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Earth-moving machinery — Operator enclosure environment —

Part 5:

Windscreen defrosting system test method

Engins de terrassement — Ambiance dans l'enceinte de l'opérateur —

Partie 5: Méthode d'essai du système de dégivrage du pare-brise



Reference number
ISO 10263-5:1994(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 10263-5 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 5: Windscreen defrosting system test method

1 Scope

This part of ISO 10263 specifies a test method to determine the performance of windscreen defrosting systems of earth-moving machinery, fitted with an operator enclosure and a device for defrosting the windscreen.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10263. At the time of publication, the editions indicated were 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 editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5353:1978, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 9249:1989, *Earth-moving machinery — Engine test code — Net power*.

3 Definitions

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

3.1 windscreen defrosting system: Means intended to defrost the windscreen. [ISO 10263-1:1994, definition 3.18]

3.2 daylight opening; DLO: Maximum unobstructed opening through any glazed aperture, with trim mouldings and mounting seals adjoining the glazed surface installed normal to the glass surface. [ISO 10263-1:1994, definition 3.22]

3.3 defrosted area: That area of the windscreen consisting of dry cleared surface and melted or partially melted (wet) test coating, and excluding that area of the windscreen covered with dry test coating of ice. [ISO 10263-1:1994, definition 3.23]

3.4 heat transfer medium; HTM: Means through which defroster system heating is achieved. [ISO 10263-1:1994, definition 3.24]

4 Test equipment

4.1 Cold chamber sufficiently large to contain the base machine or machine operator enclosure with provision for circulating cold air.

NOTE 1 In lieu of a cold chamber, the test may be conducted outside under test conditions similar to those in a cold chamber (see 5.2).

4.2 Means of recording boundaries of windscreen areas defrosted such as a wax pencil.

4.3 Engine tachometer.

4.4 Stopwatch or other timing device.

4.5 Thermometers or other temperature-measuring devices, with an accuracy of $\pm 0,5\text{ }^{\circ}\text{C}$.

4.6 Throttle control device, if desired.

4.7 Spray gun to apply mist to the windscreen, with the following characteristics:

- a) fluid: distilled water;
- b) liquid nozzle size diameter: 1,7 mm;
- c) operating gun gauge pressure:
345 kPa $\pm$ 20 kPa;
- d) cone diameter at 200 mm from the surface:
300 mm $\pm$ 50 mm.

4.8 Device to measure quantity of water applied to windscreen.

4.9 Auxiliary power supply for heater blower motor when bench-testing operator enclosure only.

4.10 Anemometer to measure air velocity, with an accuracy of $\pm$ 10 % of the observed values.

5 Test conditions

5.1 The ambient conditions shall be as follows:

- a) ambient air temperature: maximum – 15 °C;
- b) air velocity: maximum 5 m/s.

5.2 If it is not practical to test the base machine due to physical size limitations, the operator's enclosure may be bench-tested, simulating the heat loads imposed by the base machine on the enclosure. If this laboratory procedure is used, supplementary field testing should be carried out to confirm the test procedure.

5.3 The machine shall be operated in accordance with the manufacturer's recommended warm-up procedure, and then at rated speed under a maximum load of no more than 20 % of the maximum rated net engine power, determined in accordance with ISO 9249.

5.4 The heat transfer medium (HTM) flow shall come from engine operation or from an independent HTM flow.

The flow shall be that resulting from engine operation as specified in 5.3. The independent HTM flow and temperature shall be the same as that resulting from operation of the machine engine, in accordance with the requirement of 5.3.

NOTE 2 Typical examples of HTM are as follows:

- a) liquid coolant (50 % glycol and 50 % water by volume);
- b) hydraulic oil;
- c) heated air from an auxiliary heat source, i.e. gas-fired or oil-fired heater.

5.5 The HTM temperature shall be measured as close as possible to the inlet pipe of the heater unit. For those systems using more than one heater, it shall be measured at the inlet pipe of the heater unit receiving the first coolant flow.

