SLOVENSKI STANDARD
SIST ISO 7210:1998

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Rutinski analizni cigaretni dimni stroj - Dodatne preskusne metode

Routine analytical cigarette-smoking machine -- Additional test methods

Machine à fumer analytique de routine pour cigarettes -- Méthodes d'essais complémentaires

Ta slovenski standard je istoveten z: **ISO 7210:1997**

ICS:

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INTERNATIONAL STANDARD

ISO 7210

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Routine analytical cigarette-smoking machine — Additional test methods

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Reference number
ISO 7210:1997(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 7210 was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*, Subcommittee SC 1, *Physical and dimensional tests*.

This second edition cancels and replaces the first edition (ISO 7210:1983), which has been technically revised.

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Routine analytical cigarette-smoking machine — Additional test methods

1 Scope

This International Standard specifies additional test methods for routine analytical cigarette-smoking machines intended to check the conformity of these machines with ISO 3308.

It only establishes additional test methods for smoking machines and does not deal with actual smoking, which is described in other International Standards.

It is composed of three sections relating to:

- the determination of pressure drop (clause 3);
- the determination of puff profile (clause 4);
- the determination of restricted smoking (clause 5).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 3308:1991, *Routine analytical cigarette-smoking machine - Definitions and standard conditions.*

ISO 3402:1991, *Tobacco and tobacco products - Atmosphere for conditioning and testing.*

3 Determination of pressure drop

3.1 Definition

For the purposes of this International Standard, the following definition applies.

3.1.1 pressure drop: Difference in static pressure between any two points of the pneumatic circuit of a smoking machine that are passed by a current of air at a constant flow rate of 17,5 ml/s.

3.2 Principle

Measurement, under well-specified air flow conditions, of the pressure drop of a smoking machine by means of an appropriate manometer.

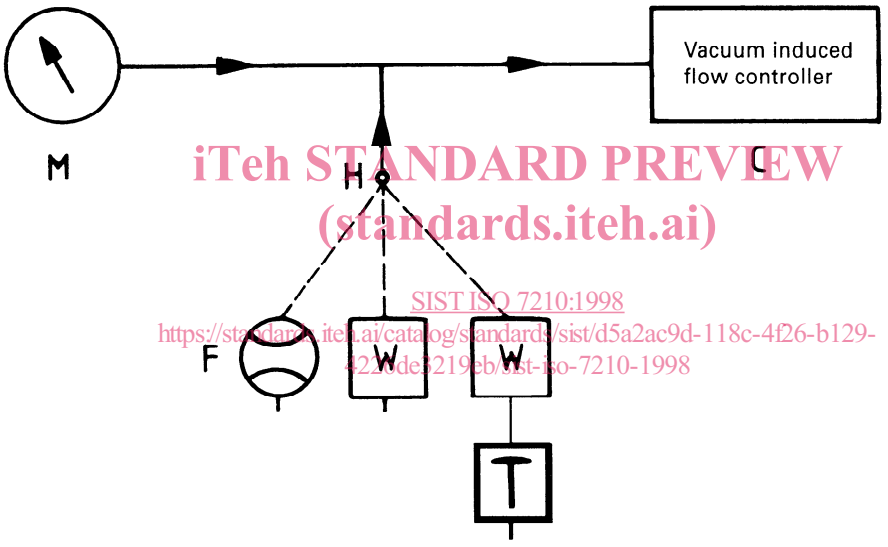
3.3 Apparatus (see figure 1)

The whole of the flow path between the butt end of the cigarette and the suction mechanism shall offer the least possible resistance and its pressure drop shall not exceed 300 Pa.

The test apparatus shall be capable of

- sucking a constant flow of air which is unaffected by the pressure drop of the system under test;

- measuring the pressure drop with sufficient accuracy.



H	Test head point
F	Flowmeter
W	Wide-bore tubing
T	Apparatus under test
M	Manometer
– – –	Test method connections

NOTE – Arrows indicate the direction of air flow.

