

# Hand Protection

## An **Expert** Guide

..... Cut Protection  
..... Multi-Purpose  
..... Thermal – Hot and Cold

..... Chemical Protection  
..... Welding Protection  
..... Impact Protection





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Arco is the UK’s leading supplier of personal protective equipment, workwear and workplace safety products offering a world-class range of over 170,000 products.

As Experts in Safety we are widely recognised as a provider of specialist advice through our sales office network and this is further supported by our training and consultancy division. We reach our customers through an extensive product catalogue, interactive website, local sales offices and a network of over 47 stores. We pride ourselves on providing customers with great availability, performance and price.

Founded in 1884 Arco has a heritage spanning four generations. With traditional family values at the heart of the business we pride ourselves on our core values: respect, hard work, enterprise and excellence in reputation.

We fully subscribe to the ETI’s Nine Principles Base Code and have fully incorporated the internationally recognised code of labour practice into our own ethical policy. In 2007 Arco was the first distributor in our industry to become a member of the Ethical Trading Initiative (ETI) and in 2010 we became a member of Sedex, the Supplier Ethical Data Exchange. We continually support local communities and charities donating in excess of 1% of pre tax profits annually.

As we are members of the BSIF Registered Safety Suppliers Scheme you can be confident that we will supply safety equipment which is genuine and compliant with the relevant standards and regulations. The BSIF monitor and regulate members of the scheme by conducting regular standards audits.



Our Service

Between 2013/14 and 2015/16 injuries to the fingers, hands and wrists accounted for almost 25% of all reported non fatal injuries to employees\*.

Reducing Workplace Accidents

Hand injuries are one of the leading causes of missed workdays which can end up costing employers in terms of lost productivity, work days and in some cases compensation.

In the workplace your employee’s hands are the most vulnerable part of their body. They are a critical area of the body that are actively put into or near high risk areas. You need to prevent risks, by providing adequate protection to keep them safe.

Helping to Keep People Safe

It is Arco’s core purpose to help to keep people safe at work by providing the appropriate PPE to protect employees from workplace hazards.

As part of our commitment to safety we have created this Expert Guide to provide information to assist with the specification and purchasing of safety gloves, including relevant legislation and upcoming changes to EN Standards safety icons and details of the testing process. A PDF version of this and other relevant documents can be found on our dedicated hand protection landing page [www.arco.co.uk/hands](http://www.arco.co.uk/hands)

We can help keep you up to date with European Glove Legislation

In recent months glove legislation has undergone a number of substantial changes, a revision to EN 388: 2016 Protective gloves against mechanical risks was published in November 2016 and in February 2017 the suite of PPE glove standards under EN ISO 374-1 Protective gloves against chemicals and micro-organisms was also revised.

An overview of the changes is covered in this guide but if you would like more detailed information, summary documents can be found by visiting [www.arco.co.uk/hands](http://www.arco.co.uk/hands)

Most Comprehensive Range

Arco lead the way in hand protection, offering the biggest, most comprehensive range of hand protection on the market. Our Arco branded styles offer a choice of protection and price points so you can choose the glove that meet your needs at a price to suit your budget. We compliment the Arco branded range with market leading brands to provide specialist products and offer a full range of hand protection to our customers.

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.

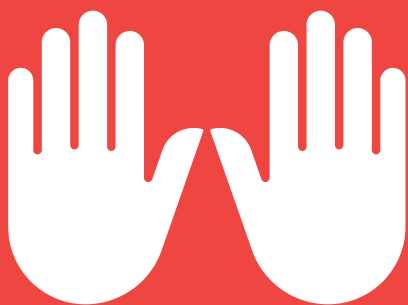
Arco Training and Consultancy (AT&C)

AT&C is our health and safety training division, offering training management and delivery to companies across the UK and Ireland. We offer a range of courses including hazardous substances, construction safety, environment safety, risk management and RPE. For further information on courses visit [www.totalaccess.co.uk](http://www.totalaccess.co.uk)

