

NIOEC-SP-47-37(3)							
DOCUMENT CODE							NO. OF PAGES:4
PLAN/PRJ/SUB	UNIT	PHASE	DISCIPLINE	DOCUMENT TYPE	SERIAL NO.	REV. NO.	DATE
NIOEC	000	EG	SF	SP	4737	A3	March, 2018



NATIONAL IRANIAN OIL REFINING & DISTRIBUTION COMPANY
NATIONAL IRANIAN OIL ENGINEERING
& CONSTRUCTION COMPANY

NIOEC SP

NIOEC SPECIFICATION FOR AIR POLLUTION CONTROL

SECOND EDITION

JULY, 2009

THIS SPECIFICATION IS THE PROPERTY OF NATIONAL IRANIAN OIL ENGINEERING & CONSTRUCTION COMPANY. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED TO THE OWNER. NEITHER WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF THE NATIONAL IRANIAN OIL ENGINEERING & CONSTRUCTION COMPANY.

IN THE NAME OF GOD**FOREWORD**

By their very nature, technical Specifications are continuously subject to modifications and revisions. To strengthen their merit and usefulness, continuous improvements, addendum, deletion of disparate information and consequently provision of updated revisions are to be made in order to ascertain that such Specifications meet the current requirements, inclusive of Iranian Petroleum Standards (IPS) and the recognized and acceptable national and international Standards, as well as the optimal codes and practices based on the accumulated in-house know-how and plant knowledge and experiences.

However, in reality, due to several reasons, not to mention the complexity of the matter, the ultimate goal of continuous direct embedment of the required changes on the relevant Specifications may be far reaching. Therefore, in the interim periods between the officially issued revisions, the required changes will appear in other documents related to the engineering and design work of the ongoing projects.

In response to the initiative of the Design and Engineering Directorate, and considering that the task of the execution of several important and mega projects for the realization of the new oil refineries, pipelines and oil terminals as well as improvements of the existing facilities, has been assigned to NIOEC, it was decided to update the NIOEC Specifications and to issue new official revisions.

The Design and Engineering Directorate was itself entrusted to carry out this important task, and as such by forming several special technical committees, working in close co-operation and cohesion and sharing their expertise and knowledge, the updated and revised NIOEC Specifications were successfully prepared and complied.

These Specifications are intended to be used for Oil Refineries, Distribution Depots, Oil Terminals, Pipelines and Pump Stations within NIOEC's projects, and have been proven to be of high value for such purposes. It must however be appreciated that these Specifications represent the minimum requirements and should in no way be interpreted as a restriction on the use of better procedures, engineering and design practices or materials.

We encourage and highly appreciate the users and other clear sighted and experts to send their comments on the Specifications to the Design and Engineering Director of NIOEC for evaluation and approval.

REVISION INDEX

REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5
1			x			26						51						76					
2			x			27						52						77					
3			x			28						53						78					
4			x			29						54						79					
5			x			30						55						80					
6						31						56						81					
7						32						57						82					
8						33						58						83					
9						34						59						84					
10						35						60						85					
11						36						61						86					
12						37						62						87					
13						38						63						88					
14						39						64						89					
15						40						65						90					
16						41						66						91					
17						42						67						92					
18						43						68						93					
19						44						69						94					
20						45						70						95					
21						46						71						96					
22						47						72						97					
23						48						73						98					
24						49						74						99					
25						50						75						100					

NOTES:

- 1) THIS SHEET IS A RECORD OF ALL REVISIONS TO THIS SPECIFICATION.
- 2) WHEN APPROVED, EACH REVISION SHALL BE CONSIDERED AS A PART OF THE ORIGINAL DOCUMENT.
- 3) NUMBER OF PAGES EXCLUDES THIS SHEET AND THE COVER SHEET.