Figure 1 – Pneumatic circuit of a typical apparatus

3.4 Test atmosphere

All measurements shall be carried out under standard ambient conditions of temperature and relative humidity as specified in ISO 3402.

3.5 Procedure

3.5.1 General

The flow of air through the smoking machine shall always be in the same direction as during the puffing cycle, i.e. from the cigarette to the suction source. The air used for measurement shall be from the test atmosphere.

3.5.2 Testing

3.5.2.1 Connect the manometer M as indicated in figure 1 and set it to zero.

3.5.3.2 Connect the flowmeter F as indicated in figure 1 and establish an air flow of 17,5 ml ± 0,1 ml/s.

3.5.3.3 Disconnect the flowmeter F and attach a suitable length of wide-bore tubing W to the test head point H. Read the pressure, if any, on the manometer M. Record the value as PD_1.

3.5.3.4 Attach the free end of the wide-bore tubing W to the point in the smoking machine from which the puffing source was disconnected. Read the pressure on manometer M. Record the value as PD_2.

3.5.3.5 Calculate the pressure drop ($PD_2 - PD_1$).

3.5.3.6 Repeat the operation for each channel of the smoking machine.

3.6 Expression of results

The following values shall be recorded:

- the pressure drop for each channel, in pascals;

- the test atmosphere used.

4 Determination of puff profile

4.1 Definition

For the purposes of this International Standard, the following definition applies.

4.1.1 puff profile: Flow rate measured directly behind the butt end of the cigarette, and depicted graphically as a function of time.

4.2 Principle

Continuous measurement of the flow rate of air of a puff through a pressure drop device of 1 kPa (see ISO 3308:1991, subclause 4.3).

4.3 Apparatus

The apparatus shall comprise the elements shown in the principle diagram (figure 2), i.e. the diagram of elements required for the two alternative measuring systems, A and B, with two different levels of sophistication.