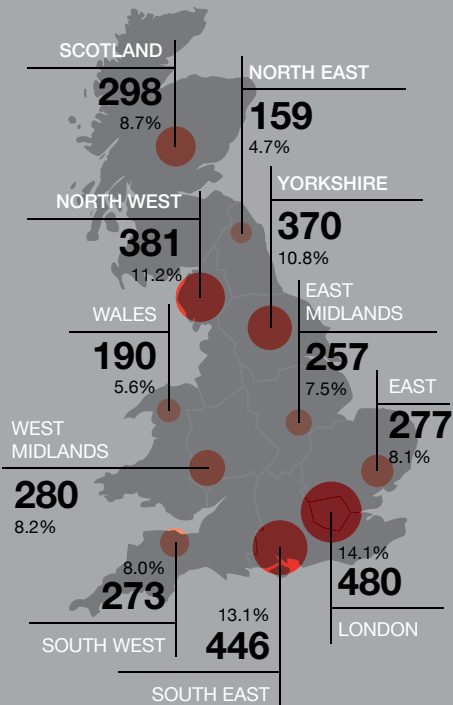


1 IN 5 WORKPLACE ACCIDENTS INVOLVE THE HANDS

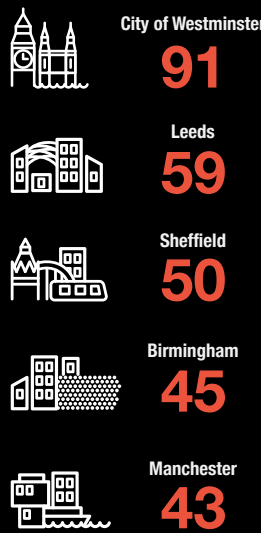
Protect your employees by giving them the correct hand protection



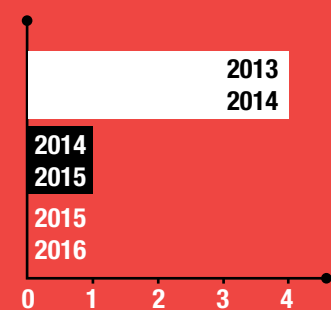
Each year many hands are injured at work through cuts from sharp objects, coarse materials and equipment, and trapped fingers – leading to a lot of pain and a lot of time off work.



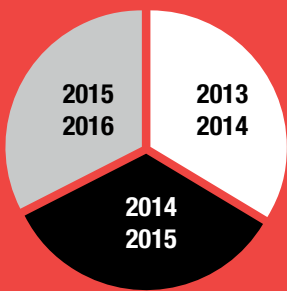
Top 5 towns and cities where hand injuries occur



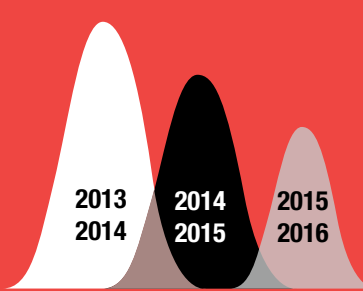
How improvements in health and safety are reducing upper limb injuries *Upper limb locations includes fingers, hands and wrists*



Number of fatal injuries  
2013/14 - 4  
2014/15 - 1  
2015/16 - 0



Injuries to fingers, hands or wrist  
2013/14 - 18,951  
2014/15 - 18,861  
2015/16 - 18,123



Of which - over 7 days  
2013/14 - 13,227  
2014/15 - 13,350  
2015/16 - 12,740

Arco Quality and Product Assurance

Our mission is to influence industry standards and to develop, source and supply the highest quality products.

Our customers tell us that product quality is one of the most important factors of our service to them. They want to feel totally assured that the products we supply to them will keep their people safe. With our core purpose to keep people safe at work we are committed to delivering high quality, safe and reliable products which meet or exceed our customers' expectations. To demonstrate this we have invested heavily and are the first safety distributor to have our own, in house, independently accredited Product Assurance Laboratory.



Committed to Developing Standards for the Future

Arco feel passionate about not only adhering to existing quality standards but where we feel that there is room for improvement, we strive to influence the development of new stricter standards.

In order to improve new standards for users, members of our Product Assurance team are also members of numerous industry safety bodies including relevant BSI (British Standards Institution) committees and BSIF (British Safety Industry Federation) trade body standard working groups.