5					
4	MARCH, 2018	M. DARABI	SH.GHASSEMI	MR FARZAM	M.KAREGAR NAJAFI
3	DECEMBER, 2015	M. BABAEI	A.AZIZ-ASIAEE	M.KAREGAR NAJAFI	A.ARMAN MOGHADAM
2	JULY, 2009	M. BEHROOZFAR	M.BEHROOZFAR	M.R.FARZAM	M.A.A.SAJEDI
1	JULY, 2005	M.R. FARZAM		M.R. FARZAM	M.A.A.SAJEDI
REV.	DATE	PREPARED	CHECKED	APPROVED	AUTHORIZED

CONTENTS:	PAGE NO.
INTRODUCTION	2
1. SCOPE	2
2. REFERENCES	2
2.1. Equivalent to IPS Standards.....	3
ADDENDUM TO IPS STANDARD	3
4. UNITS	3
5. GENERAL (Modification)	3
6. AIR POLLUTION	4
6.4. Standard Level	4
6.5. Measurement of Air Pollution (Modification).....	4

INTRODUCTION

To satisfy the requirements of this NIOEC Specification, Iranian Petroleum Standards IPS-E-SF-860(1) revised on September 2013 with the modifications as specified herein after shall be strictly followed.

Articles 0 to 2 and 4 of this document replace entirely the related articles in the referenced IPS Standard.

Air pollution is waste remaining from the many ways as production of goods, process of hydrocarbon and petrochemicals, use of transport and generation of energy to heat and light.

The major cause of all air pollution is combustion. When perfect or theoretical combustion occurs, the hydrogen and carbon in the fuel combine with oxygen from the air to produce heat, light, carbon dioxide, and water vapor. Impurities in the fuel, poor fuel-to-air ratio, or too high or too low combustion temperatures cause the formation of such side products as carbon monoxide, sulfur oxides, nitrogen oxides, fly ash and unburned hydrocarbons.

In this Specification, methods of reducing air pollution and means to decrease the pollution of the environment is discussed. Also criteria and limitations of emissions by industrial plants such as refineries, in accordance with Iranian Department of Environment has been presented.

1. SCOPE

This Specification covers the minimum requirements for detailed engineering & construction of refinery/ oil plant, distribution depots, pump stations and pipelines.

This Specification represents the minimum requirements for air pollution control and covers the following main topics:

- Pollution sources
- Types of emission
- Standard levels
- Measurement of air pollution
- Consideration in the selection of the pollution control equipment
- Process control
- Threshold limit values (TLV)

Deviations from this specification will only be permitted on obtaining written approval from NIOEC.

Resolution on cases not explicitly stipulated in this Specification, or on cases where conflicts may arise among the requirements of the referenced/relevant IPS and the international standards, shall be made through written consent and approval of NIOEC.

2. REFERENCES

The following standards, codes and specifications, to the extent specified hereinafter, shall constitute a part of this NIOEC specification. Latest edition of the undated referenced documents and the cited edition of the dated references shall apply. The applicability of changes made to the dated references, after the cited date shall be mutually agreed upon between NIOEC and the vendor/contractor.

DEPARTMENT OF ENVIRONMENT OF ISLAMIC REPUBLIC OF IRAN

Human Environmental Laws, Regulation Criteria and Standards (1st ed. Nov. 2012)

EPA (ENVIRONMENTAL PROTECTION AGENCY)

- | | |
|-------------------|---|
| AP-42 | “Compilation of air pollutant emission factors, Volume I” |
| EPA-650/9-75-001a | “The World Air Quality Management Standards Volume I” |
| EPA-650/9-75-001b | “The World Air Quality Management Standards Volume II” |

IPS (IRANIAN PETROLEUM STANDARD)

IPS-E-SF-860	“Engineering Standard for Air Pollution Control”
IPS-G-SF-860	“General Standard for Air Pollution Control”

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

ISO 6584	“Cleaning Equipment for Air and other Gases-Classification of Dust Separator”
----------	---

NIOEC-SP (NIOEC SPECIFICATIONS)

NIOEC-SP-00-10	“NIOEC Specification for Units”
NIOEC-SP-00-76	“NIOEC Specification for Process Design of Flare and Blow down System”
NIOEC-SP-45-03	“NIOEC Specification for Fired Heaters”
NIOEC-SP-47-04	“NIOEC Specification for Flares and Flare Stack”

