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Standard Specification for Nitrile Examination Gloves for Medical Application¹

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1. Scope

1.1 This specification covers certain requirements for nitrile rubber gloves used in conducting medical examinations and diagnostic and therapeutic procedures.

1.2 This specification covers nitrile rubber examination gloves that fit either hand, paired gloves, and gloves by size. It also provides for packaged sterile or nonsterile or bulk nonsterile nitrile rubber examination gloves.

1.3 This specification is similar to that of Specification [D3578](#) for rubber examination gloves.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension](#)

[D573 Test Method for Rubber—Deterioration in an Air Oven](#)

[D3578 Specification for Rubber Examination Gloves](#)

[D3767 Practice for Rubber—Measurement of Dimensions](#)

[D5151 Test Method for Detection of Holes in Medical Gloves](#)

[D6124 Test Method for Residual Powder on Medical Gloves](#)

¹ This specification is under the jurisdiction of ASTM Committee D11 on Rubber and Rubber-like Materials and is the direct responsibility of Subcommittee D11.40 on Consumer Rubber Products.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 *ISO Standard:*

[ISO 2859 Sampling Procedures and Tables for Inspection by Attributes](#)³

2.3 *Other Documents:*

[U.S. Pharmacopeia](#)⁴

3. Significance and Use

3.1 The specification is intended as a referee procedure for evaluating the performance and safety of nitrile rubber examination gloves. The safe and proper use of nitrile rubber examination gloves is beyond the scope of this specification.

4. Material

4.1 Any nitrile rubber polymer compound may be used that permits the glove to meet the requirements of this specification.

4.2 A lubricant that meets the current requirements of the U.S. Pharmacopeia for absorbable dusting powder may be applied to the glove. Other lubricants may be used if their safety and efficacy have been previously established.

4.3 The inside and outside surface of the nitrile rubber examination gloves shall be free of talc.

5. Sampling

5.1 For referee purposes, gloves shall be sampled from finished product, after sterilization when labeled sterile, and inspected in accordance with ISO 2859. The inspection levels and acceptable quality levels (AQL) shall conform to those specified in [Table 1](#), or as agreed upon between the purchaser and the seller, if the latter is more comprehensive.

6. Performance Requirements

6.1 Gloves, sampled in accordance with Section 5, shall meet the following referee performance requirements:

6.1.1 Product comply with requirements for sterility when tested in accordance with [7.2](#) when labeled sterile.

6.1.2 Shall comply with freedom from holes when tested in accordance with [7.3](#).

6.1.3 Have consistent physical dimensions in accordance with [7.4](#).

³ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴ U. S. Pharmacopeia, latest edition, Mack Publishing Co., Easton, PA 19175.

TABLE 1 Performance Requirements

Characteristic	Related Defects	Inspection Level	AQL
Sterility	fails sterility	^A	N/A
Freedom from holes	holes	G-1	2.5
Dimensions	width, length, and thickness	S-2	4.0
Physical properties	before aging, after accelerated aging	S-2	4.0
Powder-free Residue	exceeds maximum limit	N=5	N/A
Powder Amount	exceeds recommended maximum limit	N=2	N/A

^ASee U.S. Pharmacopeia.

6.1.4 Have acceptable physical property characteristics in accordance with 7.5.

6.1.5 Have a powder residue limit of 2.0 mg in accordance with 7.6

6.1.6 Have a recommended maximum powder limit of 10 mg/dm² in accordance with 7.7.

7. Referee Test Methods

7.1 The following tests shall be conducted to ensure the requirements of Section 6, as prescribed in Table 1:

7.2 *Sterility Test*—Testing for sterility shall be conducted in accordance with the latest edition of the U.S. Pharmacopeia.

7.3 *Freedom from Holes*—Testing for freedom from holes shall be conducted in accordance with Test Method D5151.

7.4 *Physical Dimensions Test:*

7.4.1 The gloves shall comply with the dimension requirements prescribed in Table 2.

7.4.2 The length shall be expressed in millimetres as measured from the tip of the middle finger to the outside edge of the cuff.

7.4.3 The width of the palm shall be expressed in millimetres as measured at a level between the base of the index finger and the base of the thumb. Values of width per size other than listed shall meet the stated tolerance specified in Table 2.

7.4.4 The minimum thickness shall be expressed in millimetres as specified in Table 2 when using a dial or digital micrometer that meets requirements described in Test Methods D412 and Practice D3767, and in the locations indicated in Fig. 1. To avoid cutting the glove, single wall thickness may be determined by measuring the double wall thickness and taking the single wall thickness as one half of the measured double wall thickness. (See Practice D3767 for more information.)

7.5 Physical Requirements Test:

7.5.1 Before and after accelerated aging, the gloves shall conform to the physical requirements specified in Table 3. Tests shall be conducted in accordance with Test Methods D412. Die C is recommended.

7.5.2 *Accelerated Aging*—The gloves shall be aged in accordance with Test Method D573. Test the gloves in accordance with either one of the following methods:

7.5.2.1 After being subjected to a temperature of 70 ± 2°C for 166 ± 2 h, the tensile strength and ultimate elongation shall not be less than the values specified in Table 3. This method shall be the conditions for referee tests.

7.5.2.2 After being subjected to a temperature of 100 ± 2°C for 22 ± 0.3 h, the tensile strength and ultimate elongation shall not be less than the values specified in Table 3.

7.5.2.3 For gloves that are older than 6 months from the date of manufacture or for which the date of manufacture cannot be determined, no accelerated aging shall be performed. If such gloves are tested, their physical requirements for tensile strength and ultimate elongation shall not be less than the “After Accelerated Aging” values specified in Table 3.

7.6 *Powder Free Gloves*—Determine the powder residue using Test Method D6124.

7.7 *Powdered Gloves:*

7.7.1 Determine the recommended maximum powder limit using Test Method D6124 for powdered gloves.

7.7.2 Determine the square decimetres for the glove size as in the paragraph on determining the square decimetres of glove size in Specification D3578.

8. Acceptance

8.1 Gloves will be considered to meet the referee performance requirements when test results conform to the requirements prescribed in Table 1.

8.2 Retests or reinspections are permissible under the provision of the U.S. Pharmacopeia and ISO 2859.

9. Packaging and Package Marking

9.1 *Sterile Packaging:*

9.1.1 The unit of packaging shall normally be one glove or one pair of gloves.

TABLE 2 Dimensions and Tolerances

NOTE 1—Sizing that falls within the tolerance overlaps between two sizes may be labeled as a size range including both sizes, for example, small/medium and medium/large.

Designation	Size								Tolerance, mm	
	6	6 ½	7	7 ½	8	8 ½	9			
Width by size	75	83	89	95	102	108	114		±6	
Width by		x-small 70	small 80	Unisize 85	medium 95	large 110	X-large 120	XX-large 130		±10
Length		220	220	230	230	230	230	230		min
Thickness, mm:				For All Sizes						
finger				0.05						min
palm				0.05						min