Membership of these bodies allows Arco to highlight any issues they have experienced with current standards and shape any changes they feel should be incorporated into any upcoming updates.

We are now taking the lead, and aim to drive improvements in quality standards across the industry. We test products to recognised standards. Where we think that accepted practices and standards can be improved, we will challenge them and influence change.

Independent Accreditation

Our Product Assurance laboratory team aim to provide our customers with a level of confidence which is second to none in our industry. It is important to us to demonstrate expertise and independence and therefore we have had our laboratory independently accredited by UKAS (United Kingdom Accreditation Services) to ISO 17025.

We are accredited for a range of safety footwear, protective glove, high visibility clothing and also limited flame spread for flame retardant clothing test methods.

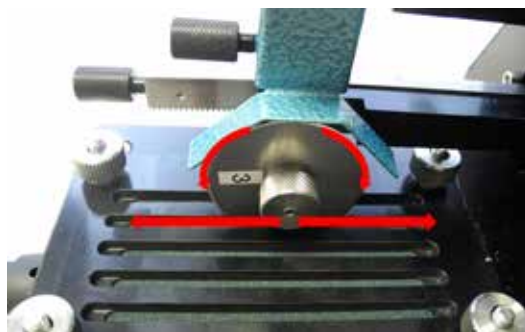
\* Source: <http://www.hse.gov.uk/statistics/sources.htm> For non-fatal injuries the RIDDOR define two categories of reportable non-fatal injuries: specified (a pre-defined list of injuries which was revised from the previous 'major' category in October 2013); and over-7-day (changed from 'over-3-day' in April 2012)

# Testing Protective Gloves

The Arco Product Assurance laboratory contains state-of-the-art equipment for the mechanical testing of gloves to the requirements of EN 388, Protective gloves against mechanical risks. Tests can be conducted to measure a glove's resistance to abrasion, blade cuts, tear and puncture.

## Blade Cut Resistance

This test is mandatory under the EN 388:2016 revision when blunting has been proven.



### EN 388 6.2 – the 'Coupe' test

The **Circular Blade Cut Resistance Tester** measures the cut resistance of a material, and is known as the 'Coupe test'. A test sample is cut from a glove and is clamped in a holder, which is placed onto the machine. A circular blade is gently lowered so that it touches the sample. The blade counter rotates whilst moving back and forth across the fabric under a specified load, and when it penetrates the sample, the machine automatically stops. Blade sharpness is assessed against a standard material before and after sample cuts to ensure blades are sharp enough.



### Changes to the Test Method 2016 Revision

The Coupe test method has been revised to include limiting the number of test cycles of the blade to a maximum of 60 cycles, whether the blade has cut through the fabric or not. This mitigates the effects of the dulling of the blade.

As a result, it is expected that when gloves utilising materials prone to blunting the blade are recertified, they are likely to produce a lower cut resistance index and reported performance level.

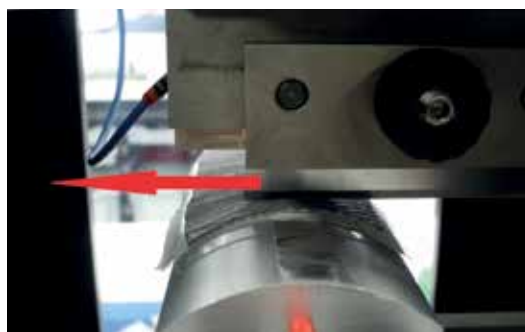
When a sample is tested using this new Coupe test method, if the sample has proven to blunt the blade by more than a factor of 3 during the 60 cycle test it then becomes mandatory to test the sample using the ISO 13997 cut resistance method.

The ISO 13997 result then becomes the reference to be used when assessing the glove's performance against cut hazards.

### EN ISO 13997:1999 Cut Resistance Test

The EN ISO 13997:1999 cut resistance test has been introduced in addition to the Coupe test method (as defined in 6.2) and aims to better demonstrate how more abrasive yarns which may have blunted the Coupe test blade, giving unrepresentative protection results, can be effectively assessed.

