INTERNATIONAL STANDARD

ISO 10263-2

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Earth-moving machinery — Operator enclosure environment —

Part 2:
Air filter test

Engins de terrassement — Ambiance dans l'enceinte de l'opérateur — Partie 2: Essai de l'élément du filtre à air

Reference number
ISO 10263-2:1994(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10263-2 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

ISO 10263 consists of the following parts, under the general title *Earth-moving machinery — Operator enclosure environment*:

— *Part 1: General and definitions*

— *Part 2: Air filter test*

— *Part 3: Operator enclosure pressurization test method*

— *Part 4: Operator enclosure ventilation, heating and/or air-conditioning test method*

— *Part 5: Windscreen defrosting system test method*

— *Part 6: Determination of effect of solar heating on operator enclosure*

Annex A of this part of ISO 10263 is for information only.

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Earth-moving machinery — Operator enclosure environment —

Part 2:
Air filter test

1 Scope

This part of ISO 10263 specifies a uniform test method to determine performance levels of operator enclosure panel-type air filters used to filter the air entering an earth-moving machine operator enclosure with a powered fresh air system.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 10263. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 10263 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5011:1988, *Inlet air cleaning equipment for internal combustion engines and compressors — Performance testing.*

3 Definitions

For the purposes of this part of ISO 10263, the following definitions apply.

3.1 operator enclosure air filter element: Medium in which particulate matter is removed from the incoming air supply. [ISO 10263-1:1994, definition 3.19]

3.2 filter efficiency: Measure of the ability of the air filter to remove particulate matter. [ISO 10263-1:1994, definition 3.20]

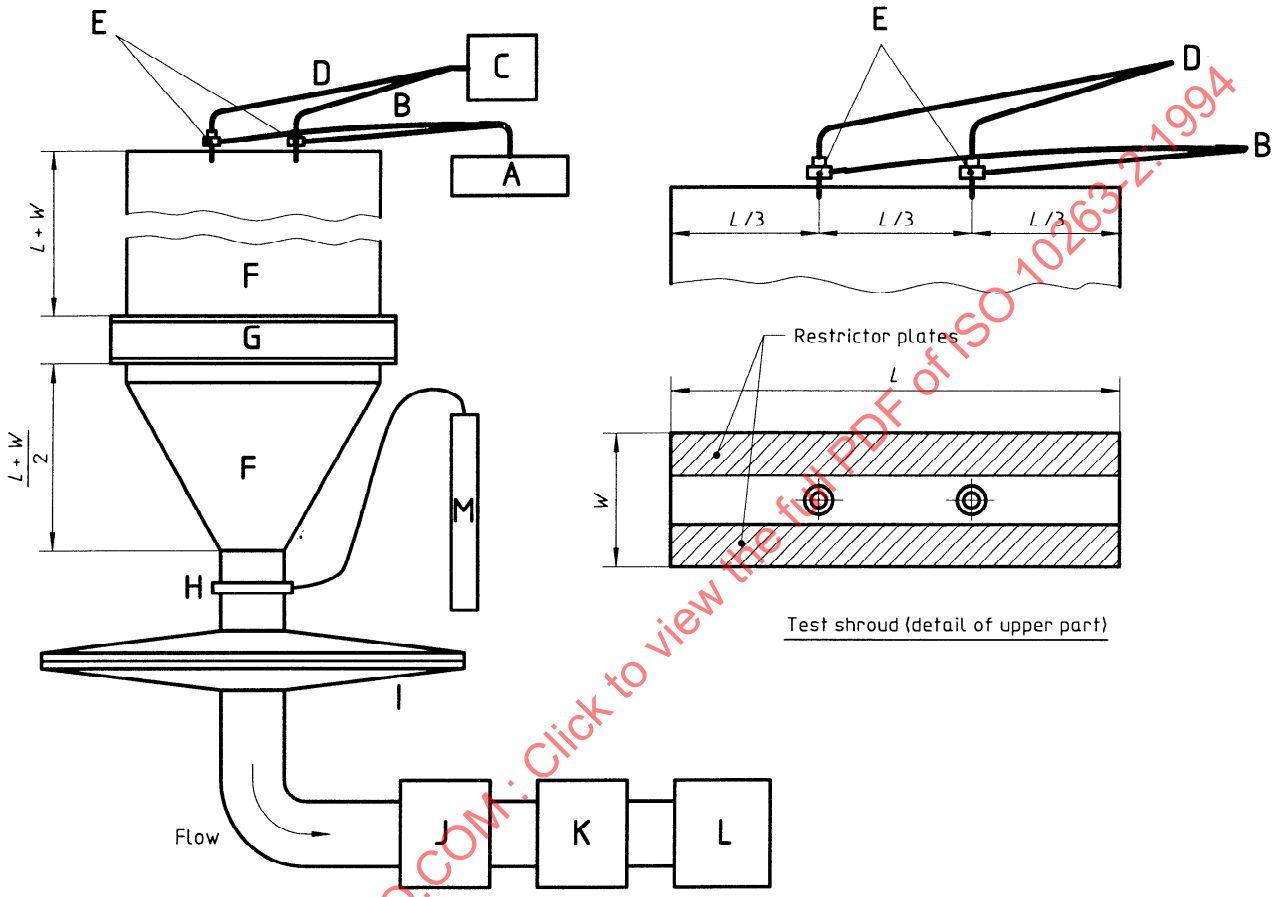
3.3 test dust: Particulate matter used to evaluate the filter element. [ISO 10263-1:1994, definition 3.21]

