relevant regulations.

4.0 Monitoring and Reporting

Free Zone companies are required to maintain record of air emissions, effluents and industrial wastes sent off site, as well as significant environmental events such as spills etc. that may have an impact on the environment. The information should be reviewed and evaluated to improve the effectiveness of the environmental protection plan.

4.1 Air Environment

This section establishes reporting, testing, monitoring and analyses requirements for sources of air pollution located or proposing to locate in FZ. The purpose of these requirements is to enable the Authority to assess compliance with the ambient air quality criteria and air emission limitations specified in Annex 25.1.

Prior to commencing construction or modification, all facilities with sources of air pollution not specifically exempted must prepare and submit an EIA report and include a section pertaining to the air environment. Depending on the nature and size of the source, Authority may require the applicant to prepare an ambient air quality analysis and/or provide ambient air monitoring data. After start-up, emission sources and potentially hazardous or nuisance-type sources are required to conduct source emission (performance testing) and report the results to Authority for compliance evaluation. For certain specified emission sources, continuous air emission monitoring and quarterly reporting is required on a case to case basis.

At any time, after start-up, Authority may request any industrial facility to prepare an updated air emissions inventory or provide other information relating to the source in question.

4.2 Air Emissions Performance Testing

- a. Performance tests are required on a case-by-case basis, for any source that may be hazardous to the environment or may be an odor nuisance. The aim of performance testing is to verify a pollutant's emission concentrations or rate at a point source and to ensure that there is no



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violation of the industrial source emission criteria stated in Annex 25.1 and/or ambient air quality (at fence line) criteria as stated in Annex 25.2 or any emission limit used for compliance evaluation. It should be noted that as a general industry requirement stack testing ports and work platforms should be installed at all facilities, which have a potential to release pollutant quantities or are otherwise subject to the criteria stated above.

- b. Performance tests shall be done at earliest after normal operation. These tests shall be conducted by an independent consultant. The date, time and place of any performance test shall be given to Authority at least one week in advance so they may witness such tests.
- c. Performance tests shall consist of the determination of exhaust gas temperatures and volumetric flow rates and gas analyses for the pollutants and efficiency of abatement equipment for which the test is required. The tests shall be conducted according to the accepted international reference test methods.
- d. Each performance test shall consist of a minimum of three separate sampling runs conducted within a 48-hour period. Each run shall be obtained while the source is operating at normal load.

The arithmetic mean of the results of the three runs shall be used for the purpose of determining compliance with applicable emission limitations.

- e. The results of the performance tests shall be submitted to Authority within one month of their completion. If Authority finds that procedures and/or methodologies used for any tests were in appropriate or defective, it may require a retest.

4.3 Water Environment

This section establishes reporting, testing, monitoring and analyses requirements for sources of water pollution located or proposing to locate at the FZ. The purpose of these requirements is to enable Authority to assess compliance with Harbour wastewater discharge criteria specified in Annex 25.3.

Prior to the commencement of construction of any industrial or other wastewater producing facility, or adding to or modifying an existing facility, an Environmental Impact Assessment (EIA) report, containing a water environment details as per

Authority EIA Guidelines shall be submitted by the industry or facility to Authority. After start-up, the facility owner/operator may be required to sample/analyze effluents initially and/or periodically to demonstrate compliance with the discharge criteria specified earlier. For groundwater appropriate number of boreholes will be installed for quarterly monitoring and reporting. For some effluent parameters, a continuous monitoring and monthly quality reporting is required on a case-by-case basis.

4.4 Wastewater Discharge Performance Testing



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Performance tests are required for any facility that discharges wastewater to the Gulf (open sea). Performance tests shall be done within one-month time after normal operation. The date, time and place of any performance test shall be given to Authority at least one week in advance.

4.5 RRR Options, Cleaner Production and Waste Minimization

Free Zone companies should adopt reuse, recovery or recycling (RRR) options for wastewater generated. It is emphasized to minimize the generation of wastewater and adopt cleaner production practices.

4.6 Noise Environment and Performance Testing

In line with Authority's requirements for premises a noise performance testing, at the boundary fence line, would be conducted within one month upon normal operation. On a case-by-case basis or annual noise level testing and reporting is required.

