INTERNATIONAL STANDARD

ISO 11659-3

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Textile machinery and accessories — Machine parts in contact with textile processing oils —

Part 3: Determination of the impact on lacquers

Matériel pour l'industrie textile — Pièces de machines en contact avec des huiles textiles —

Partie 3: Détermination de l'impact sur les laques

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11659-3 was prepared by Technical Committee ISO/TC 72, *Textile machinery and machinery for dry-cleaning and industrial laundering*, Subcommittee SC 4, *Dyeing and finishing machinery and accessories*.

ISO 11659 consists of the following parts, under the general title *Textile machinery and accessories — Machine parts in contact with textile processing oils*:

— *Part 1: Determination of anticorrosive effect upon steel*

— *Part 2: Determination of the impact on polymeric materials*

— *Part 3: Determination of the impact on lacquers*

Textile machinery and accessories — Machine parts in contact with textile processing oils —

Part 3: Determination of the impact on lacquers

1 Scope

This part of ISO 11659 specifies tests for determining the impact of processing oils on textile machine parts made with lacquers. In view of the multitude of processing oils and lacquer systems, it addresses a selection of those substances and materials. However, testing of products not mentioned is also possible. It is applicable to textile processing oils used on fibres, yarns and the filaments prepared for their processing, and to lacquer systems applied to machine parts or test plates, including the necessary pre-treatment.

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 175, *Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 1514, *Paints and varnishes — Standard panels for testing*

ISO 2409, *Paints and varnishes — Cross-cut test*

ISO 2812-1, *Paints and varnishes — Determination of resistance to liquids — Part 1: General methods*

ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20 °C, 60 °C and 85 °C*

ISO 2815, *Paints and varnishes — Buchholz indentation test*

ISO 2884-1, *Paints and varnishes — Determination of viscosity using rotary viscometers — Part 1: Cone-and-plate viscometer operated at a high rate of shear*

ISO 3205:1976, *Preferred test temperatures*

ISO 3270:1984, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

ISO 3668, *Paints and varnishes — Visual comparison of the colour of paints*

ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering*

ISO 5661, *Petroleum products — Hydrocarbon liquids — Determination of refractive index*

ISO 7253, *Paints and varnishes — Determination of resistance to neutral salt spray (fog)*

ISO 7724-3, *Paints and varnishes — Colorimetry — Part 3: Calculation of colour differences*

ISO 10336, *Crude petroleum — Determination of water — Potentiometric Karl-Fischer titration method*

ISO 10523, *Water quality — Determination of pH*

ISO 12185, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method*

3 Principle

IMPORTANT — Comparisons between lacquer systems on the basis of this test are permissible only if the test specimens are of the same dimensions (in particular of the same thickness) and, to the extent that this is possible, of the same physical condition (condition of the surface, inner stress, etc.) and in the same state of conditioning.

Partial immersion of the test specimens in a test liquid during a fixed duration of test and at a fixed storage temperature.

Checking of properties before and after impact and drying. If possible, properties are to be checked subsequently in the same test specimens.

4 Test method and general test conditions

4.1 Choice of test liquid and lacquer systems

4.1.1 Choice of test liquid

The test liquid shall be

— the processing oil in its original state, or

— a 10 % mixture of the processing oil with demineralized water (in cases where the lacquer systems concerned are usually in contact with aqueous formulations of the processing oils), or

— other formulations of processing oils (in cases where the lacquer systems concerned are usually in contact with such formulations),

selected in accordance with Annex A.

4.1.2 Choice of lacquer systems

Testing should be carried out on coatings from defined lacquer systems on machine parts or other test specimens. For systematic testing, select from Annex B lacquer systems with which test plates are coated.

4.2 Storage temperatures

Recommended temperatures for the storage of test specimens in the test liquid:

a) (23 ± 2) °C;

b) (70 ± 2) °C.

If another temperature is applied, the storage temperature should be according to ISO 3205.

NOTE For certain combinations of lacquer systems and test liquids, an increase in storage temperature to shorten the duration of test can lead to misjudgements in the evaluation.

4.3 Duration of test

The storage of test specimens in the test liquid shall last (24 ± 2) h, (48 ± 5) h, (96 ± 10) h, (168 ± 17) h or a multiple of 168 h.

4.4 Test specimens

The test specimens shall be

— already-coated machine parts, or

— uncoated machine parts, pre-treated in accordance with ISO 1514 and coated all over with the lacquer system according to the rules of the concerned lacquer producer, or

— test plates according to ISO 1514, coated all over with the lacquer system according to the rules of the concerned lacquer producer.

Prior to testing a scratch shall be made in the test specimens in accordance with ISO 7253.

4.5 Conditioning

Thermally-cured lacquers may be tested 24 h after the end of the curing process.

Two-component lacquers shall be tested after conditioning according to ISO 2812-1 (7 days).

For other lacquer systems, conditioning shall be carried out according to ISO 3270 until the state of equilibrium is reached.

4.6 Test procedure

4.6.1 Quantity of test liquid

Cover the test specimen completely by the test liquid.

4.6.2 Storage of test specimens

Store the test specimen in a closed or covered vessel in accordance with ISO 175:1999, 4.6.2.

