Experts in Safety

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an expert guide /

A summary of the update to standard BS EN ISO 374: 2003 Protective Gloves Against Dangerous Chemicals and Micro-organisms

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Introduction

BS EN ISO 374: 2016 Protective Gloves Against Dangerous Chemicals and Micro-organisms

This European Standard specifies the requirements for safety gloves to protect the user against chemicals and/or micro-organisms and defines terms to be used.

Updated Standard

Published on 3rd February 2017 the revised standard: EN 374: 2016 supersedes EN 374: 2003.

Published Standards

EN (ISO) 374 Protective gloves against dangerous chemicals and micro-organisms – consists of the following:

- **BS EN ISO 374-1: 2016** Terminology and performance **requirements for chemical risks**
- **BS EN 374-2: 2014** Determination of resistance to **penetration**
- **BS EN 374-4: 2013** Determination of resistance to **degradation** by chemicals
- **BS EN 374-5: 2016** Terminology and performance requirements for **micro-organisms risks**
- **BS EN 16523-1: 2015** Determination of material **resistance to permeation by chemicals**, under conditions of continuous contact

Helping Our Customers to Stay Compliant

Our customers tell us that they want us to help them to stay compliant with legislation, therefore as there have been recent changes to glove legislation we have created an Expert Guide to try and explain the differences between the old and revised standards and how you may be affected.

This summary guide highlights which parts of the former EN 374:2003 standard have been changed including which sections have been added, removed or amended.

New Glove Markings

In the new standard some of the test procedures remain unchanged while others have been improved. The most notable change is in relation to BS EN ISO 374-1: 2016 Terminology and performance requirements for chemical risks.

With the new standard, glove classification will be decided based on permeation performance. Gloves will then be classified as Type A, Type B or Type C being tested against 6, 3 or 1 chemical respectively and displaying the fuming conical flask symbol (the low chemical beaker symbol will no longer be used).

When Will the Changes Come into Effect?

The new BS EN ISO 374: 2016 standard will affect new products being certified after the publishing date of the new revision (February 2016).

Gloves can continue to be sold against both versions of the standard until the effects of the new PPE regulation make recertification against the latest standard mandatory.

Note: Many existing products will be recertified against the new standard without any manufacturing changes and will then display the appropriate performance levels and new markings. As in some cases the product codes may change please contact Arco if you wish to continue to use the same product throughout the recertification process.

Specialist Safety Advice

If you require support regarding glove use on your site, this may be validation of the current gloves in use, recommendations for new processes or just help with cost down initiatives. We have a Technical Specialist for gloves available to assist you. To arrange an appointment please call your local Arco branch.

Contents

Summary of the Main Changes

Overview of the Changes

BS EN ISO 374-1: 2016 - Terminology and Performance Requirements for Chemical Risks

The first part of the Standard specifies the requirements for protective gloves intended to protect the wearer against dangerous chemicals and defines the terms to be used.

Clause 5. Performance Requirements
5.4.1 General

Each combination of protective glove and test chemical shall be classified as per Table 1, using the results given in **EN 16523-1:2015** for breakthrough time.

Table 1 – Permeation Performance Levels

Measured breakthrough time (min)	Permeation performance level
>10	1
>30	2
>60	3
>120	4
>240	5
>480	6

Section I)

Table 2 – List of Test Chemicals

A further six test chemicals have been added to the revised standard (shown in the highlighted boxes below) – the number of test chemicals has been increased from 12 to 18, as shown below.

Code letter	Chemical	Class
A	Methanol	Primary alcohol
B	Acetone	Ketone
C	Acetonitrile	Nitrile compound
D	Dichloromethane	Chlorinated hydrocarbon
E	Carbon disulphide	Sulphur containing organic compound
F	Toluene	Aromatic hydrocarbon
G	Diethylamine	Amine
H	Tetrahydrofuran	Heterocyclic and ether compound
I	Ethyl acetate	Ester
J	n-Heptane	Saturated hydrocarbon
K	Sodium hydroxide 40%	Inorganic base
L	Sulphuric acid 96%	Inorganic mineral acid, oxidising
M	65% Nitric acid	Inorganic mineral acid, oxidising
N	99% Acetic acid	Organic acid
O	Ammonia hydroxide 25%	Organic acid
P	30% hydrogen peroxide	Peroxide
S	40% hydrofluoric acid	Inorganic mineral acid, contact poison
T	37% formaldehyde	Aldehyde

Section II)
Clause 5.1 Minimum Liquid Proof Length

The minimum liquid proof length requirement has been removed for the 2016 version.

