

ANSI / ISEA 105-2024

American National Standard for Hand and Arm Protection Classification

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Secretariat
International Safety Equipment Association

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American National Standards Institute, Inc.

American National Standard

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Foreword (This Foreword is not part of American National Standard ANSI/ISEA 105-2024)

ANSI/ISEA 105-2024 is the sixth edition of the voluntary industry consensus standard on hand and arm protection classification that was first published in 1999. This document provides classifications for the performance characteristics of occupational hand and arm protections. Such classifications can assist employers and product users in the appropriate specification and selection of protective gloves and sleeves for specific workplace exposures, as part of regulatory compliance. This document provides or refers to appropriate test methods for specified criteria and provides pass/fail criteria to allow users to interpret test results and determine if certain hand protection products meet their needs.

Several new concepts have been introduced into this updated document. New product marking details are included as a way to standardize the representation of classification for key mechanical properties: cut-resistance, non-needlestick puncture resistance and abrasion resistance. The standard also includes specific language for demonstrating conformity to the claimed classifications for the performance properties covered, referencing ANSI/ISEA 125-2021, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment. It is emphasized that product manufacturers may utilize any of the approaches defined in ANSI/ISEA 125-2021 to demonstrate conformity.

Updates to existing content include clarifications to abrasion testing, both in the pass/fail criteria for of leather gloves and sleeves and test execution. Conductive heat resistance classifications have been updated to include a range of temperatures when performing the testing and contain additional prescriptive criteria for determining such classification. Dexterity and anti-vibration properties have been deleted as being specifically covered by the standard but are referenced in the appendix discussion on other factors for consideration.

Referenced test methods have been updated throughout the standard to reflect the state of the art in materials performance and technology and to harmonize with other existing standards, where possible.

This revision was prepared by members of the Hand Protection Group of the International Safety Equipment Association (ISEA). The following companies were members of the group at the time of the approval of the standard:

Ansell
BlackHawk Industrial
Bob Dale Gloves
Bunzl
Cintas Corporation
DeltaPlus Group/ERB
DuPont Personal Protection
Ergodyne
Global Glove & Safety
HexArmor
Honeywell
Ironwear
Kimberly-Clark Professional
Koroyd Sarl

Lakeland Industries
Magid Glove and Safety Mfg. Co. LLC
Majestic Gloves
Malta Dynamics
MARTOR
MCR Safety
Milwaukee Tool
OLFA U.S.A Inc.
Protective Industrial Products
Pyramex Safety Products
Radians, Inc.
Saf-T-Gard International
Watson Gloves
Wells Lamont Industrial

This standard was approved using consensus procedures prescribed by the American National Institute. The following organizations were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

Cudd Energy Services
FCX Performance
Honeywell
Individual Expert
Intertek
MAPA Professional

STL Inc
TRI Environmental
United Scrap Metal
WestRock
World Fibers
YT Gloves

Inquiries related to the standard and suggestions to improve the document can be emailed to:
standards@safetysafetyequipment.org.

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American National Standard for Hand and Arm Protection Classification

1. Scope

This standard addresses the classification and testing of hand and arm protection for specific performance properties related to chemical and industrial applications. Hand and arm protection includes gloves, mittens, partial gloves, sleeves, or other items covering the hand or a portion of the hand that are intended to provide protection against or resistance to a specific hazard.

This standard provides performance ranges for many different properties based on standardized test methods. Descriptions of the test methods used in this standard are provided in Appendix C. Different levels of performance are specified for each property with zero (0) representing the minimal protection or none at all.

The standard does not address protection from electric shock, ionizing or non-ionizing radiation, every type of thermal exposure and harmful temperature extreme, and every type of exposure to chemicals, biological agents, or other hazardous substances. This standard does not address protection for welding, emergency response applications or fire fighter applications.

Recommended guidelines for hand protection selection are provided in Appendix D. Appendix E provides information on other properties not covered in this standard.

2. Purpose

The purpose of this standard is to provide manufacturers with a mechanism to classify their products for specified areas of glove and sleeve performance. The information from this testing and classification can be used to help users to select appropriate hand and arm protection.

DISCLAIMER: Manufacturers determine which tests apply to their products in order to represent a product's performance to individual test classifications of this standard.

Representations by manufacturers regarding a product's compliance with a particular test

criterion do not mean, nor should it be implied, that the product meets any other test selection criteria unless specifically stated.

3. Definitions

These definitions provide the meanings of the terms in the context of this standard. Many of the terms have broader meanings in other technical and non-technical contexts.

3.1 Definitions of Glove or Sleeve Responses to Stress

resistance (to a stressor): A property of a glove or sleeve that permits it to withstand change when stressed.

protection (from a stressor): A property that prevents or reduces deleterious effects on the wearer of a glove or sleeve when stressed.

NOTE: The distinction between resistance and protection cannot always be clearly drawn. For example, if the stressor is a sharp edge, cut resistance is a property that reduces damage both to the glove or sleeve and to the wearer.