4.6.3 Rinsing and drying of test specimens

Remove the test specimen from the test liquid and rinse in a liquid that removes the test liquid but does not influence the material to be tested. Subsequently, store the test specimen 1 h or 24 h at normal temperature 23/50 °C according to ISO 554 and examine immediately after.

5 Determination of changes of appearance and optical properties

5.1 Determination of blister formation shall be according to ISO 4628-2.

5.2 Determination of the change in colour shall be according to ISO 3668 (visual) or ISO 7724-3 (colorimetric).

5.3 Determination of the reflectometer value shall be according to ISO 2813.

6 Determination of changes in mechanical properties

6.1 Determination of indent resistance shall be according to Buchholz: in accordance with ISO 2815.

6.2 Determination of cross-cutting shall be according to ISO 2409.

7 Test report

The test report shall include the following information:

a) reference to this part of ISO 11659 (i.e. “ISO 11659-3”);

b) complete identification of the tested lacquer system;

c) test specimens used — method of preparation, dimensions, surface condition, etc;

d) conditioning procedure;

e) complete identification of test liquids used, storage temperature and duration of test as well as any other conditions occurred (e.g. illumination or darkness);

f) temperatures and duration of the applied drying procedure;

g) properties investigated and test methods used, as well as measured values;

h) if prepared, graphs showing the properties (test results) as a function of time;

i) any occurrence that might have an influence on the results.

Annex A
(normative)

Selection of processing oils for testing

Code	Product	Recommended fibre type	**Density** determined according to ISO 12185	**Viscosity** determined according to ISO 2884-1	**Refraction** determined according to ISO 5661	**pH value** determined according to ISO 10523	**Water content** determined according to ISO 10336
			g/ml	mPa·s			%
A 1	Formulation based on ethylene-oxide-propylene-oxide-copolymers	synthetic textile filaments	1,012–1,018	150–200	1,455–1,459	6,0–8,0	max. 0,5
A 2	Formulation based on synthetic ester oils	synthetic textile and technical filaments	0,903–0,923	80–100	1,479–1,481	5,2–6,2	3,5–4,5
A 3	Formulation based on polyglycol esters and ethers	synthetic textured filaments for carpet production	1,03–1,04	215–275	1,442 0–1,449 0	7,0–7,5	18,5–19,5
A 4	Formulation based on synthetic oils with emulsifiers and additives	natural and synthetic filaments and fibre yarns	0,85–0,86	17,5–21,5	1,463–1,466	7,0–8,0	max. 2
A 5	Formulation based on phosphoric acid esters	synthetic fibre cables	—	10 000–13 000	—	9,0–10,5	51–55
A 6	Formulation based on polyglycol ester and ether with phosphoric acid esters	synthetic fibre cables and staple fibres	1,446–1,450	256–296	1,445 8–1,449 8	8,0–9,0	14–16
A 7	Alkylpolyalkylene-glycol ether, end-sealed	natural and synthetic filaments and fibre yarns	0,972–0,982	33–43	1,450 – 1,451	6,0–8,0	max. 0,5

Storage, handling and useful life shall be according to the manufacturer's instructions.

NOTE Information about sources of supply is provided by: Secretariat ISO/TC 72/SC 4, DIN Deutsches Institut für Normung, Burggrafenstraße 6, D-10787 Berlin.

Annex B
(normative)

Selection of lacquer systems for testing

Polymerization-cured lacquer systems			
Code	**Product**	**Delivery form**	**Applications**
B 1	Unsaturated polyester	—	Flatting materials
Storage, handling and useful life shall be according to the manufacturer's instructions.			
NOTE Information about sources of supply is provided by: Secretariat ISO/TC 72/SC 4, DIN Deutsches Institut für Normung, Burggrafenstraße 6, D-10787 Berlin.			

Polycondensation-cured lacquer systems			
Code	**Product**	**Delivery form**	**Applications**
C 1	Alkyd-melamine	2-C-liquid	Stoving lacquer/ Single-layer lacquer
C 2	Epoxy resin ester	2-C-liquid	Bottoming
C 3	Acrylates	2-C-liquid	Coating lacquer
C 4	Acrylates	2-C-liquid	Structural lacquer
2-C = Two components.			
Storage, handling and useful life shall be according to the manufacturer's instructions.			
NOTE Information about sources of supply is provided by: Secretariat ISO/TC 72/SC 4, DIN Deutsches Institut für Normung, Burggrafenstraße 6, D-10787 Berlin.			

Polyaddition-cured lacquer systems			
Code	**Product**	**Delivery form**	**Applications**
D 1	Epoxy resin/Polyester-mixed resin	Powder lacquer	Single layer coating
D 2	Polyester resin	Powder lacquer	Single layer coating
D 3	Epoxy resin	2-C-liquid	Bottoming
D 4	Epoxy resin	2-C-liquid	Protective lacquer
D 5	Hydroxyl group-containing polyols	2-C-liquid	Grain lacquer
D 6			Smooth lacquer
D 7			Bottoming
D 8			Filling ground
D 9			Coating lacquer
D 10			Structural lacquer
2-C = Two components.			
Storage, handling and useful life shall be according to the manufacturer's instructions.			
NOTE Information about sources of supply is provided by: Secretariat ISO/TC 72/SC 4, DIN Deutsches Institut für Normung, Burggrafenstraße 6, D-10787 Berlin.			

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