4 Test equipment and instruments

4.1 Test equipment in accordance with figure 1, used to determine the resistance to airflow, particle holding capacity, particulate removal efficiency and sealing characteristics. For the dust capacity and efficiency tests, the restrictor plates specified in figure 1 shall be used to promote adequate mixing of dust upstream of the filter being tested (see 5.7). For components other than panel filters, see ISO 5011.

4.2 Dust metering device in accordance with figure 2 which, when used with the dust injector specified in figure 3, is capable of ensuring the necessary flow. The average delivery rate shall be within 5 % of the desired rate, and the deviation in the instantaneous delivery rate from the average shall be no more than 5 %. This feed system shall not change the primary particle size distribution of the particulate.

4.3 Absolute filter consisting of a fibreglass medium with a minimum thickness of 12,7 mm and a minimum density of 9,5 kg/m^3. The fibre diameters shall be 0,76 µm to 1,27 µm and the moisture absorption shall be less than 1 % by mass, after exposure to a temperature of 50 °C and 95 % relative humidity for 96 h. The filter shall be installed with the nap side facing upstream in an air-tight holder that adequately supports the medium.



Key

A	Dust metering device
B	Dust transfer tubing
C	Compressed air supply
D	Compressed air lines
E	Dust injectors
F	Test shroud
G	Filter element being tested
H	Piezometer ring
I	Absolute filter housing
J	Flowrate measuring device
K	Flowrate control system
L	Blower or other device for inducing airflow
M	Restriction measuring device

