

Regulation EN – 4.0: Air Environment

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4.1 General

A clean air supply is essential to our own health and that of the environment. But since the industrial revolution, the quality of the air we breathe has deteriorated considerably – mainly as a result of human activities. Rising industrial production and the dramatic rise in traffic on our roads all contribute to air pollution in our towns and cities which, in turn, can lead to serious health problems.

Protection of the air environment is by source control for which the Best Practicable Environmental Option (BPEO – see relevant Environment Guideline) must be used, firstly to prevent emissions to air and, secondly, to render harmless and inoffensive what cannot be prevented. When prevention has been used to the practicable limit, a standard is needed to measure the minimum acceptable result. Mass emission is an important parameter, but this is not easy to measure and we fall back on the measurement of concentration of pollutants in the exhaust gases. When measurements cannot be made from emissions, judgment has to be made by the naked eye, when there must be no significant visible emission. This is especially important for dust emissions. When the first part of BPEO has been achieved, i.e. prevention, the residual emission has to be rendered harmless and inoffensive and this is accomplished by use of proper control equipment and dispersion from suitably tall chimneys. Chimney calculations use complicated mathematical formulae, but these have been reduced to a few simple rules as shown where relevant in the text. A single source cannot be allowed to take up the whole of the permitted air quality at ground level, so the methods used by the Authority permit many multi sources to operate in the Free Zone without causing a hazard or nuisance.

4.2 Ambient Air Quality Criteria

The Authority has various objectives for the ambient air quality. A summary of these objectives is shown below in Table 4.1.

Table 4.1 – Ambient Air Quality Standards
(Air Pollutants Limit in the Ambient Air)

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



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Fluoride	HF	3	24 hour
		0.5	3 months

4.3 Air Pollution Source Standards

See Table 4.2 below. For more pertinent details see relevant Guidelines.

Table 4.2 – Source Emission Criteria
General Stationary Sources
(Air Pollutant Emission Limits for Stationary Sources)

Substance	Symbol	Sources	Maximum Allowable Emission Limits (mg / Nm ³)
Visible Emissions		Combustion Sources	Ringlemann 1 or 20% opacity or 250
		Other Sources	None
Carbon Monoxide	CO	All sources	500
Nitrogen Oxides (expressed as Nitrogen Dioxide)	NO _x	Combustion Sources Material Producing Industries Other Sources	See Table 4.3 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	250
		Cement Industry	50
		Other Sources	150
Ammonia and Ammonium Compounds (expressed as ammonia)	NH ₃	Material Producing Industries	50
		Other Sources	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	Ni	All sources	1



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(expressed as Nickel)			
Copper and its Compounds (expressed as Copper)	Cu	All sources	5
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)

Table 4.3 – Air Pollutants Emission Limits for Stationary Combustion Sources Using Hydrocarbon Fuel

Substance	Symbol	Sources	Maximum Allowable Emission Limits (mg / Nm ³)
Visible Emissions	-	All sources	250
Nitrogen Oxides [expressed as Nitrogen Dioxide (NO ₂)]	NO _x	Fuel Combustion Units – having a gross heat input above 100,000 MJ excluding glass furnaces:	
		Gas Fuel	350
		Liquid Fuel	500
		Turbine Units:	
		Gas Fuel	70
		Liquid Fuel	150
Sulfur Dioxide	SO ₂	All sources	500
Total Suspended Particles	TSP	All sources	250
Carbon Monoxide	CO	All sources	500

Notes – Tables 4.2 and 4.3

- a.) 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.



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- b.) “mg” means milligram.
- c.) “ng” means nanogram.
- d.) “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).
- e.) The limit of “Visible Emission” does not apply to emission of water vapor and a reasonable period for cold start-up, shutdown or emergency operation.
- f.) The measurement for “Total Suspended Particles (TSP)” emitted from combustion sources should be @ 12% reference CO₂.
- g.) The total concentration of the heavy metals (Pb, Cd, Ni, Hg, Cu, As & Sb) must not exceed 5 mg/Nm³.
- h.) VOC limit is for unburned hydrocarbons (uncontrolled).
- i.) The emission limits for all the substances excluding “Dioxins and Furans” are conducted as a daily average value.
- j.) 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.
- k.) With respect to point source standards for waste incinerators refer to DM or FEA relevant standards / regulations.