The HTM flow may be measured at any suitable point independent of the HTM supply.

The ambient air temperature and velocity shall be measured at a point where they are not influenced by the machine, but no further than 10 m away.

At the beginning of the test, the HTM shall be at ambient temperature.

5.6 Windscreen wiper blades and arms shall be off the windscreen glazed surface during ice application. Windscreen wipers may be used during the test.

5.7 Defroster and/or heater systems shall be on full blower maximum speed.

5.8 The voltage at the terminals of the blower motor shall be no more than 20 % above the nominal rating of the system (for example 14,4 V for a 12 V system or 28,8 V for a 24 V system).

5.9 The temperature controls shall be at maximum heat position.

5.10 All engine, heater and defroster units shall be standard production parts or equivalent, adjusted within specified limits.

5.11 The engine bonnet (hood), doors and windows shall be closed.

5.12 If an auxiliary heater(s) is part of the standard heater and defroster system, it may be operated.

5.13 Auxiliary means of preheating the engine, etc. are permissible, providing they do not heat the HTM. Similarly, no simulated or actual solar heat load shall be allowed to strike the windscreen.

5.14 An operator may be in the enclosure throughout the duration of the test.

6 Test procedure

6.1 Keep the machine in the cold chamber for a soak period at a temperature of $-15\text{ }^{\circ}\text{C}$ or below for at least 10 h.

If instrumentation is available to show that the cold chamber air and wall temperatures have stabilized, a shorter soak time may be used. If tested outside, the outside temperature need only be stabilized at the specified test temperature for a period long enough to soak the windscreen and cab for the required period.

6.2 Following the machine soak period, form a coating of ice on the windscreen(s) by spraying $0,050\text{ ml} \pm 0,005\text{ ml}$ of water per square centimetre of glazed surface with a spray gun at an air pressure of $345\text{ kPa} \pm 20\text{ kPa}$, measured while spraying, so as to form an even coating of ice over the entire glazed surface. Hold the spray nozzle, adjusted to full fan pattern and maximum flow, perpendicular to and at 20 cm to 25 cm from the glazed surface and stroke it back and forth evenly in horizontal overlapping layers until the specified quantity of liquid has been applied. Upon completion of the icing process, allow an additional soak period of 30 min to 40 min to elapse.

Alternative methods of applying the water may be used to achieve the same results.

6.3 Start the engine or heat source. Put the defrosting system into action, maintaining the test conditions specified in clause 5 throughout the test period.

Every 5 min for 1 h, outline the defrosted areas on the inside surface of the windscreen [see also 8 b)].

7 Minimum performance requirements

The windscreen areas that shall be defrosted are defined in table 1 for various classifications of earth-moving machines. Each area is defined by angles

from the operator's eye point 660 mm above and 20 mm in front of the seat index point (SIP) as defined in ISO 5353.

The upper and lower boundaries of the areas are defined by the intersection of two planes and the windscreen glazed surface, the two planes being seen as lines converging at the eye point, at the angle given in table 1.

The left and right limits of the areas are defined by the intersection of two vertical planes and the windscreen glazed surface, the two planes being seen as lines converging at the eye point, at the angle given in table 1.

If any of the four planes, or portions of them established by the angles in table 1, do not intersect the windscreen glazed surface but fall outside of the daylight opening (DLO), then relocate that part of the plane until it just intersects the windscreen glazed surface along a line which lies entirely on the DLO and touches the moulding or frame.

The areas used in determining the percentage of defrosted area are those areas on the outside glazed surface which are not within 25 mm of the edge of the DLO (pillars, division bar, header, etc.). The percentage is the ratio of defrosted area to the defined area. Figure 2 illustrates all of these areas on a typical windscreen.

After 60 min of test, the percentage of defrosted area shall meet the minimum requirements specified in table 2. The undefrosted portions of area B shall be located only along the windscreen frame or moulding of this area.