4.7 Solid / Industrial Waste

All general / industrial waste generated in PCFC entities are to be disposed off as per PCFC/DM guidelines. RRR options (see above section) and wastes minimization must be adopted by all Free Zone companies.

5.0 Key Issues for Environment Control

The key production and control practices that will assist in meeting emissions requirements can be summarized as follows:

- a. Where feasible, choose RRR options, cleaner production, integrated pollution control, waste minimization, energy-efficient and environmentally sound processes.
- b. Ensure that control, treatment, and monitoring facilities are properly maintained and that they are operated according to their instruction manuals.



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Substance	Symbol	Sources	Maximum Allowable Emission Limits (mg / Nm ³)
Visible Emissions		Combustion Sources Other Sources	Ringlemann 1 or 20% opacity or 250 None
Carbon Monoxide	CO	All sources	500
Nitrogen Oxides (expressed as Nitrogen Dioxide)	NO _x	Combustion Sources Material Producing Industries Other Sources	See Table 1.3 1500 200
Sulfur Dioxide	SO ₂	Combustion Sources Material Producing Industries Other Sources	500 2000 1000
Sulfur Trioxide including Sulfuric Acid Mist (expressed as Sulfur Trioxide)	SO ₃	Material Producing Industries Other Sources	150 50
Total Suspended Particles	TSP	Combustion Sources Cement Industry Other Sources	250 50 150
Ammonia and Ammonium Compounds (expressed as ammonia)	NH ₃	Material Producing Industries Other Sources	50 10
Benzene	C ₆ H ₆	All sources	5
Iron	Fe	Iron and Steel Foundries	100
Zinc and its Compounds (expressed as Zinc)	Zn	Electroplating / Galvanizing Industries	10
Lead and its Compounds (expressed as Lead)	Pb	All sources	5
Antimony and its Compounds (expressed as Antimony)	Sb	Material Producing Industries Other Sources	5 1
Arsenic and its Compounds (expressed as Arsenic)	As	All sources	1
Cadmium and its Compounds (expressed as Cadmium)	Cd	All sources	1
Mercury and its Compounds (expressed as Mercury)	Hg	All sources	0.5
Nickel and its Compounds (expressed as Nickel)	Ni	All sources	1
Copper and its Compounds	Cu	All sources	5



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(expressed as Copper)			
Hydrogen Sulfide	H ₂ S	All sources	5
Chloride	Cl ⁻	Chlorine Works Other Sources	200 10
Hydrogen Chloride	HCl	Chlorine works Other Sources	200 20
Hydrogen Fluoride	HF	All sources	2
Silicon Fluoride	SiF ₄	All sources	10
Fluoride and its Compounds including HF and SiF ₄ (expressed as Fluoride)	F ⁻	Aluminum Smelters Other Sources	20 50
Formaldehyde	CH ₂ O	Material Producing Industries Other Sources	20 2
Carbon	C	Odes Production Waste Incineration	250 50
Total Volatile Organic Compounds [expressed as total organic carbon (TOC)]	VOC	All sources	20
Dioxins and Furans		All sources	1 (ng TEQ / m ³)

Notes:

1. The concentration of any substance specified in the first column emitted from any source specified in the third column shall not at any point before admixture with air, smoke or other gases, exceed the limits specified in the fourth column.
2. “mg” means milligram.
3. “ng” means Nanogram.
4. “Nm³” means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degree Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atmosphere).
5. The limit of “Visible Emission” does not apply to emission of water vapour and a reasonable period for cold start-up, shutdown or emergency operation.
6. The measurement for “Total Suspended Particles (TSP)” emitted from combustion sources should be @ 12% reference CO₂.
7. The total concentration of the heavy metals (Pb, Cd, Ni, Hg, Cu, As & Sb) must not exceed 5 mg/Nm³.
8. VOC limit is for unburned hydrocarbons (uncontrolled).
9. The emission limits for all the substances excluding “Dioxins and Furans” are conducted as a daily average value.
10. TEQ means “Total Equivalent Quantity.” Dioxins and Furans Average values shall be measured over a sample period of a minimum of 6 hours and a maximum of 8 hours. The emission limit value refers to the total concentration of dioxins and furans.
11. With respect to point source standards for waste incinerators refer to DM or FEA relevant standards / regulations.



