# SLOVENSKI STANDARD
# SIST ISO 3165:1995

**01-avgust-1995**

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**Vzorļ evanje kemiļ nih proizvodov za industrijsko uporabo - Varnost pri vzorļ enju**

Sampling of chemical products for industrial use -- Safety in sampling

Échantillonnage des produits chimiques à usage industriel -- Sécurité dans l'échantillonnage



**Ta slovenski standard je istoveten z: ISO 3165:1976**



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**ICS:**

71.040.40 Kemijska analiza Chemical analysis

**SIST ISO 3165:1995 en**

# INTERNATIONAL STANDARD ISO 3165

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

## Sampling of chemical products for industrial use — Safety in sampling

*Échantillonnage des produits chimiques à usage industriel — Sécurité dans l'échantillonnage*

First edition — 1976-06-15



UDC 661 : 620.113 : 543.05 : 658.382.3

Ref. No. ISO 3165-1976 (E)

**Descriptors :** chemical compounds, sampling, safety.

Price based on 6 pages

ISO 3165-1976 (E)

## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.



International Standard ISO 3165 was drawn up by Technical Committee ISO/TC 47, *Chemistry*, and circulated to the Member Bodies in July 1973.

It has been approved by the Member Bodies of the following countries :



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| Australia | Hungary | South Africa, Rep. of |
| Austria | India | Spain |
| Belgium | Ireland | Switzerland |
| Bulgaria | Israel | Thailand |
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| Egypt, Arab, Rep. of | New Zealand | U.S.S.R. |
| France | Portugal | |
| Germany | Romania | |

No Member Body expressed disapproval of the document.



Printed in Switzerland

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# Sampling of chemical products for industrial use — Safety in sampling

## 0 INTRODUCTION

In some cases the act of taking a sample exposes the sampler to a risk of personal injury or may risk the creation of hazardous conditions endangering the safety of others. This International Standard is intended to assist those engaged in sampling or in directing the activities of samplers, and also those responsible for premises within which a sampling operation is performed, to ensure that sampling shall be a safe operation.

Attention is also directed to the existence of legislation regulating the carriage of dangerous goods, and users of this International Standard should ensure compliance with these requirements and with those imposed by the carriers.



## 1 SCOPE AND FIELD OF APPLICATION

This International Standard gives recommendations relating to safety in the sampling of chemical products for industrial use.



## 2 GENERAL RECOMMENDATIONS

**2.1** The following recommendations apply to all sampling operations whatever the nature of the material being sampled. The operator should have :

— safe access to and from the place where the sample is taken, and

— a safe working place with adequate light and ventilation.

Sampling points in fixed installations should be arranged to satisfy these needs as well as any special conditions arising from the nature of the material being sampled. Precautions shall be taken against falls when the sample is withdrawn from the top of a tank or tank vehicle and against the collapse of stacked containers or solids in bulk.

**2.2** If the material being sampled is itself hazardous, the following general recommendations apply :

**2.2.1** The sampling operation shall be carried out in such a manner as not to prejudice the security of the bulk.

This applies particularly to the sampling of fluids through cocks where the seizure of the cock in an open position could lead to the escape of large quantities of the fluid. It is recommended that the devices used for such sampling be arranged so as to limit the total quantity drawn at any one time and to restrict the rate of flow to a convenient value.

In the case of liquids, it is reasonable to assume that spillages will occur and to provide both a drained trough and a tundish to trap spilt liquids safely and a permanent splash guard to protect the sampler.

For liquids and gases, provision shall be made whenever possible for isolating the sample point from the bulk or line by a valve near to, but not immediately adjacent to, the sample point so that in the event of an accident the flow may be controlled from a safe place.

In all cases it is part of the sampler's task to ensure satisfactory re-closure by appropriate personnel of all opened packages and sample points.

**2.2.2** When it is necessary to purge or rinse a sample container with the material to be sampled, and this material presents a hazard, then appropriate facilities shall be provided for the disposal of material used in purging. Gases should be vented away from the vicinity of the sampler and other personnel.

**2.2.3** The size of the sample and the frequency of sampling shall not be greater than are necessary for the examination proposed.