8 Test report

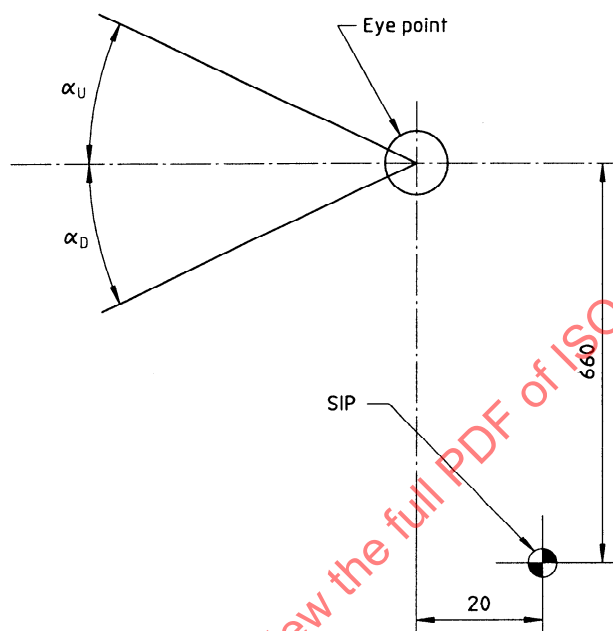
The test report shall contain the following information:

- time necessary at the specified ambient temperature to defrost the minimum requirement area given in table 2, for each area;
- the pattern of the defrosted area, preferably transferred to a transparent material by tracing, marked to identify the driver's side if it is not centred in relation to the windscreen.

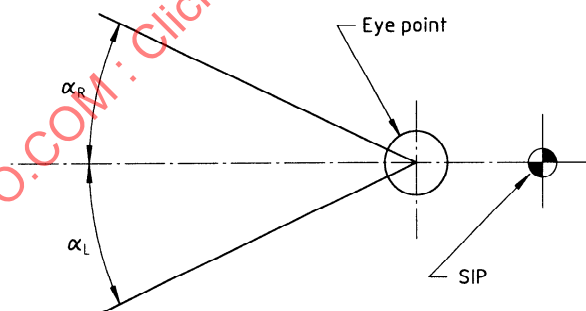
Table 1 — Windscreen areas to be defrosted

Machine type ¹⁾	Area	α_U	α_D	α_L	α_R
Loaders	A	10°	5°	15°	15°
	B	15°	15°	25°	25°
	C	30°	25°	35°	35°
Tractors	A	5°	7°	15°	15°
	B	8°	20°	25°	25°
	C	12°	35°	40°	40°
Dumpers	A	5°	7°	15°	15°
	B	8°	15°	20°	20°
	C	17°	16°	30°	39°
Tractor scrapers	A	5°	7°	15°	15°
	B	8°	15°	20°	20°
	C	12°	20°	30°	30°
Excavators	A	12°	18°	10°	20°
	B	14°	24°	17°	22°
	C	20°	30°	25°	25°
Motor graders	A	10°	5°	15°	15°
	B	15°	15°	25°	25°
	C	20°	50°	35°	35°
Backhoe loaders	A	5°	7°	15°	15°
	B	8°	20°	25°	25°
	C	12°	35°	40°	40°
NOTE — To take account of the great variety of conditions encountered for these different machines, the areas are modified appropriately.					
1) In accordance with ISO 6165:1987, <i>Earth-moving machinery — Basic types — Vocabulary</i> .					