Figure 1 — Test equipment

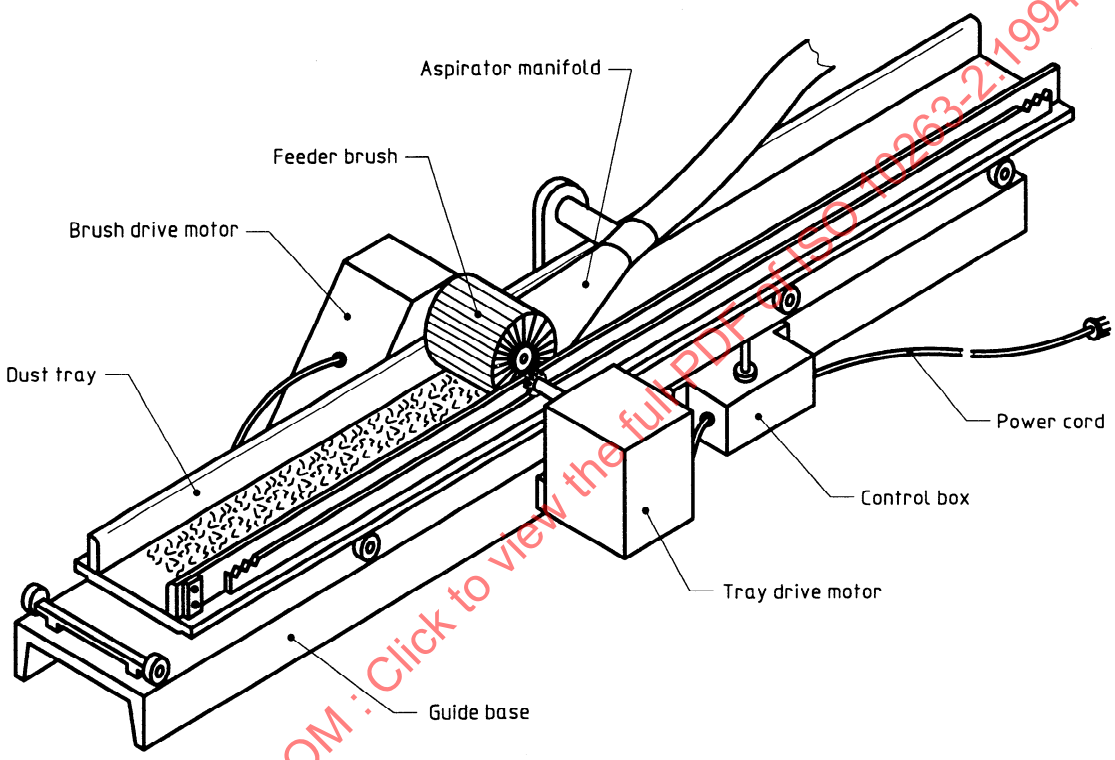


Figure 2 — Dust feeder

Dimensions in millimetres

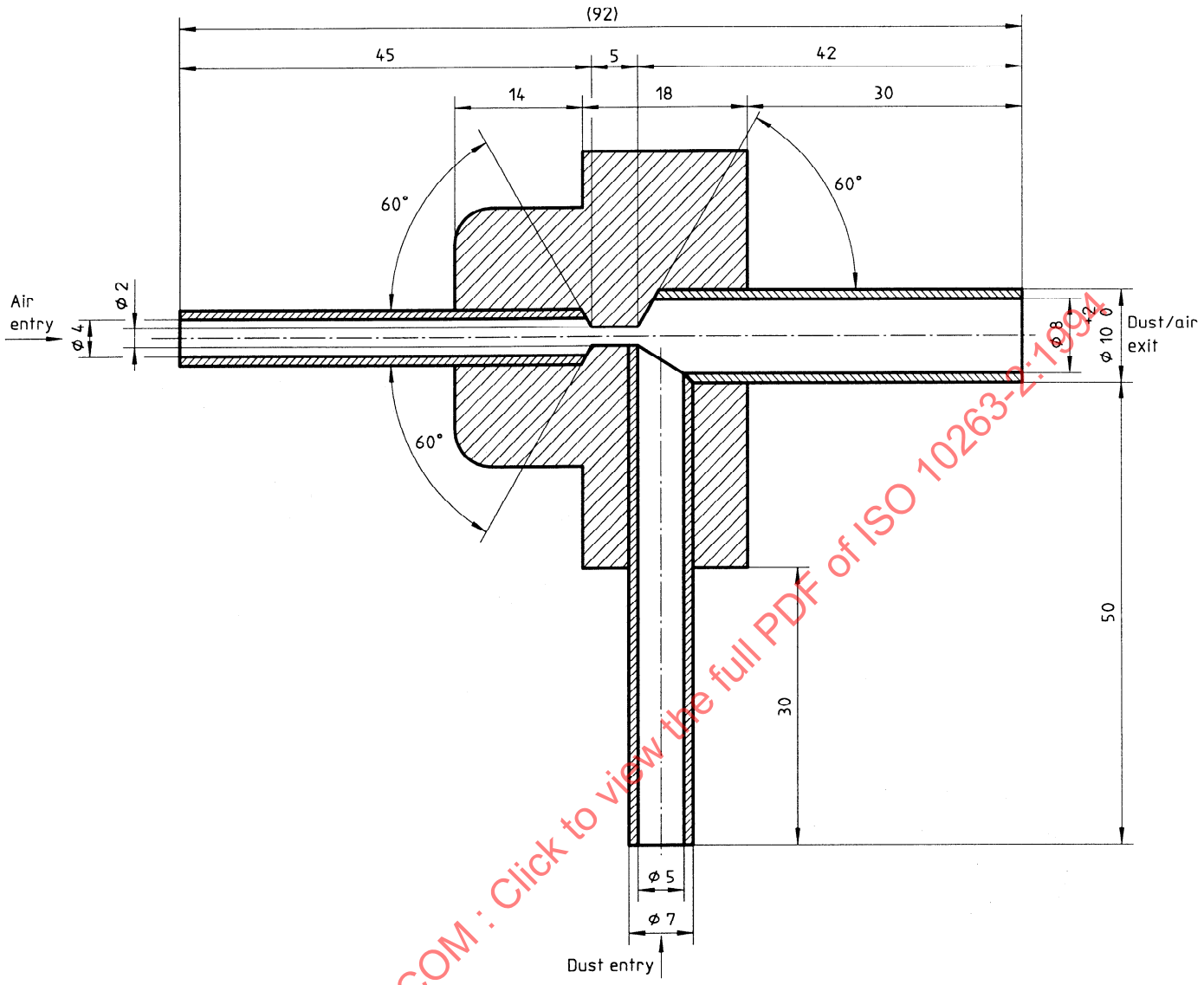


Figure 3 — Dust injector

5 Test conditions

5.1 The test dust shall have the composition specified in table 1 and the particle distribution specified in tables 2 and 3.