3.2 Definitions Related to Chemical Effects

Chemical resistance and protection from chemicals are strongly interrelated. Of the three effects of chemicals defined below, one relates to the effects on the gloves or sleeves and the other two represent routes by which chemicals can reach the wearer.

degradation: A deleterious change in one or more properties of a glove or sleeve due to contact with a chemical. Hand and arm protection made of rubber gloves may swell, soften and weaken; those made of plastic may shrink, stiffen, harden, and crack when flexed.

penetration: The flow of a chemical through a glove or sleeve on a non-molecular level through porous materials, seams, and pinholes or other imperfections in the barrier film. The gaps in the barrier are visible, although a magnifying glass or microscope may be needed to see them.

Pathways for penetration may occur as the result of degradation when a chemical or physical stressor comes in contact with the material.

permeation: The flow of a chemical through the barrier layer of a glove or sleeve on a molecular level. This process involves:

- *absorption* of the chemical onto and into the outside of a glove or sleeve;
- *diffusion* of the chemical through the glove or sleeve, as individual molecules pass between molecules of the glove or sleeve film;
- *desorption* of the chemical inside the glove.

3.3 Definitions Related to Sampling Procedures

sample: Hand and arm protection material or items removed from a batch or production lot for testing.

specimen: An individual piece or portion of the hand protection item or material to be subjected to testing.

4. Normative References

The following standards contain provisions that, through reference in this text, constitute provisions of this American National Standard:

ANSI/ISEA 125-2021, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*

ASTM D3884-09 (2017), *Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)*

ASTM D3389-16, *Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)*

ASTM F739-12e1, *Standard Test Method for Permeation of Liquids and Gases through Protective Clothing Materials under Conditions of Continuous Contact*

ASTM F1060-18, *Standard Test Method for Evaluation of Conductive and Compressive Heat Resistance (CCHR)*

ASTM F1358-16, *Standard Test Method for Effects of Flame Impingement on Materials Used in Protective Clothing Not Designated Primarily for Flame Protection*

ASTM F2878-19 *Standard Test Method for Protective Clothing Material Resistance to Hypodermic Needle Puncture*

ASTM F2992-23, *Standard Test Method for Measuring Cut Resistance of Materials Used in Protective Clothing with Tomodynamometer (TDM-100) Test Equipment*

EN ISO 21420:2020, *Protective gloves – General requirements and test methods*

EN 388:2016+A1:2018, *Protective gloves against mechanical risks*

ISO 2859-1:1999, Sampling plans for inspection by attributes - *Part 1: Sampling Schemes Indexed By Acceptance Quality Limit (AQL) For Lot-By-Lot Inspection*

ISO 17493:2000, *Clothing for protection against heat and flame – Test method for convective heat resistance using a hot air circulating oven*

5. Compliance

Demonstration of conformity to the claimed classifications set forth in this standard shall be in accordance with ANSI/ISEA 125-2021. The manufacturer shall select the level of conformity assessment claimed, and such level shall be clearly indicated in any claim, in any form, that references compliance with ANSI/ISEA 125-2021.

6. Hand and Arm Protection Classification

Hand and arm protection shall be classified according to their resulting performance when tested in accordance with the specified test method.

Testing shall be performed on the primary protective area. For gloves, the primary protective area is the palm, unless otherwise specified. For sleeves, the primary protective area is the area just above the wrist elastic, unless otherwise specified.

NOTE: For a full arm-length sleeve, the area between the elbow and the shoulder may also be tested.

Where the material in the glove or sleeve varies, testing of the intended resistance area shall be performed. End-users shall be notified regarding the varying performance levels of these products.

Manufacturers shall be permitted to report the classification of specific performance properties for different areas of the hand and arm protection items as long as the identification of protective areas and their relative performance classifications are clearly described.

6.1 Mechanical Protection

6.1.1 Cut Resistance

When tested in accordance with ASTM F2992-23, the glove's or sleeve's cut resistance shall be classified against the levels listed in Table 1, using the weight needed to cut through the material with 20 mm of blade travel.

Data collection procedures in Appendix A shall be followed. Calculation for cut-resistance classification may be done using the ISEA standardized template available at www.safetyequipment.org.

The average of a minimum of 3 samples shall be used to report the classification level.

Table 1. Classification for Cut Resistance	
Level	Weight (grams) needed to cut through material with 20 mm of blade travel
A1	≥ 200
A2	≥ 500
A3	≥ 1000
A4	≥ 1500
A5	≥ 2200
A6	≥ 3000
A7	≥ 4000
A8	≥ 5000
A9	≥ 6000

6.1.2 Puncture Resistance (other than Hypodermic Needle)

When tested in accordance with clause 6.4 of EN 388:2016+A1:2018, the glove or sleeve's resistance against puncture shall be classified against the levels listed in Table 2, using the puncture force.

The average of a minimum of 12 specimens shall be used to report the classification level.

Table 2. Classification for Puncture Resistance	
Level	Puncture (Newtons)
0	< 10
1	≥ 10
2	≥ 20
3	≥ 60
4	≥ 100
5	≥ 150

6.1.3 Hypodermic Needle Puncture Resistance

When tested in accordance with ASTM F2878-19, the glove or sleeve's resistance against puncture from a puncture probe (hypodermic needle) shall be classified against the levels listed in Table 3, using the puncture force of a 25-gauge hypodermic needle.

The average of a minimum of 12 specimens shall be used to report the classification level.