Dimensions in millimetres



a) Side view



b) Plan view

Figure 1 — Angles emanating from eye point

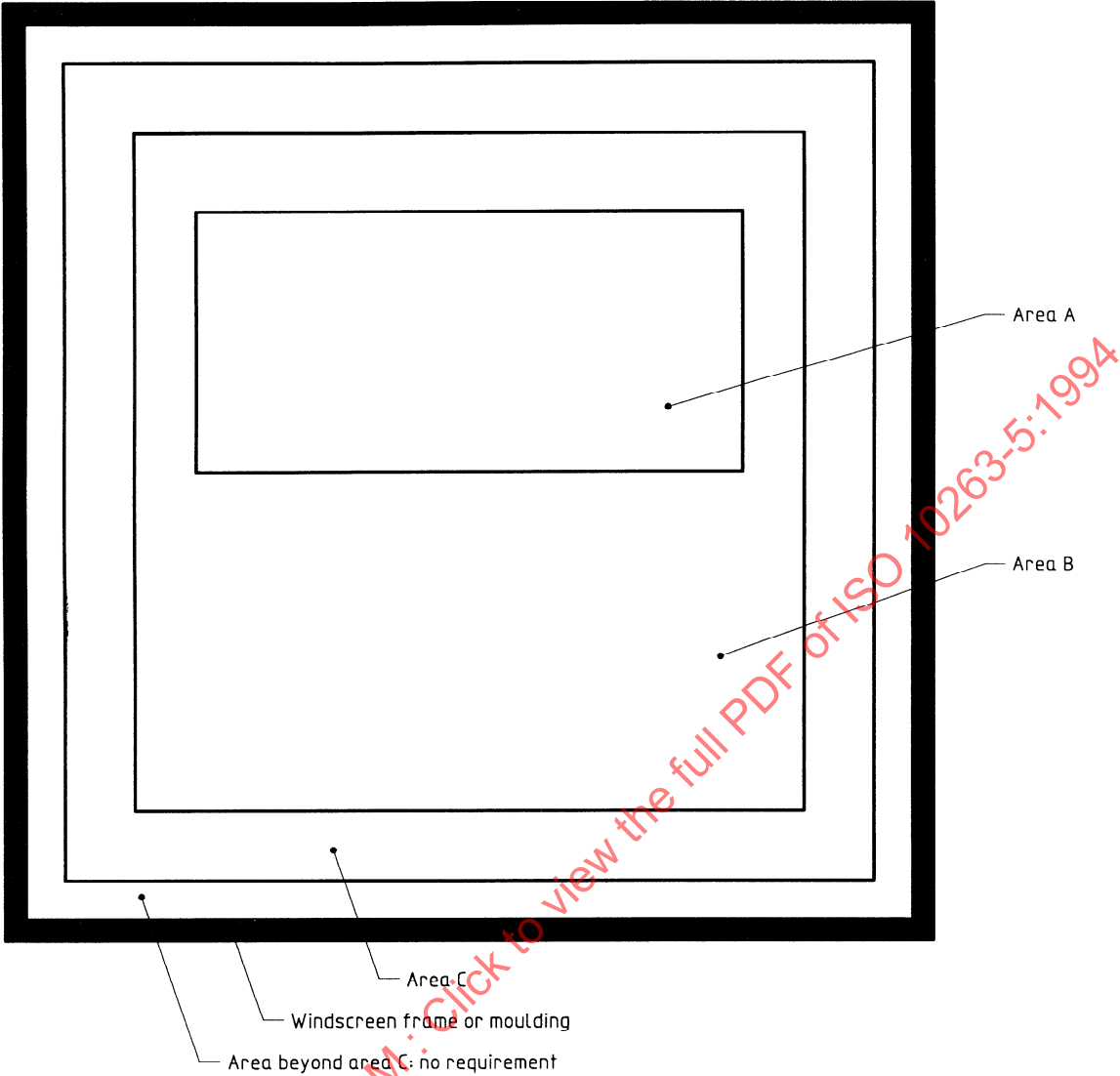


Figure 2 — Typical locations of areas A, B and C

Table 2 — Minimum percentage of defrosted area after 60 min

Values in percentage

Windscreen type	Area A	Area B	Area C
One-piece	99	94	80
Multipiece	84	70	65

Annex A

(informative)

Bibliography

- [1] ISO 5006-1:1991, *Earth-moving machinery — Operator's field of view — Part 1: Test method*.

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