The Cut Resistance Evaluator is used to measure performance of materials to cuts from very sharp blades and is suitable for the testing of highly cut resistant materials. A straight edged blade is drawn across a sample until break through takes place under a variable load. This test measures the average load (from 20+ cuts) required to achieve the moment of cut-through, after the blade has travelled 20mm. It does not suffer from blunting as the blade only passes once over the surface of the sample and for each cut a new blade is used.



## Resistance to Abrasion

### EN 388 6.1 Resistance to abrasion

The Martindale Abrasion Tester is used to test the abrasion resistance of all types of material used for protective gloves in accordance with EN 388. It is the internationally-accepted test equipment for wear of fabrics, and it is also used for determining the susceptibility of fabrics to pilling. Samples are cut from the palms of gloves and are subjected to rubbing against abrasive paper until a sample wears and a hole appears. The performance of the sample is measured in the number of abrasion rubs before sample breakthrough.



## Tear and Puncture Resistance

### EN 388:2003 Clause 6.3 / EN 388:2016 Clause 6.4 Tear resistance

### EN 388:2003 Clause 6.4 / EN 388:2016 Clause 6.5 Puncture resistance

The Tensile Tester carries out tests where extension, stretch and compression against distance are required. The tear resistance of a fabric is defined as the force to tear the fabric and puncture resistance as the force required for a stylus/simulated nail to break through the material.



# Introduction to Glove Standards

To ensure that the gloves we sell are fit for purpose; they are required to conform to a strict set of EU standards that define the properties of a glove. Each of these standards is represented by a shield symbol (except EN 420). This symbol is displayed next to the glove, throughout this expert guide and also in the Arco catalogue.



# EN 420:2003 General Requirements for Protective gloves

Ordering the correct size glove will ensure that gloves are comfortable, safe and should improve wearer compliance.

All gloves under the PPE Directive must conform to EN 420. This standard defines the requirements for protective gloves in terms of their construction, comfort and efficiency, marking and information applicable to all protective gloves. EN 420 does not have a symbol and states that:

- Glove design shall not adversely affect the users health and hygiene eg. no hazardous materials in contact with the skin
- All gloves should have a pH value as close as possible to neutral
- The highest permitted value for chromium is 3 mg/kg (chrome VI)
- Specific details of any substance used in the glove which is known to cause allergies need to be stated. i.e. Latex
- Gloves are sized by reference to an agreed common European hand size, for example minimum length.

## Sizing Guide

When determining glove size, there are two main considerations:

- Hand Circumference
- Hand Length

To determine the required size, use a tape measure and measure the circumference of the hand, above the thumb and below the fingers. The circumference of the hand, rounded to the nearest half inch is the worker's glove size (1 inch = 2.54cm).

### EN 420 Sizing of Gloves

|    | Hand (mm)          |        | Glove          |
|----|--------------------|--------|----------------|
|    | Palm circumference | Length | Minimum Length |
| 6  | 152                | 160    | 220            |
| 7  | 178                | 170    | 230            |
| 8  | 203                | 182    | 240            |
| 9  | 229                | 192    | 250            |
| 10 | 254                | 204    | 260            |
| 11 | 279                | 215    | 270            |

**Gloves Categories:**

Any glove on the market will fit into one of three categories, each category is split depending on type and which risk/danger the gloves should protect against:

• **Category I – Simple Design:**

Gloves that are placed in Category I are to be used for minimal risk only and for protection against superficial mechanical injury.

• **Category III - Gloves of complex design for irreversible or mortal risks:**

Gloves in this category are designed to protect against the highest levels of risk e.g. highly corrosive acids. Gloves in this category must also be independently tested and certified by a notified body and the reference number for the notified body must be placed on the CE logo on the glove.

• **Category II - Gloves of intermediate design, for intermediate risks:**

Gloves are placed in this category when they do not fall into the above two categories. Like category III the gloves must be subjected to independent testing and certification by a notified body, who then issues a CE mark along with appropriate markings showing the glove's protective capacities.

# EN 388 – Protective Gloves Against Mechanical Risks

EN 388 is the standard that determines a glove’s performance against mechanical hazards. The standard specifies the testing, marking and performance levels required for gloves protecting against mechanical risks such as abrasion, blade cut, tear, puncture and where relevant, impact.

