UNIGLOVES®

Gloves EN Standards Guide

KEEPING YOU SAFE

explanation of standards

EN 388 glove standard explained

Abrasion

The abrasion test enables glove samples to be rubbed against a standard sandpaper. The machine is stopped at set intervals and the samples inspected for holes produced by rubbing.

Cut (coupe method)

The cut test uses a circular blade in a slicing action across the surface of the glove sample. The performance of the glove is measured relative to a piece of control fabric and the results calculated as a cutting index. This test has problems with high cut resistant fabrics, caused when the blade becomes blunt and is unable to cut through the control fabric. When this happens the cutting index either cannot be calculated or produces an obviously low result so when dulling of the blade reaches a prescribed level, the ISO cut test is used to determine cut resistance instead.

Tear

The test piece is trouser shaped so the test measures tear propagation, not tear creation. A tensometer is used to pull the "legs" apart.

Puncture

This test is sometimes mistaken as a measurement of resistance to needles, but the test actually measures the resistance of the material to puncture by a test stylus shaped like a blunt nail, it is a type of burst strength test.

Cut (ISO method)

The ISO cut test uses a straight edged blade to measure cut resistance, which is determined as the force required to cut within a given distance. As the blade has variable weights applied to it, this corresponds to a Newton (N) value. As the blade edge is used only once, this method has been found capable of measuring higher cut resistance values.

Impact resistance

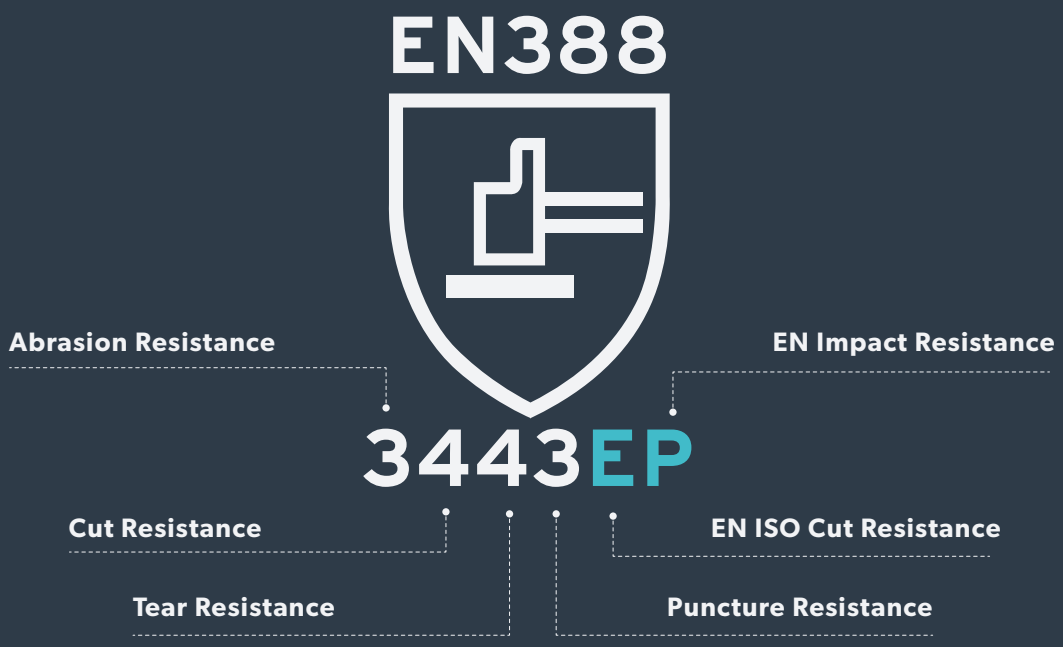
This is based on the protective gloves for motorcycle riders tests and measures the force transmitted to the hand. In reality, the test looks like a weight being dropped onto a ladle.

Levels of performance

Test	Level 1	Level 2	Level 3	Level 4	Level 5
6.1 Abrasion resistance (number of rubs)	100	500	2 000	8 000	-
6.2 Coupe test:					
Blade cut resistance (index)	1,2	2,5	5,0	10,0	20,0
6.4 Tear resistance (N)	10	25	50	75	-
6.5 Puncture resistance (N)	20	60	100	150	-

Levels of performance for materials tested with EN ISO 13997

	Level A	Level B	Level C	Level D	Level E	Level F
6.3 TDM: cut resistance (N)	2	5	10	15	22	30



Example of marking for the mechanical risks:

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

Explanation of the above examples

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

Personal Protective Equipment regulations

Personal Protective Equipment (PPE) is designed to protect the user from hazards, the principal European legislation is the PPE Regulation (EU) 2016/425.