**2.2.4** The sample in its container shall be carried in a suitable carrier designed and constructed to facilitate handling and to minimize the risk and consequences of breakage of the sample container.

**2.2.5** The equipment, including all tools and containers, shall be compatible with the material being sampled and suitable for the intended purpose. For example, the sample container shall be capable of tight closure and shall be fitted with a pressure release. Samples shall be kept away from other chemical products liable to interact with them.

**2.2.6** Before sampling, or as soon as possible, mark the container to indicate the nature of the material and the risks associated with it.

**2.2.7** The person taking the sample shall be made fully aware of the nature of the hazards involved and the precautions to be taken. He shall be instructed in the use of all appliances provided for his safety, including fire extinguishers, protective goggles and clothing, etc. He shall

be instructed to report to an appropriate supervisor before and after taking the sample and shall report, preferably to the same authority, any unusual happening or situation.

If toxic substances are being sampled, he shall be instructed that, in the event of feeling unwell, he should report immediately to his supervisor.

**2.2.8** The sampler should be accompanied by a second person whose task is to ensure the safety of the sampler. During the sampling operation this observer shall remain well clear of the sampling point and observe the whole operation. He shall be given specific instructions as to the action he shall take in an emergency and such instructions should always require that he first raises an alarm and does **not** attempt a single-handed rescue, except in extreme circumstances.

**2.2.9** These general recommendations and the specific ones which follow should be used as a guide to the precautions necessary in preparing all samples.

**2.2.10** Eye protection equipment should be used continuously wherever there is contact with chemicals.

**2.2.11** It is stressed that those directing the activities of samplers shall consider in detail the consequences of minor mishaps which may occur, such as spillage, failure of cocks, etc. The sampler shall be given specific instructions covering both the normal situation and what he must do in the event of mishaps. Equally important are the specific instructions to be given to the safety observer present when toxic or dangerously corrosive materials are sampled (see 3.4 and 3.5).



## 3 SPECIFIC RECOMMENDATIONS FOR HAZARDOUS MATERIALS

The physical or chemical properties of the material being handled may be such that they can have a direct physiological effect or be such that, for example, fire or explosion risks are present. The degree of risk is extremely variable and only general guidance is possible. A general classification of risks is listed below together with the appropriate precautions which are additional to those given in 2.2. It should be assumed, in the absence of specific information to the contrary, that all new material being sampled is hazardous.

Many materials present more than one hazard; for example benzene is toxic and flammable and its vapour forms an explosive mixture with air.

Further information on individual substances is given in the following publications :

– *Substances chimiques dangereuses et proposition concernant leur étiquetage.* Conseil de l'Europe (Sous-comité de la santé et sécurité industrielle) – (Section chimie), Strasbourg, 3ème édition 1971.

– *Dangerous properties of industrial materials,* by N. Irving Sax, Published by Reinhold.

– *Toxicity and metabolism of industrial solvents,* by Ethel Browning. Published by Elsevier.

– *Hazards in the chemical laboratory,* Ed. by G. D. Muir. Published by Royal Institute of Chemistry.

– *The care, handling and disposal of dangerous chemicals*, by P. J. Gaston. Published by The Institute of Science Technology.

In addition, the Manufacturing Chemists Association Inc. of Washington, D.C., U.S.A., publishes Chemical Safety Data Sheets relating to specific chemicals, and most manufacturers of chemicals are willing to advise prospective users and others on the handling of their products.

The following types of hazard may be encountered :

– explosive substances, including unstable substances not used as explosives (see 3.1);

– oxidizing substances (see 3.2);

– flammable substances (see 3.3);

– toxic substances (see 3.4);

– corrosive substances and irritants (see 3.5);

– substances dangerous by virtue of their physical state, notably their pressure and temperature (see 3.6);

– radioactive materials (see 3.7).

### 3.1 Explosive and unstable substances

**3.1.1** *Examples*

Unstable substances kept under water or other liquids, concentrated hydrogen peroxide, ketone peroxides, peroxy organic acids, acetylene, etc.

**3.1.2** *Additional precautions*

**3.1.2.1** The sample container shall be closed so as to prevent loss of contents or evaporation, but the closure should provide for safe release of pressure.

**3.1.2.2** The samples shall be protected from heat and shock and shall be transported only in a carrier designed to retain the sample in the event of a breakage or a leakage.

