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Standard Specification for Food Preparation and Food Handling (Food Service) Gloves[1]

This standard is issued under the fixed designation D7329; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the properties necessary for thin film, unlined polymer gloves to be used in food preparation and food handling.

1.2 This specification is intended to serve as a referee and a guide to permit obtaining gloves of a consistent performance. The safe and proper use of gloves is excluded from the scope of this specification.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

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

D882 Test Method for Tensile Properties of Thin Plastic Sheeting

D3578 Specification for Rubber Examination Gloves

D3767 Practice for Rubber—Measurement of Dimensions

D4679 Specification for Rubber General Purpose, Household or Beautician Gloves

D5151 Test Method for Detection of Holes in Medical Gloves

D5250 Specification for Poly(vinyl chloride) Gloves for Medical Application

D5712 Test Method for Analysis of Aqueous Extractable Protein in Natural Rubber and Its Products Using the Modified Lowry Method

D6124 Test Method for Residual Powder on Medical Gloves

D6319 Specification for Nitrile Examination Gloves for Medical Application

D6499 Test Method for The Immunological Measurement of Antigenic Protein in Natural Rubber and its Products

D7246 Test Method for Detection of Holes in Polyethylene Food Service Gloves

2.2 *ISO Standard:*

ISO 2859-1 Sampling Procedures and Tables for Inspection by Attributes[3]

2.3 *Code of Federal Regulations—Title 21—Food and Drugs:*

21 CFR Parts 170–199[4]

3. Materials and Manufacture

3.1 Any material or composition that permits the glove to meet the specification identified by this standard and comply with the requirements of this specification and the regulations promulgated by the U.S. Food and Drug Administration concerning the materials used and permitted for direct food contact and the regulations concerning any powder or lubricants added to the gloves are acceptable.

4. Performance Requirements

4.1 Gloves shall be sampled in accordance with the AQL specified in Table 1 using a sampling plan derived from ISO 2859-1 or its equivalent, or other suitable statistical rationale.

4.2 Gloves shall be tested for freedom of holes as described in 5.1 and comply with the requirements of Table 1 for freedom from holes.

4.3 Gloves shall meet and be tested for dimensions and tolerances as described in 5.2 and comply with the performance requirements listed in Table 1 for dimensions.

4.4 Gloves shall meet and be tested for physical properties as described in 5.3 and comply with the performance requirements listed in Table 1 for physical properties.

[1] This specification is under the jurisdiction of ASTM Committee D11 on Rubber 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.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

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TABLE 1 Performance Requirements

Characteristic	Related Defect	Inspection Level	AQL
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 max limit	N=5	N/A
Powder amount	exceeds recommended max limit	N=2	N/A
Protein content (natural rubber)	exceeds recommended max limit	N=3	N/A
Antigenic protein content (natural rubber)	exceeds recommended max limit	N=1	N/A

4.5 Powder-free gloves shall be tested for glove powder residue per 5.4 and comply with 21 CFR Parts 170–199 (as applicable).

4.6 Powdered gloves shall be tested for glove powder amounts per 5.4 and comply with 21 CFR Parts 170–199 (as applicable).

4.7 *Protein:*

4.7.1 Gloves made from natural rubber shall be tested for compliance to the recommended aqueous soluble protein content limit as described in 5.6, or

4.7.2 Tested for compliance to the recommended antigenic protein content limit as described in 5.7.

5. Referee Test Methods

5.1 *Holes*—Gloves shall be tested in accordance with Test Method D5151 to an AQL of 2.5 as specified in Table 1 or as required by each existing material specific ASTM glove standard.

5.1.1 Polyethylene gloves shall be tested using Test Method D7246 to an AQL of 2.5 as specified in Table 1.

5.1.2 If food service gloves are made of a material type not described or specified in an existing ASTM glove standard and the material is a non-elastomer, then Test Method D7246 shall be used for the detection of holes to an AQL of 2.5 as specified in Table 1.

5.2 *Dimensions*—Gloves shall be tested for dimensions and tolerances in accordance with their individual standards or Practice D3767 to an AQL of 4.0 per Table 1 and as specified in Table 2a through Table 2f. Measurement locations are specified in Fig. 1.

5.2.1 Dimensions shall be expressed in millimetres (mm).

5.2.2 Values shall meet the requirements established in Table 3.

5.2.3 When the customer specifies thickness, it shall be measured using an appropriate instrument to measure thickness in accordance with Test Methods D412 and Practice D3767 in the location specified in Fig. 1.

5.3 *Physical Properties*—Gloves shall be tested for physical properties as described Test Methods D412 and to an AQL 4.0 per Table 1 and as specified in Table 3a through Table 3h. Accelerated aging shall be conducted in accordance with Test Method D573. Accelerated aging shall be conducted at 70 ± 2ºC for a period of 168 ± 2 h on gloves that are no more than 12 months old from the date of manufacture.