Our gloves certified under these regulations protect the user against common hazards found in industry: micro-organisms and chemical hazards. The main standards for gloves certified as PPE are listed below.

EN ISO 374-1

This contains the terminology and performance requirements for chemical protective gloves including a list of 18 chemicals whose code letters can be used on the glove marking. Permeation testing is carried out using EN 16523-1. Three different types of performance level are defined:

Type A gloves achieve level 2 or greater against 6 of the 18 chemicals	**Type B** gloves achieve level 2 or greater against at least 3 of the 18 chemicals	**Type C** gloves achieve at least level 1 against 1 of the 18 chemicals
ISO 374-1/Type A 	ISO 374-1/Type B 	ISO 374-1/Type C 

CODE LETTER	CHEMICAL	CODE LETTER	CHEMICAL	CODE LETTER	CHEMICAL
A	Methanol	G	Diethylamine	M	Nitric acid 65%
B	Acetone	H	Tetrahydrofuran	N	Acetic acid 99%
C	Acetonitrile	I	Ethyl acetate	O	Ammonium hydroxide 25%
D	Dichloromethane	J	n-Heptane	P	Hydrogen peroxide 30%
E	Carbon disulphide	K	Sodium hydroxide 40%	S	Hydrofluoric acid 40%
F	Toluene	L	Sulphuric acid 96%	T	Formaldehyde 37%

EN374-2

Penetration is the movement of a chemical through a material, seam, pinhole or other imperfection when tested to:
- the air leak test where a glove is inflated under water or
- the water leak test where a glove is filled with water In both tests, the glove shall not leak

EN374-4

Degradation is a change in glove material, typically flaking, swelling, change in appearance, or hardening. The results are expressed in % where a positive number indicates the material is weaker after testing and a negative number indicates the material has harden during testing.

EN374-5

This contains the terminology and performance requirements for protective gloves against microbiological agents - bacteria, virus or fungi. Penetration testing is required as per EN374-2, but gloves offering protection against viruses shall additionally pass a penetration test performed to ISO 16604:2004 determination of resistance of protective clothing materials to penetration by blood-borne pathogens.

EN420 & EN ISO 21420

Defines the general requirements of gloves to comply with the PPE regulations.
These regulations and this standard is primarily concerned with **protecting the wearer.**

EN1186

Food safe

In conjunction with Articles in Contact with Food regulations, defines the requirements of gloves in contact with food.

UKCA News

Post-Brexit, new glove markings called UKCA (UK Conformity Assessed) came into effect in the UK from the 1st of January, 2021. However, to allow businesses time to adjust, CE markings can be used until the 1st of January 2023. Unigloves is working with the UK Approved Bodies to ensure our PPE complies with CE and UKCA requirements; certification is already underway.

Medical device regulations

The Medical Devices Regulation (EU) 2017/745 governs our range of medical gloves and ensures products are safe for patients and users.

EN455

Is a series of standards that define medical gloves and their requirements.
The medical device regulation and EN455 are primarily concerned with protecting the patient.

Part 1

Requirements and testing for freedom from holes

Gloves must pass this test at AQL level 1.5 in order to prove that they are an effective barrier against micro-organisms.

Part 2

Requirements and testing for physical properties

Gloves must meet set dimensions and physical strength depending on the material.

	Force at break (Newtons)
Latex	6.0
Nitrile	6.0
Vinyl	3.6

Part 3

Requirements and testing for biological evaluation

Includes tests for potentially hazardous materials that may affect the wearer or be transferred to a patient, including endotoxins, latex proteins (can cause Type I reactions), chemical residues including accelerators (can cause Type IV reactions) and powder (powder free gloves should have a powder level of <2mg per glove).

Part 4

Determination of shelf-life

Specifies tests for determining how long a glove will be fit for use. five years is the maximum shelf-life that can be claimed for medical gloves.

EN407

Limited Flame Spread is tested according to EN ISO 15025 with the glove mounted and tested vertically. A flame is placed directly below and in line with the glove at an angle of 30° and a distance of 20mm. The flame is applied for 10 seconds and afterwards, the innermost surface shall show no sign of melting. No hole shall appear on all layers of the tested area. Any seam shall not come apart after the ignition time.

For high thermal resistant gloves (level 3 or 4), all outer materials different to the finger area shall be tested according to EN ISO 15025:2016, method A and comply at least with level 3. Seams and outer accessories with a surface area greater than 10cm^2 shall also be tested. If the outermost layer melts, the material shall not produce molten or flaming debris.