**3.1.2.3** All spillages shall be reported for immediate action.

**3.1.2.4** Naked lights, smoking and equipment which can produce sparks shall be prohibited.

**3.1.2.5** Protective goggles and protective clothing should be worn.

**3.1.2.6** The location of alarm systems and fire fighting equipment should be known.

### 3.2 Oxidizing substances

#### 3.2.1 *Examples*

Liquid air and oxygen, oxidizing acids and their salts, hydrogen peroxide, etc.

The risk varies according to the nature of the substance and any combustible material with which it may come into contact, and also their degrees of subdivision. It is important to remember that the sampler's clothing is almost certainly combustible.

#### 3.2.2 *Additional precautions*

**3.2.2.1** The vicinity of the sampling operation shall be free of combustible matter as far as possible.

**3.2.2.2** Adequate and appropriate fire extinguishers shall be available.

**3.2.2.3** Sample carriers should not include combustible padding material.

**3.2.2.4** Naked lights and smoking shall be prohibited.

**3.2.2.5** All spillages shall be reported and corrected as soon as possible.

**3.2.2.6** Protective goggles and protective clothing should be worn.

### 3.3 Flammable substances

#### 3.3.1 *Examples*

In addition to flammable gases, liquids and solids (typified by hydrogen, fuel oil and coal), these include substances which, although not normally regarded as being flammable themselves, give combustible products if exposed to moisture (the alkali metal hydrides and calcium carbide are examples) and substances which ignite spontaneously in contact with air, for example white phosphorus, pyrophoric metals, etc.

The risk varies with the substance, its temperature and its state of subdivision. It is generally higher with liquids than with solids and is always high if the substance is volatile and yields flammable gases or is in a form which is readily dispersed in air. Attention is particularly directed to the risks of explosion which are present in enclosed spaces, where volatile fractions of the material including residual traces of solvents may accumulate, and in places where dust arising from combustible matter such as flour, starch, coal will, if dispersed, yield an explosive mixture. Those responsible for the sampling shall be acquainted with the flash and auto-ignition points of these substances, and the explosive concentrations limits of their vapours in air.

#### 3.3.2 *Additional precautions according to severity of risk*

**3.3.2.1** The vicinity of the sampling operation shall be free of possible means or aids to ignition. Naked lights, smoking and equipment which can produce sparks shall be prohibited.

**3.3.2.2** Precautions shall be taken to ensure that static electrical charges cannot exist. Rubber-tyred vehicles shall be earthed before operations commence. In fixed installations, sampling points shall be individually earthed. It should be noted that, although these precautions will ensure the absence of a charge on the material being sampled, there is some possibility of the sampler or his clothing carrying a charge. Nylon overalls are often heavily charged in dry weather and cotton is preferred. The sampler should wear conductive foot-wear. The flow of fluids can generate static electricity, as can also the mixing of liquids, and sufficient time should be allowed to elapse after movement has stopped and before sampling is undertaken to ensure leakage to earth of the charge generated by movement.

**3.3.2.3** Adequate and appropriate fire extinguishers shall be available.

**3.3.2.4** All spillages should be reported and corrected as soon as possible. Spilt flammable liquids should not be allowed to enter drains unless they are water miscible and can be flushed away with a continuous flow of water.

**3.3.2.5** Protective goggles and protective clothing shall be worn. Such clothing shall not in itself be flammable. Clothing made from synthetic fibres or plastics should not be worn.

**3.3.2.6** Spontaneously flammable substances shall be handled either under an inert liquid or in an inert atmosphere.

### 3.4 Toxic substances

#### 3.4.1 *Introduction*

Poisons may be assimilated by :

- ingestion (see 3.4.2);
- respiration (see 3.4.3);
- absorption (see 3.4.4).

In acute poisoning, i.e. from a single heavy dose, the effects may be associated with immediate discomfort and other symptoms, but in some cases there are delayed effects not appearing for some hours. In all cases, medical attention should be obtained.

Repeated low level doses of some substances are a health hazard because of accumulation of the poison itself in the body or by virtue of accumulated minor physiological changes. Persons exposed to this kind of risk should be periodically examined by a doctor.