4.4 Special Industries – Major Potential Offenders

There are certain industrial processes with an abnormally high potential for causing harm and distress to the local community, especially during breakdown, start-up and shutdown conditions when emissions to the air are unusually high. If a breakdown on a process results in the emission of black smoke, or of large quantities of inert dust, the result is not serious, although it may be a nuisance. On the other hand, if it results in the massive release of dangerous substances such as hydrogen sulfide, hydrochloric acid, sulfur oxides, nitrogen oxides, fluorides, etc. The resultant damage to health, vegetation, animals and materials of construction could be extremely serious. Therefore, special precautions have to be taken with use of cleaner fuel (having < 0.005% Sulfur Content), the design of the process, operation, maintenance, training of operators, supervision, keeping of spares, duplication of equipment, etc.

In order to take all practicable steps properly to control such processes, special requirements and standards of emissions, including monitoring, have to be specified. Guidelines for a number of selected industries operating under Ports, Customs and Free Zone Corporation (PCFC) / Dubai World (DW) Communities or which may be introduced in the future have been prepared. For example:

- Secondary Aluminum Works
- Cement Works
- Petroleum Works – Refineries
- Iron and Steel Works
- Chlorine and Hydrochloric Acid Works
- Large Boilers and Furnaces
- Chemical Fertilizer Works
- Ammonia Works
- Sulfuric Acid Works
- Lead Works
- Mineral Works
- Iron and Steel Works – Foundries

For more details of specific industry refer to pertinent Guidelines.



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4.5 Local Control

The industries discharging wastes to the air environment must exercise good control practice to meet maximum emission limits specified in Table 4.2 “General” and “Specific” sections whichever specifies the more stringent standard.

- 4.5.1 The Authority may prescribe any other control requirements or emission limits for any class of industry in addition to those listed in the relevant guideline.
- 4.5.2 The industry discharging wastes to the air environment shall ensure that such discharge is via a properly constructed chimney or stack unless the nature of the process prohibits this; however, appropriate enclosure and exhaust systems should be provided in order to prevent any fugitive emissions to the air environment. Works not having a properly constructed chimney or stack should have a prior to approval from the Authority.
- 4.5.3 The maximum ground level concentration (1 hour average) of any indicator shall not exceed the acceptable level specified in Table 4.1 or for any other indicator, a level derived by dividing the approved occupational Threshold Limit Value (TLV) by a factor of 30 or the odor threshold of that indicator, whichever is the lower concentration.
- 4.5.4 The industries shall not use any fuel in new industrial boiler or furnace exceeding 0.005% (50 ppm) by weight sulfur.
- 4.5.5 The industries using a fuel of sulfur content exceeding 0.005% (50 ppm) by weight in an existing boiler, or furnace or any other combustion equipment at the time of approval of this regulation must obtain an approval from the Authority and shall convert gradually to a fuel with sulfur content not exceeding 0.005% (50 ppm) by weight as per the Federal Cabinet decision.
- 4.5.6 Open burning of any waste is prohibited.
- 4.5.7 The generator of any emissions to the air environment must hold an Air Emissions Permit from the Authority as part of Operation Fitness Certificate (OFC) issuance. All emission points shall be subjected to emissions quality analysis; otherwise, Authority shall decide on a case to case basis.
- 4.5.8 The industries in operation at the time of declaration of this requirement shall be granted twelve (12) months to apply for a permit in accordance with item 4.5.7.
- 4.5.9 The permit issued in accordance with item 4.5.8 must specify as a minimum:
 - a. The permitted wastes emitted from each source;
 - b. The types of fuel and any other substance, which may be used;
 - c. The potential emissions from each discharge point;
 - d. A monitoring program for the emission; and
 - e. Any other management arrangements necessary to protect the beneficial uses of the air environment.
- 4.5.10 Emissions Non-compliance

During Air Emission Permit renewal, regulatory monitoring shall be mandatorily conducted by Trakhees – Environmental Laboratory. Non-compliance of any emission parameter as proven by the



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emission analysis report shall be considered as a major offense in which a correction notice shall be issued initially.

Any subsequent non-compliance/s shall be levied with a financial penalty. The financial penalty shall consist of the following:

- a. Failure to meet stack emission standards – all parameters of the emission analysis report should be in compliance with the standards specified in Tables 4.2 and 4.3 of this Regulation; otherwise, there will be AED 2,000/- financial penalty for each failed parameter.
- b. Failure to satisfactorily progress on a Warning Notice – as Warning Notice have been issued on the first instance of non-compliance, subsequent non-compliance means that there is no satisfactory progress on the previously issued Warning Notice, thus, daily financial penalty shall be enforced at a rate of AED 1,000/- per day. The total number of days shall be based on the number of calendar days counted from the date of issuance of Warning Notice until the date of sampling of the analysis report wherein all parameters are within the emission standards.