IRANIAN DOE (Department of Environment) REGULATIONS**2.1. Equivalent to IPS Standards**

Substitute the following IPS Standards as referred to throughout IPS-E-SF-860 for the relevant NIOEC’s Specifications as follows:

IPS Standard	Relevant NIOEC Specification
IPS-E-SF-860	NIOEC-SP-47-37
IPS-E-PR-460	NIOEC-SP-00-76
IPS-E-PR-810	NIOEC-SP-45-03
IPS-G-ME-210	NIOEC-SP-47-04

ADDENDUM TO IPS STANDARD

This addendum revises the below listed articles of the referenced standard as follows:

4. UNITS

International system of units (SI) shall be used in accordance with NIOEC-SP-00-10, unless otherwise specified.

5. GENERAL (Modification)

Add the following paragraph to clause 5:

To decrease pollution agents and environmental impacts, all production, industrial and service provider companies and underlying installations shall do the followings:

- Prior to any execution and in the feasibility study stage/positioning studies, they shall assess environmental side effects based on Iranian Department of Environment (DOE) regulation. The results obtained shall be strictly obligated to prevent any unwanted consequence.
- Project specifications shall be enhanced up to comply all DOE and FRW (Forest, Range and Watershed Management Organization) regulation. Any deviation will be claimed.
- For those plants/units that installation of continuous/online monitoring system is necessary according to DOE regulations. Any deviation will be punished in accordance to air pollution obligations.
- All oil refineries in any capacity shall be considered as big industrial unit and are mandated to install continuous/online monitoring system.

6. AIR POLLUTION

6.4. Standard Level

6.4.2. Emission standard (Modification)

The last paragraph of this clause shall be changed as follows:

Unless otherwise specified, following limits shall be considered for effluent emissions in refineries taken from Iranian DOE requirements:

Pollutant Source	Pollutant	Acceptance Criteria (mg/Nm ³)	Notes
Boilers and process heaters stack	NO _x	376	Gas Fuel
		282	Liquid Fuel
	SO ₂	752	Gas Fuel
		1177	Liquid Fuel
	Particle	100	
Process vents	HCl	200	
	NH ₃	100	
	H ₂ S	6	
	HF & F ₂	20	
	Phthalic Anhydride, Maleic Anhydride, Toluene diisocyanate	50	
	Ethylene Oxide, Ethyl Benzene, Styrene, Toluene, Aromatic Compounds	20	
	Paraffin, Acetone, Olefin, Mono Vinyl Chloride	150	

6.5. Measurement of Air Pollution (Modification)

Add following paragraph to the end of clause 6.5

All refineries in any capacity shall be considered as big industrial unit and are mandated to install continuous/online monitoring system. Parameters needed to be measured by online/continuous monitoring system are the following item:

- Particles
- Opacity
- NO_x
- SO₂
- H₂S*
- HF*
- NH₃*
- HCl*
- Metallic contaminations*

For asterisked items or those not mentioned in the above list, type of parameter shall be defined as per recommendation of Iranian DOE Monitoring Office with written approval from Accredited Laboratory Committee.

ENGINEERING STANDARD**FOR****AIR POLLUTION CONTROL****FIRST EDITION****OCTOBER 2007**

This standard specification is reviewed and updated by the relevant technical committee on Sep. 2013. The approved modifications are included in the present issue of IPS.

FOREWORD

The Iranian Petroleum Standards (IPS) reflect the views of the Iranian Ministry of Petroleum and are intended for use in the oil and gas production facilities, oil refineries, chemical and petrochemical plants, gas handling and processing installations and other such facilities.