5.3.1 Polyethylene gloves shall be tested for "Maximum Force at Yield" per Test Method D882 using die type "D".

5.4 *Powder (Powder-free Gloves)*—Gloves shall be tested for residual powders in accordance with Test Method D6124. Food Service gloves labeled as "Powder-free" shall adhere to the powder residue limit established in Specification D3578. All glove powders shall comply with 21 CFR Parts 170–199, as applicable. A powder, release agent, or lubricant not listed within 21 CFR Parts 170–199 shall not be used for gloves designed to contact food products.

5.5 *Powder (Powdered Gloves)*—Gloves shall be tested for maximum powder limit using Test Method D6124. Powdered Food Service gloves shall adhere to the maximum powder limit established in Specification D3578. All glove powders shall comply with 21 CFR Parts 170–199, as applicable. A powder, release agent, or lubricant not listed within 21 CFR Parts 170–199 shall not be used for gloves designed to contact food products.

5.6 *Aqueous Extractable Protein Content*—For gloves made from natural rubber, determine the aqueous extractable protein for each glove sample tested using Test Method D5712. Representative glove samples shall have a recommended aqueous soluble protein content limit (measured in $\mu g/dm^2$) in accordance with Specification D3578. Alternatively, representative glove samples may have a recommended antigenic protein content limit in accordance with Specification D3578.

5.7 *Antigenic Protein Content*—For gloves made from natural rubber determine the extractable antigenic protein for each glove sample tested using Test Method D6499. Representative glove samples shall have a recommended antigenic protein content limit (measured in $\mu g/dm^2$) in accordance with Specification D3578. Alternatively, representative glove samples may have a recommended aqueous soluble protein content limit in accordance with Specification D3578.

5.8 *Design*—Any glove design meeting the requirements of this standard and suitable for direct food contact may be used.

6. Quality Assurance

6.1 *Responsibility for Inspection*—When specified in the contract or purchase order, the supplier is responsible for performance of all inspection requirements.

6.2 Gloves shall be considered to meet the referee performance requirements when the test results meet the performance requirements found in Table 1.

6.3 Retests are permissible under the provisions of ISO 2859 with a documented statistical rationale.

7. Product Marking

7.1 *Glove Identification*—Each consumer package of gloves shall at a minimum be legibly marked with the following information: size, the name and trademark (if applicable) of the manufacturer or supplier, the manufacturer's lot number, manufacturer's or supplier's contact information, and the country of origin.

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.

Table 2a Dimensions and Tolerances: Natural Rubber (Latex)

Designation	Size									Tolerance, mm
	6	6½	7	7½	8	8½	9			
Width by size	75	83	89	95	102	108	114			±6
Width by	x-small	small	Unisize	medium		large	X-large	XX-large		
	70	80	85	95		110	120	130		±10
Length	220	220	220	230		230	230	230		Min
Thickness, mm	For All Sizes									
Finger	0.08									Min
Palm	0.08									Min
Cuff	0.08									Min

Table 2b Dimensions and Tolerances: Synthetic Rubber; Polychloroprene and Nitrile

Designation	Size									Tolerance, mm
	6	6½	7	7½	8	8½	9			
Width by size	75	83	89	95	102	108	114			±6
Width by	x-small	small	Unisize	medium		large	X-large	XX-large		
	70	80	85	95		110	120	130		±10
Length	220	220	230	230		230	230	230		Min
Thickness, mm	For All Sizes									
Finger	0.05									Min
Palm	0.05									Min
Cuff	0.05									Min

Table 2c Dimensions and Tolerances: Vinyl (PVC)

Designation	Size									Tolerance, mm
	6	6½	7	7½	8	8½	9			
Width by size	75	83	89	95	102	108	114			±6
Width by	x-small	small	Unisize	medium		large	X-large	XX-large		
	70	80	85	95		110	120	130		±10
Length	230	230	230	230		230	230	230		Min
Thickness, mm	For All Sizes									
Finger	0.05									Min
Palm	0.08									Min
Cuff	0.05									Min

Table 2d Dimensions and Tolerances: Low Density Polyethylene (LDPE)

Designation	Size					Tolerance, mm
Width by	x-small	small	medium	large	X-large	
Range (mm)	95-135	100-140	105-155	110-165	120-170	
Length (mm)	250	250	260	265	265	Min
Thickness, mm	For All Sizes					
Finger	0.018					Min
Palm	0.018					Min
Cuff	0.018					Min

Table 2e Dimensions and Tolerances: High Density Polyethylene (HDPE)

Designation	Size					Tolerance, mm
Width by	x-small	small	medium	large	X-large	
Range (mm)	125-160	135-170	145-180	155-190	165-200	
Length (mm)	210	210	210	210	210	Min
Thickness, mm	For All Sizes					
Finger	0.016					Min
Palm	0.016					Min
Cuff	0.016					Min

Table 2f Dimensions and Tolerances: Cast Polyethylene (CPE)

Designation	Size					Tolerance, mm
Width by	x-small	small	medium	large	X-large	
Range (mm)	100-135	100-145	115-155	130-165	135-170	
Length (mm)	285	285	300	300	300	Min
Thickness, mm	For All Sizes					

