भारतीय मानक Indian Standard

IS 16806 (Part 7): 2018 ISO 29042-7: 2010

मशीनरी की सुरक्षा — वायुजनित खतरनाक पदार्थों के उत्सर्जन का मूल्यांकन

भाग 7 प्रदूषक एकाग्रता पैरामीटर के माप के टेस्ट बैंच विधि

Safety of Machinery — Evaluation of the Emission of Airborne Hazardous Substances

Part 7 Test Bench Method for the Measurement of the Pollutant Concentration Parameter

ICS 13.110

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भारतीय मानक ब्यूरो

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NATIONAL FOREWORD

This Indian Standard (Part 7) which is identical with ISO 29042-7: 2010 'Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 7 Test bench method for the measurement of the pollutant concentration parameter' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on recommendation of the Manufacturing Machinery and Their Safety Sectional Committee and approval of the Mechanical Engineering Division Council.

Other parts in this series are:

- Part 1 Selection of test methods
- Part 2 Tracer gas method for the measurement of the emission rate of a given pollutant
- Part 3 Test bench method for the measurement of the emission rate of a given pollutant
- Part 4 Tracer method for the measurement of the capture efficiency of an exhaust system
- Part 5 Test bench method for the measurement of the separation efficiency by mass of air cleaning systems with unducted outlet
- Part 6 Test bench method for the measurement of the separation efficiency by mass of air cleaning systems with ducted outlet
- Part 8 Room method for the measurement of the pollutant concentration parameter
- Part 9 Decontamination index

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below alongwith their degree of equivalence for the editions indicated:

International Standard	Corresponding Indian Standard	Degree of
		Equivalence
ISO 12100, Safety of machinery —	16819 : 2018 Safety of machinery —	Identical
General principles for design — Risk	General principles for design — Risk	
assessment and risk reduction	assessment and risk reduction	
ISO 2602, Statistical interpretation	IS 14277: 1996 Statistical interpretation	Identical
of test results — Estimation of the mean	of test results — Estimation of mean,	
 Confidence interval 	standard deviation and regression	
	coefficient — Confidence interval	

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values (*revised*).' The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Indian Standard SAFETY OF MACHINERY — EVALUATION OF THE EMISSION OF AIRBORNE HAZARDOUS SUBSTANCES

PART 7 TEST BENCH METHOD FOR THE MEASUREMENT OF THE POLLUTANT CONCENTRATION PARAMETER

1 Scope

This part of ISO 29042 specifies a test bench method for the measurement of the pollutant concentration parameter of a given airborne hazardous substance from a machine, using a test bench under specified operating conditions. The method is applicable only to the determination of emitted gases, vapours and respirable particles. It is intended that whenever possible the emission rate be determined in a test bench (see ISO 29042-3).

Measurement of the pollutant concentration parameter of a machine can serve for the

- a) evaluation of the performance of the machine,
- b) evaluation of the improvement of the machine,
- c) comparison of machines within different groups of machines with the same intended use (such groups being defined by the function and materials processed),
- d) ranking of machines from the same group according to their pollutant concentration parameters, and
- e) determination of the state of the art of a machine with respect to its pollutant concentration parameter.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2602, Statistical interpretation of test results — Estimation of the mean — Confidence interval

ISO 12100, Safety of machinery — General principles for design — Risk assessment and risk reduction

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and the following apply.

3.1

pollutant concentration parameter of the cabin

 P_{cc}

measured concentration of a given pollutant in defined position(s) near the machine

NOTE For the purposes of this part of ISO 29042, one measurement plane is used, preferably in the exhaust duct.

4 Principle

The principle of the measurement method is to operate machines under controlled conditions in a test bench and measure the pollutant concentration at a well-defined location (see 5.2) for a specified exhaust air flow rate of the test bench. This concentration gives an indication of the emission from the machine.

5 Test bench

5.1 Description of the test bench

The test bench consists of a test cabin with a funnel and a subsequent air mover (see Figure 1).

The air mover produces an air flow in the test cabin from the inlet towards the funnel. The test cabin shall be equipped with a permeable inlet (for example, macroporous filter material, perforated plastic foil or plate) in order to obtain a uniform air flow across the inlet and to avoid escape of the pollutant from the test cabin.

The test cabin exhaust flow rate shall be specified in type-C standards. It shall be controlled in order to remain constant. The cross-section of the test cabin (form and dimensions) shall be chosen according to the size of the machine. The maximum cross-sectional area of the machine shall not exceed a fifth of the cross-sectional area of the test cabin.