**EN 388: 2016 Revision**  
(Published on 2nd November 2016 the revised standard supersedes the EN 388: 2003 revision.) Gloves can continue to be sold against the 2003 revision until April 2019, at which point gloves should either have been recertified against the new standard or production/importation ceased.  
We’ve created a summary to guide you through the changes, to download a copy visit [www.arco.co.uk/hands](http://www.arco.co.uk/hands)



### EN 388 6.1 Resistance to Abrasion

The abrasion test (as described on page 4) tests the abrasion resistance of material taken from the palm of a glove. Abrasive paper rubs against the sample with a specified/constant pressure applied until a hole appears, the number of rubs determines the level given, which is shown in the first position under the shield symbol.

| Test                                 | Performance Level |     |       |       |
|--------------------------------------|-------------------|-----|-------|-------|
|                                      | 1                 | 2   | 3     | 4     |
| Abrasion Resistance (number of rubs) | 100               | 500 | 2,000 | 8,000 |

### EN 388 – Clause 6.2 Blade Cut Resistance

This test (as described on page 5) is known as the ‘Coupe test’ and is based on the number of cycles required to cut through the sample at a constant speed and mass (equivalent to a force of 5 Newtons) when compared to the cut resistance of a standard material e.g. specified cotton canvas. The number of cycles of the rotating blade is used to determine the cut index (second position).

| Test                         | Performance Level |     |   |    |    |
|------------------------------|-------------------|-----|---|----|----|
|                              | 1                 | 2   | 3 | 4  | 5  |
| Blade Cut Resistance (index) | 1.2               | 2.5 | 5 | 10 | 20 |

### EN 388 – Clause 6.3 Cut Resistance Method (EN ISO 13997:1999)

This cut resistance test can also be used (as defined in 6.2). It is mandatory when yarns have blunted the Coupe test blade, it can also be used as an alternative to the Coupe test with non-blunting material.  
The cut level is defined using the letters A to F, denoting increasing levels of protection. This is measured in Newtons where 1 Newton equates to approximately 100 grams weight.

| Test                          |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|
|                               | Level A | Level B | Level C | Level D | Level E | Level F |
| 6.3 EN ISO Cut Resistance (N) | 2       | 5       | 10      | 15      | 22      | 30      |

Gloves satisfying the requirements of EN 388: 2016 will feature a pictogram as shown below in the example.

**EN388**  
Example 1 : 3 4 4 3 E P  
Example 2 : 3 X 0 3 E

| Example Test      | Example 1 | Example 2                            |
|-------------------|-----------|--------------------------------------|
| Abrasion (6.1)    | Level 3   | Level 3                              |
| Cut (6.2)         | Level 4   | Test not performed or not applicable |
| Tear (6.4)        | Level 4   | Level 1 not achieved                 |
| Puncture (6.5)    | Level 3   | Level 3                              |
| Cut (6.3)         | Level E   | Level E                              |
| Impact Protection | Achieved  | Test not performed                   |

The pictogram shows the mechanical properties of the glove plus the respective performance levels of each mechanical test. The pictogram will now include two new characters relating to two new elements: denoted by the ISO straight cut test and the optional impact protection test.

### EN 388 – Clause 6.4 Tear Resistance

The test (as described on page 4) assesses the tear resistance and is based on the amount of force, in Newtons required to tear the sample.

| Test                      | Performance Level |    |    |    |
|---------------------------|-------------------|----|----|----|
|                           | 1                 | 2  | 3  | 4  |
| Tear Resistance (Newtons) | 10                | 25 | 50 | 75 |

### EN 388 – Clause 6.5 Puncture Resistance

The test assesses the puncture resistance is based on the amount of force, in Newtons required to pierce the sample with a standard sized nail/stylus.

| Test                          | Performance Level |    |     |     |
|-------------------------------|-------------------|----|-----|-----|
|                               | 1                 | 2  | 3   | 4   |
| Puncture Resistance (Newtons) | 20                | 60 | 100 | 150 |

### EN 388 - Clause 6.6 Impact Protection

This test is optional and is used only for gloves that claim specific impact resistant properties, usually added to the back of the hand and / or the knuckles. Testing is carried out in accordance with EN 13594:2015 6.9 Protective Gloves for Motorcycle Riders. When the requirements in the test are fulfilled by the gloves, the marking code ‘P’ will be displayed on the glove marking after all other protective characteristics.