IPS is based on internationally acceptable standards and includes selections from the items stipulated in the referenced standards. They are also supplemented by additional requirements and/or modifications based on the experience acquired by the Iranian Petroleum Industry and the local market availability. The options which are not specified in the text of the standards are itemized in data sheet/s, so that, the user can select his appropriate preferences therein

The IPS standards are therefore expected to be sufficiently flexible so that the users can adapt these standards to their requirements. However, they may not cover every requirement of each project. For such cases, an addendum to IPS Standard shall be prepared by the user which elaborates the particular requirements of the user. This addendum together with the relevant IPS shall form the job specification for the specific project or work.

The IPS is reviewed and up-dated approximately every five years. Each standards are subject to amendment or withdrawal, if required, thus the latest edition of IPS shall be applicable

The users of IPS are therefore requested to send their views and comments, including any addendum prepared for particular cases to the following address. These comments and recommendations will be reviewed by the relevant technical committee and in case of approval will be incorporated in the next revision of the standard.

Standards and Research department

No.17, Street14, North kheradmand

Karimkhan Avenue, Tehran, Iran.

Postal Code- 1585886851

Tel: 021-88810459-60 & 021-66153055

Fax: 021-88810462

Email: Standards@nioc.ir

GENERAL DEFINITIONS:

Throughout this Standard the following definitions shall apply.

COMPANY:

Refers to one of the related and/or affiliated companies of the Iranian Ministry of Petroleum such as National Iranian Oil Company, National Iranian Gas Company, National Petrochemical Company and National Iranian Oil Refinery And Distribution Company.

PURCHASER:

Means the "Company" where this standard is a part of direct purchaser order by the "Company", and the "Contractor" where this Standard is a part of contract documents.

VENDOR AND SUPPLIER:

Refers to firm or person who will supply and/or fabricate the equipment or material.

CONTRACTOR:

Refers to the persons, firm or company whose tender has been accepted by the company.

EXECUTOR:

Executor is the party which carries out all or part of construction and/or commissioning for the project.

INSPECTOR:

The Inspector referred to in this Standard is a person/persons or a body appointed in writing by the company for the inspection of fabrication and installation work.

SHALL:

Is used where a provision is mandatory.

SHOULD:

Is used where a provision is advisory only.

WILL:

Is normally used in connection with the action by the "Company" rather than by a contractor, supplier or vendor.

MAY:

Is used where a provision is completely discretionary.

CONTENTS:

PAGE No.

0. INTRODUCTION	1
1. SCOPE	2
2. REFERENCES	2
3. DEFINITIONS AND TERMINOLOGY	3
4. UNITS	10
5. GENERAL	10
6. AIR POLLUTION.....	10
6.1 Clean Air	10
6.2 Pollution Sources.....	11
6.3 Types of Emissions in Petroleum Industries	12
6.3.1 Refinery.....	12
6.3.2 Petrochemicals	15
6.4 Standard Level	16
6.4.1 Ambient air quality standards	16
6.4.2 Emission standard.....	17
6.5 Measurement of Air Pollution	18
6.6 Cleaning Equipment for Air and Other Gases	18
6.6.1 Classification of dust separators	18
6.6.3 Flare, flare stack and furnaces	18
6.7 Process Control	18
6.7.1 Refineries.....	18
6.7.2 Petrochemical processes	21
6.7.4 Crude oil terminals:	29
6.8 Threshold Limit Values.....	30

APPENDICES:

APPENDIX A CARCINOGENICITY	38
APPENDIX B SUBSTANCES OF VARIABLE COMPOSITION	39
APPENDIX C THRESHOLD LIMIT VALUES MIXTURES	40
APPENDIX D PARTICLE SIZE – SELECTIVE	43
APPENDIX E ODOR CONTROL METHODS FOR REFINERY PURPOSES	46
APPENDIX F MEASUREMENT OF AIR POLLUTION	49

0. INTRODUCTION

Air pollution is waste remaining from the many ways as production of goods, process of hydrocarbon and petrochemicals, use of transport and generation of energy to heat and light.