Finger	0.024	Min
Palm	0.024	Min
Cuff	0.024	Min

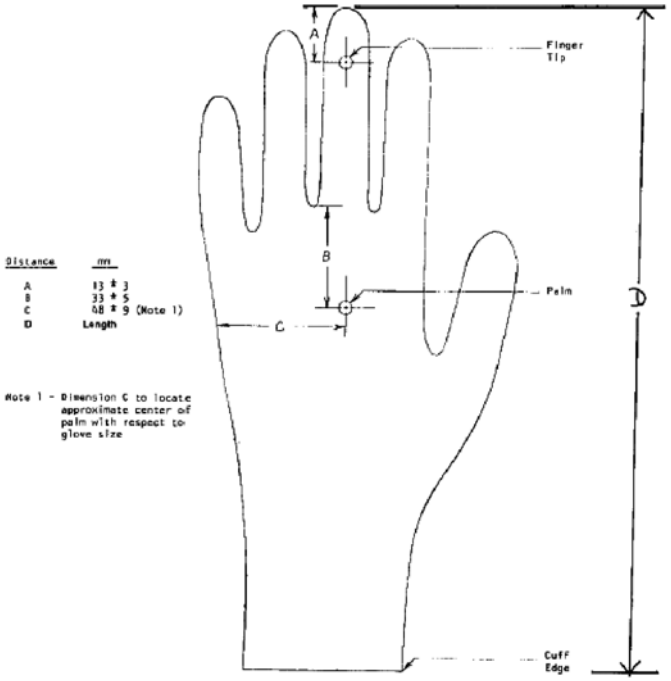

FIG. 1 Glove Measurement Locations

TABLE 3 Physical Requirements

Table 3a Physical Requirements for Natural Rubber (Type I)			
Before Aging		After Accelerated Aging	
Tensile Strength	Ultimate Elongation	Tensile Strength	Ultimate Elongation
18 MPa min	650 % min	14 MPa min	500 % min
Table 3b Physical Requirements for Natural Rubber (Type II)			
Before Aging		After Accelerated Aging	
Tensile Strength	Ultimate Elongation	Tensile Strength	Ultimate Elongation
14 MPa min	650 % min	14 MPa min	500 % min
Table 3c Physical Requirements for Synthetic Rubber: Polychloroprene			
Before Aging		After Accelerated Aging	
Tensile Strength	Ultimate Elongation	Tensile Strength	Ultimate Elongation
14 MPa min	500 % min	14 MPa min	400 % min
Table 3d Physical Requirements for Synthetic Rubber: Nitrile			
Before Aging		After Accelerated Aging	
Tensile Strength	Ultimate Elongation	Tensile Strength	Ultimate Elongation
14 MPa min	500 % min	14 MPa min	400 % min
Table 3e Physical Requirements for Vinyl (PVC)			
Before Aging		After Accelerated Aging	
Tensile Strength	Ultimate Elongation	Tensile Strength	Ultimate Elongation
9 MPa min	300 % min	9 MPa min	300 % min
Table 3f Physical Requirements for Low Density Polyethylene (LDPE)			
Before Aging		After Accelerated Aging	
Max Force at Yield	Ultimate Elongation	Max Force at Yield	Ultimate Elongation
280 N/m min	500 % min	280 N/m min	500 % min
Table 3g Physical Requirements for High Density Polyethylene (HDPE)			
Before Aging		After Accelerated Aging	
Max Force at Yield	Ultimate Elongation	Max Force at Yield	Ultimate Elongation
320 N/m min	500 % min	320 N/m min	500 % min
Table 3h Physical Requirements for Cast Polyethylene (CPE)			
Before Aging		After Accelerated Aging	
Max Force at Yield	Ultimate Elongation	Max Force at Yield	Ultimate Elongation
360 N/m min	300 % min	360 N/m min	300 % min

8. Packaging and Storage

8.1 The gloves shall be packaged in a manner sufficient to protect them against excessive degradation. All packaging materials in direct contact with product surfaces shall be approved for food contact, and protect products from damage during transportation and storage.

8.2 No packaging material in contact with gloves is to contain substances that will impair the quality or use of the gloves.

8.3 All labeling for gloves compliant with this standard and scheduled to be sold in the United States shall comply with applicable U.S. government regulations.

8.4 Appropriate labeling for Food Service gloves shall include instructions for use or such instructions for use shall be made available to the purchaser or end-user that identify materials with which contact should be avoided because the identified material may degrade the gloves in use, compromise the barrier, or are otherwise harmful to the glove material. Limitations of the materials affecting the use of the glove shall be provided in the labeling or be made available to the purchaser or end user.

8.5 Appropriate environmental protection labeling requirements that affect the integrity of Food Service gloves shall be included on the packaging. Such labeling for Food Service gloves shall at a minimum include instructions or limitations that address the following: appropriate protection from exposure to light and excessive heat, environmental conditions that may compromise the food service glove material, and the appropriate storage temperatures or conditions, or both, for food service gloves. Such labeling shall be consistent with the applicable standard for the material.

8.6 Gloves compliant with this standard may be labeled with a statement that the gloves comply with this specification.

9. Keywords

9.1 food contact; gloves; natural rubber; polyethylene; synthetic rubber; vinyl

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