**EN 388: 2016 Protective Gloves Against Mechanical Risks**  
Further information on the revised Standard can be downloaded at [www.arco.co.uk/hands](http://www.arco.co.uk/hands)



# EN 374 – Protective Gloves Against Dangerous Chemicals and Micro-organisms

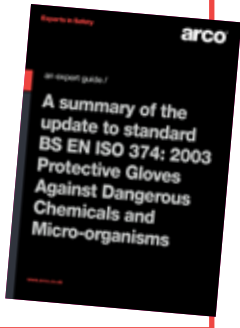
This standard specifies the capability of gloves to protect the user against chemicals and/or micro-organisms.



### EN 374: 2016 Revision

(Published on 3rd February 2017 the revised standard: BS EN ISO 374-1: 2016 Protective gloves against dangerous chemicals and micro-organisms supersedes BS EN 374-1: 2003. Gloves can continue to be sold against the 2003 revision until April 2019, at which point gloves should either be recertified against the new standard or production/importation ceased.

For more detailed information on the new EN 374 Standard, we have created a summary document to guide you through the changes. To view or download a copy of the brochure, please visit [www.arco.co.uk/hands](http://www.arco.co.uk/hands)



### 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

### BS EN ISO 374-1: 2016 - Terminology and performance requirements for chemical risks

Specifies the requirements for protective gloves intended to protect the user 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.

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



Table 1 – Permeation performance levels

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

Table 2 – List of test chemicals

A further six test chemicals have been added to the revised standard – the number of test chemicals has been extended from 12 to 18.

| 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 base                        |
| P           | 30% hydrogen peroxide | Peroxide                            |
| S           | 40% hydrofluoric acid | Inorganic mineral acid              |
| T           | 37% formaldehyde      | Aldehyde                            |

# Marking

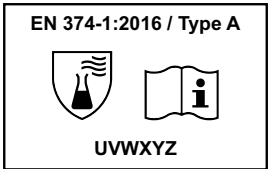
Clause 6 - Marking Low Chemical Protection

Marking using the beaker symbol for low chemical protection, has been removed from 2016 version and replaced by the same conical flask icon for all performance levels.

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 which shall be marked under the pictogram as shown below. If other chemicals not present in the list have been tested, information about the performance levels shall be provided in the user instructions.

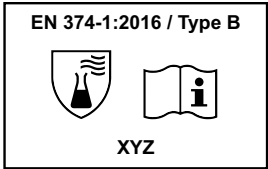
Example



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 which shall be marked under the pictogram as shown below. If other chemicals not present in the list have been tested, information about the performance levels shall be provided in the user instructions.

Example

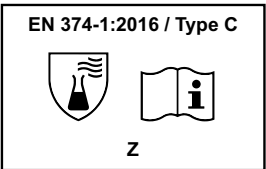


Clause 6.3 - Marking of Type C gloves

Protective gloves that comply **with a permeation performance of at least level 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 which shall be marked under the pictogram as shown below. 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.*

Example



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 chemical tested on a particular glove material will produce a reported permeation rate over time.

EN 374-4:2013 - Determination of resistance to degradation by chemicals

In some cases, a glove may only offer the defined level of protection for a limited time due to the glove materials being degraded by the chemical hazard over time. This 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.

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.

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). When tested to this method, if a glove passes these tests it can claim protection against bacteria and fungi. Testing to clause 5.3 must be performed if virus protection is claimed.

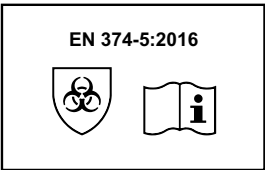
Clause 5.3 - Protection against viruses

Protective gloves against virus shall 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 (<1PFU/ml) of the Phi-X174 bacteriophage through the glove material.

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 (above) the following pictogram shall be used with reference to this part of EN 374.

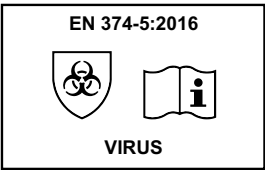
Example



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 (above) the following pictogram shall be used with reference to this part of EN 374.