The major cause of all air pollution is combustion. When perfect or theoretical combustion occurs, the hydrogen and carbon in the fuel combine with oxygen from the air to produce heat, light, carbon dioxide, and water vapor. Impurities in the fuel, poor fuel-to-air ratio, or too high or too low combustion temperatures cause the formation of such side products as carbon monoxide, sulfur oxides, nitrogen oxides, fly ash and unburned hydrocarbons.

There can be different approach for controlling air pollution. Design approach of air pollution control one of the best ideas for controlling air pollution especially oil, natural gas, petrochemical and refining industry.

In this Standard, methods of reducing air pollution and means to decrease the pollution of the environment is discussed.

1. SCOPE

This Standard represents the minimum requirements for air pollution control and covers the following main topics:

- Pollution sources
- Types of emission
- Standard levels
- Measurement of air pollution
- Consideration in the selection of the pollution control equipment
- Process control
- Threshold limit values (TLV)

Note 1:

This is a revised version of this standard, which is issued as revision (1)-2007. Revision (0)-1994 of the said standard specification is withdrawn.

Note 2:

This standard specification is reviewed and updated by the relevant technical committee on Sep. 2013. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 391 on Sep. 2013. These modifications are included in the present issue of IPS.

Note 3:

If there is some non-conformity through legislative requirement which has been approved by Iranian governmental organization such as Department of Environment and Health Ministry, the performance criteria shall be consider base on the above legislative mentioned.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

EPA (U.S. Environmental Protection Agency)

Compilation of air pollutant emission factors, Volume I (AP-42, 5th,1995)

EPA-650/9-75-001a

"The World Air Quality Management Standards Volume I" (Oct. 1974)

EPA-650/9-75-001b

"The World Air Quality Management Standards Volume II" (Oct. 1974)

Human Environmental Laws, Regulation Criteria and Standards

By Department of Environment of Iran (1st ed. Nov. 2012)

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-G-SF-860	"General Standard for Air Pollution Control"
IPS-E-PR-460	"Engineering Standard for Process Design of Flare and Blowdown System"
IPS-G-ME-210	"General Standard for Flare and Flare Stacks"
IPS-E-PR-810	"Engineering Standard for Process Design of Furnaces"

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

ISO 6584: 1981	"Cleaning Equipment for Air and other Gases-Classification of Dust Separator"
----------------	---

3. DEFINITIONS AND TERMINOLOGY**ABSORPTION**

A physico-chemical process in which a substance associates with another to form a homogeneous mixture presenting the characteristics of a solution.

ACCESS HOLE

A hole in the duct, at the extremity of a sampling line, through which sampling is undertaken.

ACGIH

American Conference of Governmental industrial Hygienists, Inc (ACGIH) is an organization open to all practitioners in industrial hygiene, occupational health, environmental health, or safety.

ADSORPTION

A physical process in which the molecules of a gas, of dissolved substances or of liquids, adhere in extremely thin layers to the exposed surface of solid substances with which they come into contact.

AEROSOL

A suspension, in a gaseous medium, of solid particles, liquid particles, or solid particles and liquid particles, having a negligible falling velocity.

Note:

In physics, an upper value is arbitrarily assigned to the dimensions of particles capable of constituting an aerosol, adopting for the place being considered a maximum limit for the falling velocity. It is defined as being that of a spherical particle of density equal to 10^3 kg/m^3 and of diameter $100 \text{ }\mu\text{m}$, falling under the effect of its own weight in an immobile gas at a temperature of 20°C and at a pressure of 101.3 kPa . In air, under a gravitational acceleration of 9.81 m/s^2 , this speed is 0.25 m/s .

AGGLOMERATE

A collection of solid particles adhering to each other.

AGGLOMERATION

The action leading to the formation of agglomerates.

AGGLUTINATION

The action of joining, by impact, solid particles coated with a thin adhesive layer or of trapping solid particles by impact on a surface coated with adhesive.

AGGREGATE

A relatively stable assembly of dry particles, formed under the influence of physical forces.

ANTHROPOGENIC

Referring to environmental alterations resulting from the presence or activities of humans.

(Dictionary of Environmental Science, McGraw-HILL pub, inc. 2003)

ASH

The solid residue of effectively complete combustion.