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Annex 25.2 – Ambient Air Quality Standards

Substance	Symbol	Maximum Allowable Limits ($\mu\text{g} / \text{m}^3$)	Average Time
Sulfur Dioxide	SO ₂	350	1 hour
		150	24 hour
		50	1 year
Carbon Monoxide	CO	23 (mg)	1 hour
		10 (mg)	8 hour
Nitrogen Dioxide	NO ₂	290	1 hour
		110	24 hour
Ozone	O ₃	160	1 hour
		120	8 hour
Total Suspended Particles	TSP	230	24 hour
		90	1 year
Particulate Matter	PM ₁₀	300	1 hour
		150	24 hour
Lead	Pb	1	3 months
Benzene	C ₆ H ₆	50	1 hour
Fluoride	HF	3	24 hour
		0.5	3 months



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Annex 25.3 – Standards for Discharge of Wastewater to Harbour

PARAMETERS ⁽²⁾	SYMBOL	UNIT	MAXIMUM ALLOWABLE STANDARD ⁽⁷⁾
Physical Properties			
Color	-	Color units	50
Total Suspended Solids	TSS	mg / l	50
Floating Particles	-	mg / m ³	None
pH	-	pH units	6-9 ⁽⁶⁾
Temperature ⁽³⁾	T	°C	35 – maximum
Total Dissolved Solids	TDS	mg / l	1,500
Turbidity	-	NTU	75
Inorganic Chemical Properties			
Ammonia Total as (N)	NH ₄ ⁺	mg / l	2
Biochemical Oxygen Demand	BOD ₅	mg / l	50
Chemical Oxygen Demand	COD	-	100
Chlorine Residual ⁽⁴⁾ Total	Cl ⁻	mg / l	1.0
Dissolved Oxygen ⁽⁵⁾	DO	mg / l	> 3
Nitrate	NO ₃ -N	mg / l	40
Sulfide	S ⁻²	mg / l	0.1
Total Kjeldahl Nitrogen as (N)	TKN	mg / l	10
Total Phosphorous as (P)	PO ₄ ⁻³	mg / l	2
Trace Metals			
Aluminum	Al	mg / l	20
Antimony	Sb	mg / l	0.1
Arsenic	As	mg / l	0.05
Barium	Ba	mg / l	2
Beryllium	Be	mg / l	0.05
Cadmium	Cd	mg / l	0.05
Cyanide	CN	mg / l	0.05
Chromium, total	Cr	mg / l	0.2
Chromium, VI	Cr ⁺⁶	mg / l	0.15
Cobalt	Co	mg / l	0.2
Copper	Cu	mg / l	0.5



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Iron	Fe	mg / l	2
Fluoride	F	mg / l	25
Lead	Pb	mg / l	0.1
Manganese	Mn	mg / l	0.2
Mercury	Hg	mg / l	0.001
Nickel	Ni	mg / l	0.1
Selenium	Se	mg / l	0.02
Silver	Ag	mg / l	0.005
Zinc	Zn	mg / l	0.5
Organic Chemical Properties			
Halogenated Hydrocarbons and Pesticides		mg/l	Nil
Hydrocarbons	HC	mg/l	15
Oil & Grease	O & G	mg/l	10
Phenols	-	mg/l	0.1
Solvent	-	mg/l	none
Total Organic Carbon	TOC	mg/l	75
Biological Properties			
Colon Group	TC	No. / 100 cm ²	5,000
Egg Parasites	-	-	None
Fecal Coliform Bacteria	-	Cells / 100 mL	1,000
Total Coliform	-	MPN / 100 mL	1,000
Warm Parasites	-		None

Notes:

1. Any discharge to surface drainage must be authorized by Jebel Ali Free Zone Authority (JAFZA) and shall only be permitted in exceptional circumstances.
2. For any parameters not identified, specific standards will be determined on a case-by-case basis.
3. The temperature increment standard for Harbour discharge applies to treated wastewater/cooling water discharges.
4. Chlorine residual is after 30 minutes contact and is total residual chlorine
5. Dissolved oxygen requirement is a minimum concentration requirement
6. Inclusive range not to be exceeded.
7. With respect to Harbour Discharge Standard, FZ Companies should concentrate on full compliance of Harbour Discharge Standard.