Since it is difficult to select a test dust size distribution and concentration which is representative of all service conditions, the concentration to be used for the tests, based primarily on practical considerations, shall be 1 g/m^3, for both fine and coarse dusts.

NOTE 1 A concentration of 1 g/m^3 is generally accepted as zero visibility conditions.

Table 1 — Chemical analysis of test dust

Chemical	Amount % (*m/m*)
SiO_2	67 to 69
Fe_2O_3	3 to 5
Al_2O_3	15 to 17
CaO	2 to 4
MgO	0,5 to 1,5
Total alcalis: 3 % (*m/m*) to 5 % (*m/m*) Ignition loss: 2 % (*m/m*) to 3 % (*m/m*)	

Table 2 — Particle size distribution by volume

Size µm	Fine grade % (*V/V*) max.	Coarse grade % (*V/V*) max.
⩽ 5,5	38 ± 3	13 ± 3
⩽ 11	54 ± 3	24 ± 3
⩽ 22	71 ± 3	37 ± 3
⩽ 44	89 ± 3	56 ± 3
⩽ 88	97 ± 3	84 ± 3
⩽ 125	100	100

Table 3 — Particle size distribution by mass

Dimension d µm	Fine grade % (*m/m*)	Coarse grade % (*m/m*)
$0 < d \leqslant 5$	39 ± 2	12 ± 2
$5 < d \leqslant 10$	18 ± 3	12 ± 3
$10 < d \leqslant 20$	16 ± 3	14 ± 3
$20 < d \leqslant 40$	18 ± 3	23 ± 3
$40 < d \leqslant 80$	9 ± 3	30 ± 3
$80 < d \leqslant 200$	0	9 ± 3

5.2 The face velocity of the absolute filter shall not exceed 50 m/min, to maintain media integrity.

5.3 The absolute filter mass shall be measured to the nearest 0,01 g after the mass has stabilized and while in a ventilation oven at 105 °C ± 5 °C. If stabilization cannot be determined, the filter shall remain in the oven for at least 4 h.

5.4 All tests shall be conducted with air entering the air filter at a temperature of 24 °C ± 8 °C, and a relative humidity of 50 % ± 15 %.

NOTE 2 Since atmospheric conditions affect test results, when comparing performance of filters designed for the same application, tests should be conducted within the narrowest range of temperature and humidity possible.

5.5 All airflow measurements shall be corrected to a standard condition of 25 °C at 100 kPa.

5.6 The velocity of the air entering the top of the dust mixing chamber is calculated between the top restrictor plates where the velocity is equal to the flowrate divided by area, based on the measured flowrates. The velocity shall be a minimum of 6 m/s. (See figure 1.)

5.7 The airflow restriction and pressure drop tests shall be conducted using a minimum of three points: 80 %, 100 % and 120 % of rated airflow, using the element restriction test setup shown in figure 1. The unit to be tested shall be conditioned for at least 30 min under the same temperature and humidity conditions as those of the test area.

5.8 The air filter efficiency, E, as a percentage, is calculated as follows:

$$E = \frac{m_f}{m_f + m_A} \times 100$$

where

m_f is the increase in mass of the filter element under test;

m_A is the increase in mass of the absolute filter.

6 Performance requirements

Performance requirements shall be agreed between supplier and purchaser. See the qualification test form in annex A.

Annex A
(informative)

Example of qualification test form for panel-type air filter in accordance with ISO 10263-2

Test flowrate: ..... m^3/min

Initial restriction: ..... Pa

Dust concentration (See 5.1): ..... g/m^3

Dust type: fine/coarse

Minimum quantity of dust to obtain a restriction of ..... Pa: ..... g

Minimum efficiency of filter element at above restriction: ..... %

Minimum efficiency of filter element for a restriction of 125 Pa, initial efficiency: ..... %

Laboratory test conditions

	Before	**After**
Temperature	..... °C	..... °C
Relative humidity	..... %	..... %
Barometric pressure	..... kPa	..... kPa

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