CAPTURE

The extraction of solid particles, liquid particles or gases close to their sources.

CLEANING (after clogging)

The removal of the deposit of solid or liquid particles which has produced clogging.

CLEANING FACTOR

The ratio of the quantity of pollutants entering a separator to the quantity leaving it.

CLOGGING

The deposition, progressive or otherwise, of solid or liquid particles on or within a filter medium, causing the flow to be obstructed.

CLOGGING CAPACITY; HOLDING CAPACITY

The particle mass that can be retained by equipment up to the point at which one of the specified operational limits is reached.

COALESCENCE

The action by which liquid particles in suspension unit to form larger particles.

COLLECTION EFFICIENCY

With regard to filters, dust separators and droplet separators, the ratio of the quantity of particles retained by a separator to the quantity entering it (generally expressed as a percentage).

CONCENTRATION; CONTENT

The quantity of a solid, liquid or gaseous material expressed as a proportion of another material in which it is contained in the form of a mixture, a suspension or a solution.

CONTAMINANT

See pollutant.

CONTAMINATION

See pollution.

CONTENT

See concentration.

CYCLONE

A dust separator or droplet separator utilizing essentially the centrifugal force derived from the motion of the gas.

DISPERSION

An operation as a result of which solid particles or liquid particles are distributed in a fluid. Also applied to a two-phase system in which one phase, known as the "dispersed medium", is distributed throughout the other, known as the "dispersion medium".

DROPLET

A liquid particle of small mass, capable of remaining in suspension in a gas. In some turbulent systems, for example clouds, its diameter can reach 200 μm .

DROPLET SEPARATOR

An apparatus for separating liquid particles from a gas stream in which they are suspended.

DUST

Small solid particles conventionally taken as those particles below 75 μm in diameter which settle out under their own weight but which may remain suspended for some time....(see dust, and, grit): A general term applied to solid particles of different dimensions and origin generally remaining suspended in a gas for a certain time.

DUCT

An enclosed structure through which gases travel from one point to another.

DUST CONTROL

The whole of the processes for the separation of solid particles from a gas stream in which they are suspended. (By extension, also the activities involved in the construction and commissioning of a dust separator.)

DUST SEPARATOR

An apparatus for separating solid particles from a gas stream in which they are suspended.

Note:

Dust separators working on the following principles are given as examples:

- gravity;

- inertia;
- centrifugal force;
- electricity;
- fibrous layer;
- packed tower;
- bubble washer;
- spray washer;
- venturi-scrubber.

ELUTRIATION

A method of separating particles using the difference in apparent weight which may exist between the particles when they are suspended in a fluid.

Emission

A natural or anthropogenic discharge of particulate, gaseous, or soluble waste material or pollution into the air.

Emission Factor

An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e.g., kilograms of particulate emitted per mega gram of coal burned).

EQUIVALENT DIAMETER

The diameter of a spherical particle the size of which will give identical geometric, or optical, or electrical or aerodynamic behavior to that of the particle being examined.

For sieves, the equivalent diameter is the diameter of the holes in a round hole sieve which will pass the same proportion of material as will a specified square mesh sieve. It is dependent upon the shape and size of the particles under examination.

FILTER

An apparatus for separating solid or liquid particles from a gas stream in which they are suspended. This apparatus is generally formed of a porous or fibrous layer or of an assembly of porous and/or fibrous layers. (By extension, applied also to some oil-bath devices and some electrical devices.)

FILTER MEDIUM

The part of a filter on or within which the particles are retained.

FILTRATION

The separation by a filter of solid particles or liquid particles from a gas stream in which they are suspended. (By extension, also the whole of the activities involved in the construction and commissioning of a filter installation.)

FLY ASH

Ash entrained by combustion gases.

FUME

An aerosol of solid particles, usually from metallurgical processes, generated by condensation from the gaseous state generally after volatilization from melted substances and often accompanied by chemical reactions such as oxidation.