Example





# European Glove Standards



**Standard EN 407: 2004 - Protective gloves against thermal risks (heat and/or fire)**



This standard specifies thermal performance for protective gloves against heat and/or fire. The nature and degree of protection is shown by a pictogram followed by a series of six performance levels, relating to specific protective qualities. The 'heat and flame' pictogram is accompanied by a six digit number:

- a. Burning behaviour (0 to 4)**  
Based on the length of time the material continues to burn and glow after exposure to a flame.
- b. Contact heat resistance (0 to 4)**  
Based on the increasing temperature (100-500 °C) at which the temperature of the sample must not increase by 10°C within 15s.
- c. Convective heat resistance (performance level 0 to 4)**  
Based on the length of time the glove is able to delay the transfer of heat from a flame.
- d. Radiant heat resistance (0 to 4)**  
Based on the length of time the glove is able to delay the transfer of heat when exposed to a radiant heat source.
- e. Resistance to small splashes of molten metal (0 to 4)**  
The number of molten metal drops required to heat the glove sample to a given level.
- f. Resistance to large quantities of molten metal (0 to 4)**  
The weight of molten metal required to cause smoothing or pinholing across a simulated skin placed directly behind the glove sample. The test is failed if metal droplets remain stuck to the glove material or if the specimen ignites or is punctured. This applies to Iron as standard (other metals can be tested as required).



**Standard EN 511: 2006 - Gloves giving protection from thermal hazards (cold)**



- To achieve this standard gloves must also have:
- At least level 2 for abrasion and tear if claiming convective and/or contact cold performance at levels 2-4 or
  - Level 1 for abrasion and tear if claiming convective and/or contact cold performance Level 1

Applies to any gloves that protect the hands against convective and contact cold, down to -50°C. Protection against cold is expressed by a pictogram followed by a series of three performance levels, relating to specific protective qualities.

The 'cold hazard' pictogram is accompanied by a three digit number:

- A. Resistance to convective cold (0 to 4)**  
Based on the thermal insulation properties of the glove which are measured by assessing the transfer of cold via convection.
- B. Resistance to contact cold (0 to 4)**  
Based on the thermal resistance of the glove material when exposed to contact with a cold object.
- C. Penetration by water (pass or fail)**  
If the glove fails this test a notice must be included in the information that states gloves may lose their insulative properties when wet.



**European Regulation 10/2011**



This regulation applies to all plastic articles or materials supplied in the EU which are intended to come into contact with food. This includes packaging that touches food and items in contact with foodstuffs during processing, such as 'food contact' gloves.

Regulation 10/2011 and its amendments limits the release of substances from the plastic into the food due to health risks, there are two type of limits:

- Overall migration limit (OML)
- Specific migration limit (SML)

The OML is the maximum permitted amount of non volatile substances released into the food, determined by exposing a product to a chemical simulant for a specified length of time and temperature. The simulants required will vary, depending on the end use of the product.

For SML the conditions of 'worst foreseeable use' influence the testing procedure. The regulation contains guidance on how to relate the intended time period during which the food is in contact with the material, as well as the temperature used in the laboratory testing conditions.

For both specific and overall migration, a glove intended for repeat use is tested three times using fresh simulant each time. Compliance is based on the outcome of the third test.

**EN 12477 - Protective gloves for welders**

Requires performance to be determined against small splashes of molten metal, short term exposure to flame, convective and contact heat. Glove materials suitable for EN 12477:2001 applications also have to provide a degree of physical protection against typical occupational risks such as cutting, tearing, abrasion and puncture.



**Standard EN 421: 2010 - Gloves giving protection from radioactive contamination and ionising radiation**



This standard applies to gloves that protect from ionising radiation and radioactive contamination. The nature of protection is shown by a pictogram relating to the specific protective qualities.