4.6 Odour and Dust Control

4.6.1 The industries shall not generate the emission of substance which as per Authority would be offensive to human beings.

4.6.2 The facilities emitting dust from stockpile, unpaved roads or any other source must control that emission if that dust is, in the opinion of the Authority, detrimental to the beneficial uses of the air environment in neighbouring premises.

4.7 Working Areas Control

Exhaust ventilation shall be designed to prevent dispersion into the air of dusts, fumes, mists, vapours and gases in concentration causing harmful exposure. Such exhaust systems shall be designed in a way that dusts, fumes, mists, vapours or gases are not drawn through the work area of employees.

Trakhees has adopted specific areas maximum allowable limits for air pollutants for inside working areas (See Regulation IO-11.0 Appendix for Maximum Allowable Limits for Indoor Air Pollutants)

4.8 Protecting the Ozone Layer

The ozone layer, a layer of gas in the upper atmosphere, performs the vital role of protecting humans and other living things from the harmful ultraviolet (UV-B) rays of the sun. In the 1970s, scientists discovered that certain manmade chemicals could destroy ozone and deplete the ozone layer. Further research found that the growing production and use of chemicals like chlorofluorocarbons (CFCs) in aerosol sprays, refrigeration, insulation and air conditioning was contributing to the accumulation of ozone-depleting substances (ODS) in the atmosphere. Development of an ozone hole was observed above the Antarctic.

The thinning ozone layer leads to a number of serious health risks for human. It causes greater incidences of skin cancer and cataract of the eye. Increased UV-B rays reduce levels of plankton in the oceans and subsequently diminish fish stocks. It can also have adverse effects on plant growth, thus reducing agricultural productivity and there will be reduced lifespan of certain materials.

Consequently, the following rules are to be complied with:

- a. The facilities shall not install any equipment which contains or consumes any controlled substance according to Montreal Protocol (see relevant guideline).



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- b. Chlorofluorocarbons (CFC) and Carbon Tetrachloride were phased out since January 2010; facilities using CFC shall use safer alternatives such as hydrofluorocarbon (HCFC), etc.
- c. The facilities shall ensure that all the refrigerants covered from their premises shall be recycled and are not released into the atmosphere.
- d. Replace halon fire extinguishers with non-ozone depleting substances (non-ODS) alternatives (e.g., carbon dioxide, foam, etc.).
- e. Usage of refrigerant gas for cleaning shall be prohibited.
- f. All servicing of air conditioning or refrigeration equipment shall be carried out by properly trained personnel only.
- g. Before a refrigerant will be added to the system, make sure the causes of possible leakage are identified and checked and all leakages are repaired. When a leak is located, isolate the part of the system to minimize the loss of refrigerant. If it is impossible to isolate that part of the system, pump the refrigerant charge to the plant receiver or to a properly designed container.
- h. Use vacuum pump to remove the air and moisture instead of using refrigerant to purge all connecting lines or hoses before charging the system.
- i. Never vent refrigerant to the atmosphere; venting of refrigerant is prohibited. Always, recover, recycle and re-use refrigerant during servicing to avoid discharge to the atmosphere.
- j. Different refrigerant gases should not be mixed in the same container.
- k. Use only non-ozone depleting substances (non-ODS) solvent whenever possible.
- l. If ODS solvent is used, the system should be deep-evacuated to recover the solvent vapour into a container that can be sealed after use. The system should then be pressurized and a thorough leak test carried out before recharging with refrigerant.
- m. The facilities shall not violate Authority, Dubai Municipality (DM), or Federal Law in their respect.

4.9 Performance Testing

Facilities with new air emission source equipment/s shall be required to conduct performance testing for point sources of air emissions prior to full operations through Dubai Accreditation Centre's enlisted third party environmental laboratory. The results of the performance testing shall be used as a basis for the issuance of Air Emissions Permit for new equipment in order to ensure compliance with relevant requirements.

4.10 References

- Federal Environment Agency Regulation on Air Pollution 2006
- Dubai Municipality Ambient Air Quality Standards
- Dubai Municipality Environmental Standards and Allowable Limits of Pollutants on Land, Water and Air Environment 2003
- Dubai Municipality Local Order 61 of 1991 Concerning Environment Protection Regulation in the Emirate of Dubai
- Dubai Municipality Technical Guidelines