PERFORMANCE LEVEL	AFTER FLAME TIME (s)	AFTER GLOW TIME (s)
1	≤15	no requirement
2	≤10	≤120
3	≤3	≤25
4	≤2	≤5

Contact heat is tested according to EN ISO 12127-1:2015. Samples are taken from the palm area and placed in contact with the appropriate temperature. For each performance level, the temperature of the inside of the glove cannot rise by more than 10°C within the threshold time at any of the 4 temperatures tested. For contact heat levels 3 or 4, limited flame spread shall be performed and reach at least level 3 otherwise the maximum contact heat performance that shall be reported is level 2.

PERFORMANCE LEVEL	CONTACT TEMPERATURE °C	THRESHOLD TIME
1	100	≥15
2	250	≥15
3	350	≥15
4	500	≥15

Convective Heat is tested according to EN ISO 9151:2016. Samples are subjected to the incident heat from a flame, and the heat passing through to the inside of the glove is measured. The time to record a temperature rise of 24°C is the Heat Transfer Index (HTI). For convective heat levels 3 or 4, limited flame spread shall be performed and reach at least level 3 in the limited flame spread test, otherwise the maximum convective heat performance that shall be reported is level 2.

PERFORMANCE LEVEL	HEAT TRANSFER INDEX HTI (S)
1	≥4
2	≥7
3	≥10
4	≥18

Radiant Heat is tested according to EN ISO 6942 : 2002. The sample is exposed to radiant heat density of 20kW/m2 and the time taken for the temperature on the inside of the glove to rise 24°C gives the performance level. For radiant heat performance levels of 3 or 4, the limited flame spread test shall be performed and reach at least level 3 in the limited flame spread test, otherwise the maximum radiant heat performance that shall be reported is level 2.

PERFORMANCE LEVEL	HEAT TRANSFER INDEX HTI (S)
1	≥7
2	≥20
3	≥50
4	≥95

Small splashes of molten metal is tested according to EN348 : 1992. Molten drops from a metal rod melted by exposing the rod to a flame are allowed to fall on the sample. The number of drops required to raise the temperature on the inside of the glove by 40°C gives the performance level. For small splashes of molten metal performance levels of 3 or 4, the limited flame spread test shall be performed and reach at least level 3 in the limited flame spread test, otherwise the maximum small splashes of molten metal performance that shall be reported is level 2.

PERFORMANCE LEVEL	NUMBER OF DROPLETS
1	≥10
2	≥15
3	≥25
4	≥35

Large quantities of molten metal is tested according to EN ISO 9185:2007. A quantity of molten iron as shown in the table opposite is poured onto the sample, which has a PVC film mounted behind the sample and 30 seconds after completion of pouring, the film must not show any changes to the grained surface (such as smoothness, discrete spots or damage). For large quantities of molten metal performance levels of 3 or 4, the limited flame spread test shall be performed and reach at least level 3 in the limited flame spread test, otherwise the maximum large quantities of molten metal performance that shall be reported is level 2.

PERFORMANCE LEVEL	MOLTEN IRON (G)
1	30
2	60
3	120
4	200

▷ EN511

Protective Gloves Against Cold

Convective Cold is tested by measuring the power required to maintain a constant temperature on a heated full-scale hand model in the ambient atmosphere of a climatic room which provides uniform conditions. The hand model is typically heated to 30-35°C. The resultant thermal insulation (ITR) is calculated using the hand model temperature, climatic room temperature and the power consumption of the heated hand to maintain a constant temperature.

PERFORMANCE LEVEL	THERMAL INSULATION (ITR) IN $M^2\,^oC/W$
1	$0.10 \leq I_{TR} < 0.15$
2	$0.15 \leq I_{TR} < 0.22$
3	$0.22 \leq I_{TR} < 0.30$
4	$0.30 \leq I_{TR}$

Contact Cold is tested according to ISO 5085-1 : 1989. The Thermal Resistance (R) is calculated by placing the sample on top of a heated plate with another metal plate (cold plate) placed on top of the sample. This is placed inside a cabinet which has an extractor fan to draw air past the assembly which has a cooling effect on the cold plate. The temperature gradient either side of the sample is measured and compared with the temperature gradient either side of a reference standard. The Thermal Insulation is calculated from the known thermal resistance of the standard and the measured temperature gradients.

PERFORMANCE LEVEL	THERMAL RESISTANCE (R) IN $M^2\,^oC/W/W$
1	0.025≤R <0.050
2	0.050≤RR <0.100
3	0.100≤R <0.150
4	0.150≤R

Water Impermeability is tested in accordance with EN ISO 15383. Water penetration shall not appear less than 30 minutes after the start of the test and is essentially a pass or fail.

EN60903 Live Working Gloves of Insulating Material

To obtain compliance with EN60903, all gloves must be tested to the relevant voltage in the table opposite. The construction, thickness and test voltage combine to give the class compliance. To maintain compliance, gloves of classes 1, 2, 3 and 4 must be re-tested every 6 months.

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