INTERNATIONAL STANDARD

ISO 17491

First edition
2002-04-15

Protective clothing — Protection against gaseous and liquid chemicals — Determination of resistance of protective clothing to penetration by liquids and gases

Vêtements de protection — Protection contre les produits chimiques liquides et gazeux — Détermination de la résistance des vêtements de protection à la pénétration des liquides et des gaz

Reference number
ISO 17491:2002(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 17491 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

Introduction

Chemical protective clothing is worn in conjunction with appropriate respiratory protective devices, in order to isolate the body of the wearer from the environment. Several tests exist for determining the resistance of chemical protective clothing materials to either the permeation or penetration of gaseous or liquid chemicals. However, the effectiveness of the overall protective clothing item in preventing exposure from chemical hazards depends on the integrity of the clothing item's design in eliminating or reducing inward leakage of chemicals.

The selection of the appropriate integrity test method will depend on the application of the chemical protective clothing and the exposure hazards present. Usually, the integrity test method will be specified in the overall chemical protective clothing specification.

Evaluations of protective clothing material chemical resistance should be carried out by the appropriate test. ISO 6529 specifies methods for measuring the resistance of the protective clothing materials to permeation by either liquids or gases. ISO 13994 specifies a method for determinig the penetration resistance of protective clothing materials under conditions of continuous liquid contact and pressure, and can be applied to microporous materials, seams, and assemblages. ISO 6530 specifies a procedure for measuring the penetration resistance of protective clothing materials from the impact and runoff of liquids. General protective clothing requirements are specified in ISO 13688.

Protective clothing — Protection against gaseous and liquid chemicals — Determination of resistance of protective clothing to penetration by liquids and gases

1 Scope

This International Standard specifies six different test methods for determining the resistance of complete protective clothing to inward leakage of either gaseous or liquid chemicals (protective clothing integrity). These test methods apply to either liquid or gaseous chemicals, or aerosols, and range in the level of severity.

The six integrity test methods specified by this International Standard are as follows:

a) **Method A** specifies a method for assessing the resistance of a gas-tight suit to outward leakage of air through, for example, essential openings, fastenings, seams, interface areas between items, pores and any imperfections in the materials of construction.

b) **Method B** specifies two different methods for determining the inward leakage of chemical protective suits in a gaseous (or aerosol) environment. The procedure is applicable to gas-tight suits and provides an evaluation of chemical protective suit integrity, paticularly leakage in the breathing zone, under dynamic conditions through the use of human subjects.

c) **Method C** specifies a method for determining the resistance of chemical protective clothing to penetration by jets of liquid chemicals. This procedure is applicable to clothing worn where there is a risk of exposure to a forceful projection of a liquid chemical and intended to be resistant to penetration under conditions which require total body surface cover but not gas-tight clothing.

d) **Method D** specifies a method for determining the resistance of chemical protective clothing to penetration by sprays of liquid chemicals. This procedure applies to protective clothing intended to be worn when there is a risk of exposure to slight splashes of a liquid chemical or to spray particles that coalesce and run off the surface of the garment and intended to be resistant to penetration under conditions which require total body surface cover but not gas-tight clothing.

e) **Method E** specifies an alternative method to method D for determining the resistance of chemical protective clothing to penetration by sprays of liquid chemicals. Method E differs from Method D in that it uses a static mannequin instead of a test subject, it also uses a different spray configuration and duration (1 h compared to 30 min for Method D) and is based on a qualitative determination of observed liquid on the absorbent coverall or interior of the chemical protective clothing.

f) **Method F** is a modification of Method D where the spray has been modified to light spray or mist by use of different nozzles and spray conditions and is intended for partial body protective clothing where the likelihood of splash exposure is low.

Methods C, D, E and F are not appropriate for evaluating the permeation or penetration of liquid chemicals through the material from which the clothing is made.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 13688, *Protective clothing — General requirements*

EN 136:1998, *Respiratory protective devices — Full face masks — Requirements, testing, marking*

EN 149:1991, *Respiratory protective devices — Filtering half masks to protect against particles — Requirements, testing, marking*

EN 12941:1998, *Respiratory protective devices — Powered filtering devices incorporating a helmet or a hood — Requirements, testing, marking*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1
assemblage
permanent fastening between two or more different garments, or between chemical protective clothing and accessories, obtained, for example by sewing, welding, vulcanizing, gluing

3.2
calibrated stain
fluorescent or visible stain, with a defined minimum area, generated by dropping a specified quantity of test agent onto an absorbent coverall

NOTE The calibrated stain is used to measure liquid penetration during spray and jet testing of chemical protective clothing.

3.3
chemical protective clothing
combined assembly of garments, worn to provide protection against exposure to or contact with chemicals

3.4
chemical protective suit
clothing worn to protect against chemicals that covers the whole, or greater part of the body

NOTE 1 A chemical protective suit may comprise of garments combined together to provide protection to the body.

NOTE 2 A suit may also have various types of additional protection such as hood or helmet, boots and gloves joined with it.

3.5
connection
assemblage or joint

3.6
degradation
deleterious change in one or more physical properties of a protective clothing material due to contact with chemicals

3.7
garment
individual component (of chemical protective clothing), the wearing of which provides protection against contact with chemicals to the part of the body that it covers