Section III)
Clause 5.4: Mechanical Protection Characteristics

The 2003 version of this Standard required EN 388 – gloves offering protection against mechanical hazards performance levels to be displayed. The new version of the Standard has removed this requirement.

Note: No minimum performance requirements were specified in EN 388: 2003 so the impact of removal of this clause is negligible

Clause 6: Markings

Section IV) Low Chemical Protection
The beaker symbol has been removed from the 2016 version and replaced by the same conical flask icon for all performance levels.

EN 374

Implications for User

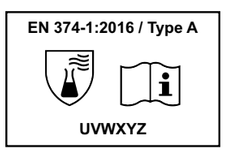
If you are currently using a glove displaying the beaker symbol for low chemical protection, under the new revision this could be replaced by a glove classified as Type C.

The chemical performance levels of the glove will remain the same, however you should take advice to ensure the glove is suitable if additional properties such as dexterity or grip are required. If you would like to discuss this in more detail, please speak to your Arco Account Manager.

V) Permeation performance - chemical protective gloves are classified into three types: type A, type B or type C according to their permeation performance. The test chemical(s) shall be taken from the list of test chemicals in table 2 for classification purposes.

Clause 6.1 - Marking of Type A gloves

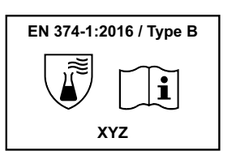
Protective gloves that comply with a permeation performance of at least **level 2 (Table 1)** against a minimum of six test chemicals (listed in Table 2), the following pictograms shall be used with reference to this part of EN 374.



The **six tested chemicals** shall be identified by their code letter (as shown in Table 2) which shall be marked under the pictogram as shown. If other chemicals not present in the list have been tested, information about the performance levels shall be provided in the user instructions.

Clause 6.2 - Marking of Type B gloves

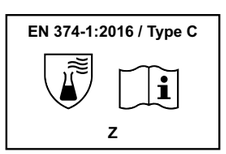
Protective gloves that comply with a permeation performance of at least **level 2 (Table 1)** against a minimum of **three test chemicals** (listed in Table 2), the following pictograms shall be used with reference to this part of EN 374.



The **three tested chemicals** shall be identified by their code letter (Table 2) which shall be marked under the pictogram as shown. If other chemicals not present in the list have been tested, information about the performance levels shall be provided in the user instructions.

Clause 6.3 - Marking of Type C gloves

Protective gloves that comply with a permeation performance of at **least level 1 (Table 1)** against a minimum of **one test chemical** (listed in Table 2), the following pictograms shall be used with reference to this part of EN 374.



The **tested chemical** shall be identified by its code letter (Table 2) which shall be marked under the pictogram as shown. If other chemicals not present in the list have been tested, information about the performance levels shall be provided in the user instructions.

Note: Type C gloves offer lower levels of protection in terms of breakthrough time as well as for only one test chemical, Type C gloves are designed to be for low chemical risks.

Implications for User

When replacing gloves marked as chemical protective under EN 374 revision 2003, you should carefully assess the three letters shown under the conical flask symbol to understand the chemicals and their breakthrough times. You can then ensure that and gloves certified under the new 2016 revision provide the same level of protection.

Generally, any 2016 revision Type B glove claiming the same list of chemicals and breakthrough times as an EN 374-3 2003 certified product will offer at least equivalent protection.

Gloves classified as Type A under the new revision offer protection against a larger list of chemicals (six chemicals with a >30-minute breakthrough time).

You should not automatically assume a Type A glove will offer better protection then a Type B in any given application. For example, a Type B glove may offer protection against a specific chemical hazard or at a higher breakthrough level than another product classified as Type A.

Section VI) EN 16523-1:2015 (supersedes EN 374-3 2003) - Determination of Material Resistance to Permeation by Chemicals

Permeation is a process by which a chemical moves through the glove on a molecular level where several parameters (absorption, diffusion, desorption) are concerned. Each situation chemical/PPE material will have a specific permeation rate over time.

Clause 4 Test Principles

The resistance of a protective glove material to permeation by liquid chemical is determined by measuring the normalized breakthrough time (NBT) of a chemical through the glove material. In the permeation test apparatus, the glove material separates the test chemical from the collecting medium. The collecting medium, which can be a gas, a liquid or a solid, is analysed quantitatively for its concentration of the chemical and thereby the amount of that chemical that has permeated the barrier as a function of time. The basic principles of this method have remained the same however some modifications to the testing method have been made.