The test cabin shall be long enough to accommodate the machine and the operator, with the emission sources as close to the specified location as practicable, according to Figure 1.

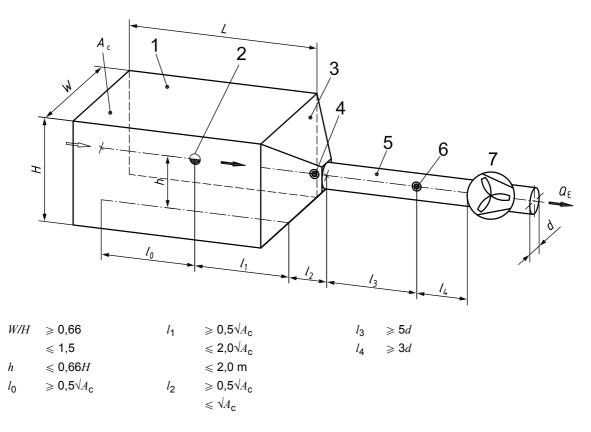
The machine shall be positioned in the test cabin such that the source of the pollutant emitted from the machine is in the area of the longitudinal axis of the test cabin at a distance, l_1 , from the beginning of the funnel and a distance, l_0 , from the inlet, as shown in Figure 1.

5.2 Location of measurement planes

The concentration of the pollutant shall be measured at measurement plane 1 in the exhaust duct.

Alternatively, if it is necessary to use measuring instruments having larger sampling heads and/or suitable only for lower air velocities, then measurement plane 2, located in the area of the middle axis of the funnel as near as possible to the exhaust duct, may be used.

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Key

1	test cabin	A_{c}	cross-section of test cabin
2	emission source	d	diameter of outlet
3	funnel	H	height of test cabin
4	measurement plane 2	h	height of emission source
5	exhaust duct	L	length of test cabin
6	measurement plane 1 (preferred)	Q_{E}	cabin exhaust flow rate
7	air mover	W	width of test cabin

NOTE Generally, the emission source cannot be considered as a point, but as a zone including several sources.

Figure 1 — Test bench (schematic layout)

6 Procedure

6.1 Operation of machine

The machine shall be operated according to its intended use. The stipulation of working procedures, the tools used and the materials to be processed with specified categories of machines will be defined in type-C standards.

If the machine is equipped with its own separator, re-circulating air towards the working zone depending on the intended use, the outlet of the separator shall be located in the test cabin so as to ensure that the pollutant from this secondary source reaches the measurement plane.

The machine shall be operated in accordance with the manufacturer's instructions. When the machine is provided with a pollutant control system this shall be adjusted according to these instructions.

Tests shall not be carried out unless manufacturer's specifications for operating the pollutant control system are available.

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6.2 Measurement procedures

The measurement procedures used for the pollutant concentration shall comply with the appropriate International Standards. Detailed procedures shall be specified in the appropriate type-C standards for each type of machine.

The measurement shall take into account the normal operational cycles of the machine.

The measurement time shall be sufficient to enable the collection of concentration data representative of the normal operational cycles of the machine.

At least three tests shall be performed.

7 Expression of results

The pollutant concentration parameter of the cabin, $P_{\rm cc}$, is the sum of the mean value and the 95 % confidence interval according to ISO 2602.

8 Test report

The test report shall include at least the following information:

- a) reference to this part of ISO 29042 ("ISO 29042-7:2010") and any associated type-C standards;
- description of the machine tested (manufacturer, model, type, version, design, size, year of manufacture, serial number, etc.) — for the machine itself and for each additional piece of equipment;
- operational data during tests, including tools used with the machine and the material processed on the machine;
- d) description of the pollutant control system (manufacturer, model, type, version, design, size, year of manufacture, serial number, operational data, etc.);
- e) test cabin exhaust flow rate;
- description of measurement procedures, including the locations of the measurement plane and pollutant measured;
- g) measuring instruments used and their most recent calibration date;
- h) environmental data (temperature, humidity, atmospheric pressure);
- i) description of procedures used (e.g. list of standards) for concentration and flow rate measurements;
- j) number of tests performed;
- k) measured concentrations;
- l) pollutant concentration parameter of the cabin, P_{cc} , mean value and 95 % confidence interval;
- m) any comments on deviations from any relevant standards;
- n) test laboratory;
- o) name of the person responsible for carrying out the test;
- p) date of testing;
- q) any additional comments.

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Bibliography

[1] ISO 29042-3, Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 3: Test bench method for the measurement of the emission rate of a given pollutant

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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