



ANSI/ISEA

201-2012

American National Standard for Classification of Insulating Apparel Used in Cold Work Environments

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**American National Standard for
Classification of Insulating Apparel Used
in Cold Work Environments**

Secretariat
International Safety Equipment Association

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American National Standards Institute, Inc.

**American
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Foreword (This Foreword is not part of American National Standard ANSI/ISEA 201-2012)

The contribution of clothing to maintain consistent comfortable temperatures for the wearer is an important factor in productivity, endurance and safety in performing a given activity.

In cold weather particularly, a clothing ensemble must meet a number of requirements. It must provide the required level of insulation for the comfort and protection of the wearer in the exposure environment. The clothing must maintain the level of "as new" performance reasonably throughout the expected useful lifetime of the garment/ensemble. In addition, the garment's other performance properties such as warmth to weight, thickness to weight, warmth to thickness, breathability, and bending modulus must be considered to optimize the ensemble for comfort and performance in the chosen activity.

This standard provides a tool for rating insulative garments for intrinsic insulation value (clo units) in six performance categories and for temperature, with minimal restriction to design options. The ANSI/ISEA 201-2012 standard also requires that a certified garment will retain its insulative properties over a known period of its useful lifetime as a function of the number of cycles of its recommended cleaning procedure, to provide reliable lasting protection to the wearer. Appendix material provides direction to a specifier or user on how to use this and other related standards to determine an appropriate baseline for specifying intrinsic insulation value for a given activity level and exposure condition.

Garments classified to ANSI/ISEA 201-2012 may comply with other standards addressing additional hazards such as low visibility, heat and flame exposures, or hazards related to arc flash. The existence of competing hazards may greatly affect the choices of materials for the ensemble.

This standard was processed and approved using consensus procedures prescribed by the American National Standards 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.

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1 Scope

This standard establishes classification requirements for occupational apparel items worn in cold environments. The apparel items specified in this standard are passively insulated, i.e., designed to regulate body temperature of the wearer by inhibiting heat transfer away from the body.

Specific criteria are included for thermal insulation (in units of clo) and thermal transport properties. The resistance to the deterioration of these properties due to laundering are assessed and classified accordingly. The standard also includes garment care and labeling requirements and provides guidance on the selection of the apparel items based on given environments and activity levels.

Specific apparel covered by this standard includes insulated or shell jackets, parkas, vests, coveralls, pants and insulated flame resistant occupational wear, as well as combinations thereof.

This standard does not address gloves, headwear, and footwear, although these items should be included in the prescribed cold weather ensemble in order to achieve functional protection.

Apparel items which are actively heated or use phase change materials (PCMs) to regulate body temperature of the wearer by actively generating, adding, or releasing heat are not included in this standard.

2 Purpose

The purpose of this standard is to be a tool to assist garment selectors or specifiers in determining appropriate apparel items for cold ambient environments based on temperature and the activity of the wearer. It is also intended to assist garment manufacturers in selecting materials and performance of said apparel items (See Appendix A).

3 Compliance

3.1 Durability class as a function of laundry procedure and number of cycles shall be assigned in accordance with Section 7. The form in Appendix B1 shall be used.

3.2 Thermal classification (of finished intact insulating apparel shall be certified to verify performance to the requirements specified in Section 8. The form in Appendix B2 shall be used.

3.3 All certificates and test reports that verify the performance of finished intact insulating apparel shall be retained by the manufacturer and be made available upon request.

3.4 A garment compliance certificate shall be developed for all models produced by each manufacturer, using the format in Appendix B3.

Note: All forms are available for download in Adobe Acrobat format on www.safetyequipment.org.

4 Definitions

Accredited laboratory: A laboratory having a certificate of accreditation meeting the requirements of ISO/IEC Guide 17025:2005 (or other equivalent standard) for the collection and analysis of data within the parameters of this standard.

Certify: To provide documentation from either an independent, third-party laboratory or to self-certify, through the use of the Apparel Compliance Certificate (See Appendix B3)

clo: Unit of thermal resistance defined as the insulation required to keep a resting man (producing heat at the rate of 58 W/m²) comfortable in an environment at 21°C, air movement 0.1 m/s.

(NOTE: Numerically, 1 clo = 0.155 K·m²/W or roughly the insulation value of a heavy business suit.)