- To protect from radioactive contamination, the glove has to be liquid resistant and needs to pass the penetration test defined in EN 374.
- For gloves used in containment enclosures, the glove shall pass a specific air pressure leak test.
- Materials may be modelled by their behaviour to ozone cracking. This test is optional and can be used as an aid to selecting gloves.
- To protect from ionising radiation, the glove has to contain a certain amount of lead or equivalent metal, quoted as lead equivalence. This lead equivalence must be marked on each glove.

| Test                                 | Type & Minimum level required |   |
|--------------------------------------|-------------------------------|---|
|                                      | A                             | B |
| EN 388 Abrasion                      | 2                             | 1 |
| EN 388 Cut                           | 1                             | 1 |
| EN 388 Tear                          | 2                             | 1 |
| EN 388 Puncture                      | 2                             | 1 |
| EN 407 Burning Behaviour             | 3                             | 2 |
| EN 407 Contact Heat                  | 1                             | 1 |
| EN 407 Convective Heat               | 2                             | - |
| EN407 Small Splashes of Molten Metal | 3                             | 2 |
| EN 420 Dexterity                     | 1                             | 4 |



# Our Range of Gloves



## Cut Resistant Gloves

Mechanical hazards are associated with the handling of rough or sharp objects which could abrade, cut or pierce the skin. Arco supply a range of gloves specially designed to protect the wearer from cut hazards. These products offer comfort, dexterity and flexibility without any compromise to performance. A unique combination of cut resistant yarns and polymer coatings make these gloves ideal for a multitude of industrial applications.

If you have additional requirements, such as a glove that provides protection from thermal hazards, a number of styles have also been tested to EN 407. A selection of liners and coatings are available and alternative grip patterns mean that you can select the style best suited to the job you're doing.



## Mechanical Handling

A mechanical hazard is not associated with moving machinery; in fact it can be extremely dangerous to wear gloves which could catch in moving parts or serrated blades. Please note - Gloves should not be used when working with serrated blades. USE GUARDS.

Injuries resulting from the manual handling of objects and materials with sharp edges are common in the engineering industry. Data from businesses show that as many as a third of all recorded injuries are caused by cuts from sharp metal during handling. Even minor incidents can lead to significant time off work for the injured individual. Many accidents result in the injured person being away from work for some days or transferring to lighter duties. Problems can also occur with infections of uncovered cuts or contamination of cuts with chemicals.

We offer a range of gloves and many combinations of liners and coatings so that you can choose the correct one for your application. We offer a range of different styles of coating including dotted palm, palm or fully coated so you can select the ideal level of grip without sacrificing comfort.



## Chemical Protection

Any substance which would irritate, inflame or burn the skin is classed as a chemical hazard. Some substances can cause the skin to become sensitised over a period of time while others have a more immediate and painful effect whether total immersion or merely splash is involved.

Arco supply a range of chemical protection gloves which are ideal for both janitorial and industrial tasks. All styles have additional features such as added liners for comfort and enhanced grip patterns to ensure products are as comfortable and effective as possible.



## Specialist Handling

A series of gloves designed for unique and specialist requirements including vibration dampening, electrical insulation puncture resistance and sharps protection.



## Thermal and Hi Vis

Thermal hazards come in many forms. Heat can be radiated and conducted, or it may be actual flames. Cold can be caused by anything from cold water to frozen gases. It is important to understand the type of hazard and the temperature involved in order to recommend suitable protection.

Arco has a full range of gloves for working in thermal conditions whether indoors or outdoors. We offer a range of styles with different grip patterns so the required grip can be achieved in a wet or dry climate. Our gloves are designed with the wearer in mind. We try to ensure our styles offer dexterity and comfort to encourage the wearer to wear their gloves when necessary.

We also offer a range of stay warm hi vis gloves for those who may be working in the cold and require their hands to be seen.



## Welding Protection

All gloves in the welding range meet Standard EN 407: 2004 Gloves Giving Protection from Thermal Hazards. This standard specifies thermal performance for protective gloves against heat and/or fire.





## Contact Us

### Call your regional sales office

|                             |                      |
|-----------------------------|----------------------|
| Aberdeen                    | <b>01224 249 494</b> |
| Scotland & Northern Ireland | <b>01506 841 510</b> |
| North England               | <b>0191 499 1555</b> |
| North West England          | <b>0161 869 5807</b> |
| Yorkshire & Humber          | <b>01482 611 611</b> |
| East Midlands               | <b>0115 938 0456</b> |
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