Section VII) EN 374 – 4: 2013 - Determination of Resistance to Degradation by Chemicals

The new European Standard specifies the test method for the determination of the resistance of protective glove materials to degradation by dangerous chemicals with continuous contact. In some cases, a glove may offer the defined level of protection for a limited time due to the glove materials being affected by the chemical hazard, over time.

Other tests used to evaluate chemical resistance such as permeation resistance and penetration resistance may not provide sufficient information on the physical property changes affecting a glove during exposure to a chemical over time.

Clause 4 Test Principles

The resistance of a protective glove material to degradation by a liquid chemical is determined by measuring the puncture resistance change of the glove material before and after continuous contact with the challenge test chemical.

Note: It is mandatory to perform this test for each chemical claimed on the product marking.

Any observations of changes in the physical appearance of the material specimens following chemical exposure such as swelling, shrinking, brittleness, hardening, softening, flaking, disintegration, colour change, colour bleeding, delaminating are reported.

There is no minimum requirement for degradation performance but the results of the tests must be reported in the user information.

Section VIII) BS EN ISO 374-5: 2016 - Terminology and Performance Requirements for Micro-organisms Risks

This part of EN 374 specifies the requirements and test methods for protective gloves intended to protect the user against micro-organisms such as bacteria, virus or fungi.

Clause 5.1 General Requirements

Protective gloves against micro-organism risks shall comply with the requirements given in EN 420: 2003 (Protective gloves general requirements).

Clause 5.2 Penetration

Protective gloves against virus, bacteria and fungi shall not leak when tested according to **EN 374-2: 2014** (this standard uses both an air and water leak test), if a glove passes these tests it can claim protection against bacteria and fungi.

Clause 5.3 Protection Against Viruses

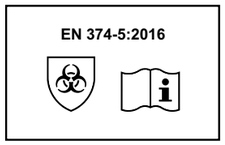
Protective gloves claiming protection against viruses shall additionally be tested according to ISO 16604: 2004 (Clothing for protection against contact with blood and body fluids – determination of resistance of protective clothing materials to penetration by blood-borne pathogens) and shall exhibit no detectable transfer (<PFU/ml) of the Phi-X174 bacteriophage through the glove material.

Clause 6 Marking

Clause 6.1 General

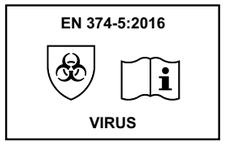
Marking protective gloves against micro-organisms shall be in accordance with the marking requirement for protective gloves in EN 420.

Clause 6.2 Marking of Gloves Protecting Against Bacteria and Fungi



For gloves protecting against bacteria and fungi complying with the requirements stated in Clause 5.2 the pictogram displayed above shall be used with reference to this part of EN 374.

Clause 6.3 Marking of Gloves Protecting Against Viruses, Bacteria and Fungi



For gloves protecting against viruses, bacteria and fungi complying with the requirements stated in Clauses 5.2 and 5.3 the above pictogram shall be used with reference to this part of EN 374.

Implications for User

Virus protection is now assessed separately under the new 2016 revision and gloves requiring this protective element should display the markings shown in clause 6.3 (EN 374-5).

Section IX) Quality Control of Chemical/ Micro-organism Protective Gloves

In **EN 374-1: 2003** Clause 5.2.2 an acceptable quality level (AQL) was defined for the penetration test, this was defined as the number of gloves that must be sampled in a given batch and the pass rate of those tested. This was previously mandatory as an AQL of level 2. The 2016 requirements allow three defined AQL levels with level 3 being the most stringent.

Note: AQL levels can be agreed between purchaser and seller as long as they meet or exceed the specified levels in the standard

Section X) National Annexes

When standards are drafted through European committees (CEN) they are given the title of an EN standard. CEN committees are made up of representative bodies from several EU countries. The BSI (British Standards Institution) is the UK's representative on the European committee and have a vote on whether a standard is deemed appropriate.

The BSI committee issued a negative vote to publish the **EN 374-1: 2016** and **EN 374-5: 2016** standards as it felt that there were certain issues within the standards that still needed addressing. This vote was overruled by a majority vote from other EU countries and so BSI was obliged to issue the British Standard version of the documents with UK national annexes.

The British version of **EN 374-1: 2016** and **EN 374-5: 2016** contain National Annexes that surmise why a negative vote was issued and contains advisory information that UK notified bodies should consider when issuing certification to this standard. An example of this advisory information is to test the cuffs that extend onto the lower arm, for the same chemical/virus protection tests as the palm. The EU version states this is only necessary if chemical protection is claimed in the cuff area, the BSI committee argues that testing should not be based upon marketing claims but based on foreseeable use.

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