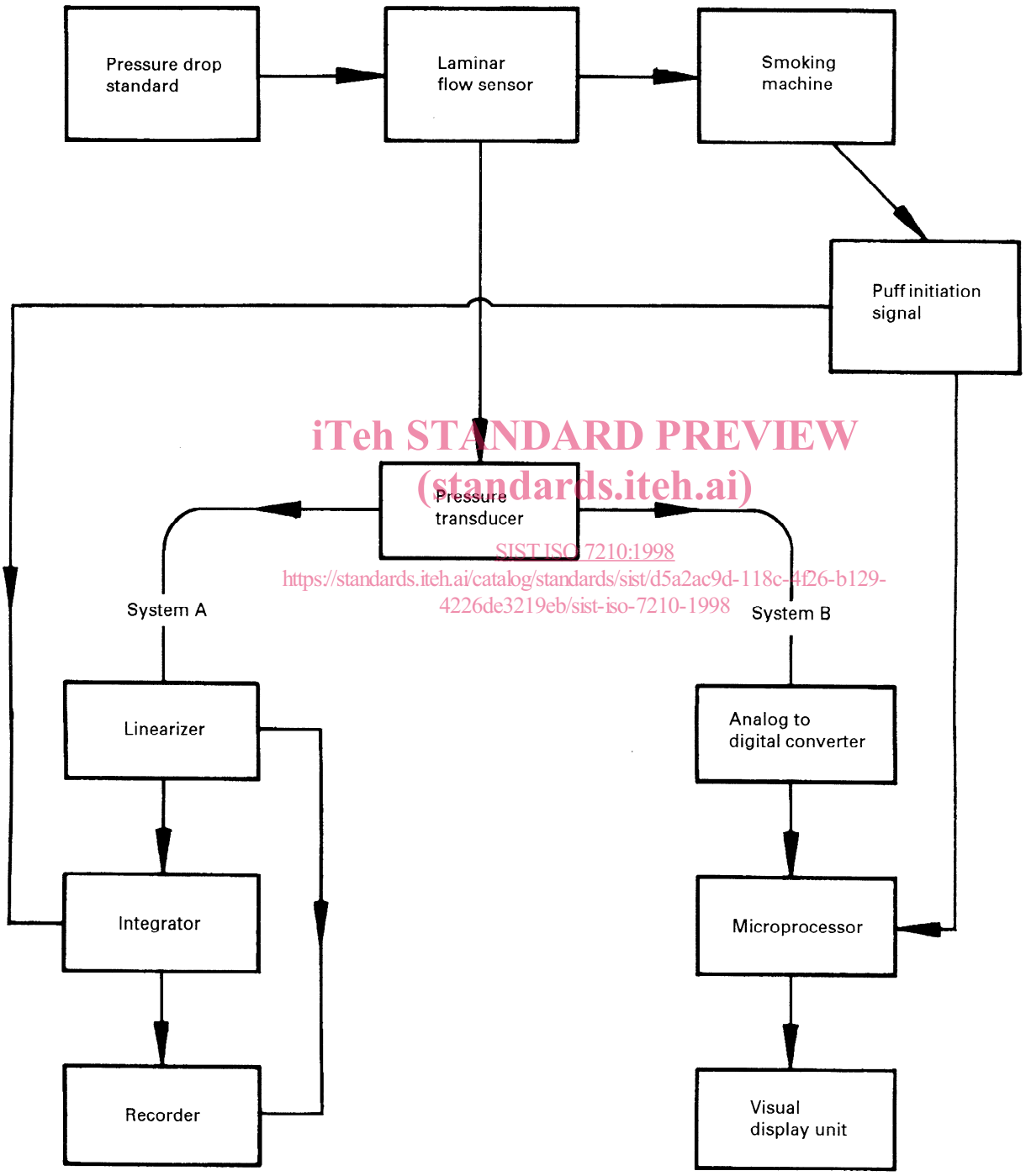


Figure 2 – Principle diagram

4.3.1 System A

The signal delivered by the pressure transducer is linearized by appropriate circuits and transmitted to an integrator and a recording apparatus.

The system can record a picture of the puff profile and measure its volume.

4.3.2 System B

This system uses digital conversion and a computer.

4.3.3 Requirements for both systems

The elements used in the system shall fulfil the following conditions:

- laminar flow element having a nominal pressure drop of 100 Pa ± 10 Pa at a flow of 17,5 ml/s;

- pressure transducer with a range of 500 Pa, a response time of 1 ms, and a response frequency of 1 kHz.

The above apparatus provides the means to obtain flow rate and time profiles for puffing as shown in figure 3.

At time $t = 0$, suction may be applied to the cigarette by means of a piston pump. The resulting flow rate Φ at the butt end of the cigarette varies to give a bell-shaped puff profile. The maximum flow rate Φ_m is reached at time t_m. The flow rate then decreases during the puff duration to reach the value Φ_d at time t_d when the puffing source ceases to apply suction, but a pressure differential exists.

Finally, the flow rate decreases slowly to 0, a value reached at time t_e.

The standard puff profile so be such that

$$25 \text{ ml/s} \leq \Phi_m \leq 30 \text{ ml/s}$$

at a time t_m, such that

$$0{,}8 \text{ s} \leq t_m \leq 1{,}2 \text{ s}.$$

The standard puff duration is $t_d = 2$ s, and the time t_e is consequently limited by the standard puff frequency to $t_e = 60$ s.

The puff volume, V, may be calculated on the basis of the shaded area in figure 3 from the formula:

$$V = \int_0^{t_e} \Phi(t)\,\mathrm{d}t = A + B = \int_0^{t_d} \Phi(t)\,\mathrm{d}t + \int_{t_d}^{t_e} \Phi(t)\,\mathrm{d}t$$