FUMES

In popular usage, gaseous effluents, often unpleasant and malodorous; which might arise from chemical processes.

GAS

A mixture of gaseous compounds or elements flowing in a duct, carrying particulate matter.

GAS-PURIFIER

An apparatus for totally or partially removing one or more constituents from a gas mixture.

GRIT

Airborne solid particles in the atmosphere or flues in the United Kingdom

HOOD

An inlet device for an extraction system.

IMPACT

A collision of two particles with each other or of a particle with a solid or liquid surface.

IMPACTION

The action of particles entering into contact with a surface.

ISOKINETIC SAMPLING

Sampling at such a rate that the average velocity of the gas entering the sample nozzle is the same as that of the gas in the duct at the sampling point.

LD50

Lethal Dose 50 is Standard measure of the toxicity of a material that will kill half of the sample population of a specific test animal in a specified period through exposure via ingestion, skin contact, or injection.

MIST

A suspension of droplets in a gas.

NORMAL TEMPERATURE AND PRESSURE (NTP)

15°C and 101325 N/m².

OSHA

Occupational Safety and Health Administration

PARTICLE

A small discrete mass of solid or liquid matter.

PARTICLE SIZE ANALYSIS

The science which deals with the measurement of the dimensions and determination of the shape of particles.

PARTICLE SIZE ANALYSIS; GRANULOMETRIC ANALYSIS

The whole of the operations by which a particle size (granulometric) distribution may be obtained.

PARTICLE SIZE DISTRIBUTION; GRANULOMETRIC DISTRIBUTION

A presentation, in the form of tables of numbers or of graphs, of the experimental results obtained using a method or an apparatus capable of measuring the equivalent diameter of particles in a sample or capable of giving the proportion of particles for which the equivalent diameter lies between defined limits.

PARTICULATES

Solid matter, in a gas stream, that is solid at normal temperature and pressure.

PENETRATION; TRANSMISSION

The ratio of the quantity of particles leaving a filter, dust separator or a droplet separator, to the quantity entering it.

POLLUTANT; CONTAMINANT

Any undesirable solid, liquid or gaseous matter in a gaseous or liquid medium.

POLLUTION; CONTAMINATION

The introduction of pollutants into a liquid or gaseous medium, the presence of pollutants in a liquid or gaseous medium, or any undesirable modification of the composition of a liquid or gaseous medium.

POROUS LAYER

A permeable layer of solid material in any form having interstices of small size, generally known as "pores".

PRECIPITATION

An operation in which particles are separated from a gas stream in which they are suspended, by the action of an electrical field or a thermal gradient.

PURIFICATION

The total or partial removal of unwanted constituents from a gaseous medium.

RATED FLOW

The gas flow rate through a separator either as stated by the manufacturer for defined conditions of use or as agreed between the interested parties for a particular installation.

SAMPLING LINE

The line across the sampling plane on which the sampling points are located.

SAMPLING PLANE

The cross section of the duct in which all sampling is carried out.

SAMPLING POINT

A specific location on a sampling line at which an individual sample is extracted.

SAMPLING POSITION

A place in a duct where sampling is carried out.

SEDIMENTATION

Separation under the action of gravity of particles from the fluid in which they are suspended.

SEPARATOR

An apparatus for separating, from a gaseous stream in which they are suspended or mixed, solid particles (filter and dust separator), liquid particles (filter and droplet separator) or gases (gas-purifier).

SERVICE FLOW

The gas flow rate through a separator under given service conditions.

SITE

Works or plant where sampling is to be carried out.

SMOKE

A visible aerosol resulting from combustion.

Note:

In some literature, smoke is referred to quantitatively in terms of a Ringelmann Number, a smoke shade, a darkness of stain or a mass of deposit collected.(see fume, fumes, and especially smoke, for approximate terms)

The whole of the combustion gases and the particles entrained by them. (By extension, also the gases charged by particles resulting from a chemical process or from a metallurgical operation.)

SOOT

Agglomerates of carbonaceous particles formed by incomplete combustion and deposited before emission.