EUROPEAN STANDARDS FOR PPE

European legislation regulates the requirements that must be met in order for personal equipment to be CE marked. Each country has a work safety authority that can provide more detailed information in the national language(s).

The previous European directive 89/686/EEC was superseded by a new PPE Regulation (EU) 2016/425 in April 2019. The goal is to better protect the health and safety of the PPE user and to ensure fair competition between companies. For more information on the revision of the directive and its implications, please visit the Ejendals website. Two glove standards have recently been updated, EN 388 (mechanical risks) and EN 374 (chemical and microorganism risks).

CE CATEGORY
European Regulation 2016/425

CE

Cat. I **Minimal risks.** Protects users against minimal risks.

Cat. II **Other risks.** Meets both the basic requirements and further standards that may apply to specific areas of use.

Cat. III **Serious risks.** Includes exclusive protection against risks that may cause very serious consequences, such as death or irreversible damage to health.

EN 420:2003 + A1:2009
General requirements and test methods

- The gloves must have been made so as to provide the protection they are intended for.
- The material, seams and edges must not cause harm to the user.
- The gloves must be easy to put on and take off.
- The pH of the gloves should be between 3.5 and 9.5.
- Chromium (VI) content should be below 3 mg/kg in leather gloves.
- The manufacturer must state whether the gloves contains substances that may cause allergies.
- The protective quality of the gloves must not be affected if the washing instructions are followed.
- The gloves must allow maximum finger mobility (dexterity), given the need for protection.

EN 374-1:2016 + A1:2018
Standard for protective gloves against dangerous chemicals and microorganisms

The standard defines the requirements for the capability of gloves to protect the user against penetration, permeation and degradation by chemicals an microorganisms.

EN 374-2: 2014
Penetration resistance

Gloves that are to give protection against microorganisms and chemicals must be impenetrable (without holes). In the case of thin, disposable gloves, penetrability is tested by filling the glove with water or air. If the water or air leaks out of the glove is deficient.

EN 16523-1: 2015
Resistance to chemical permeation
(replaces EN 374-3:2003)

Test method to measure the resistance of the PPE material to permeation by hazardous chemicals at molecular level and under continuous contact. Gloves will be classified as Type A, Type B or Type C.

Type of glove	Marking	Requirement
Type A	EN374-1/Type A  UVWXYZ	Breakthrough time > 30 min for at least 6 chemicals in the new list
Type B	EN374-1/Type B  UVW	Breakthrough time > 30 min for at least 3 chemicals in the new list
Type C	EN374-1/Type C 	Breakthrough time > 10 min for at least 1 chemical in the new list

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

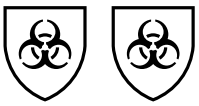
The list of chemicals on which the gloves are tested has been expanded with a further six chemicals. Increasing numbers of chemicals are used in industrial applications, and some were not covered by the previous standard.

	List of test chemicals			
	Code letter	Chemical	CAS Number	Class
Original	A	Methanol	67-56-1	Primary alcohol
	B	Acetone	67-64-1	Ketone
	C	Acetonitrile	75-05-8	Nitrile compound
	D	Dichloromethane	75-09-2	Chlorinated hydrocarbon
	E	Carbon disulphide	75-15-0	Sulphur containing organic compound
	F	Toluene	108-88-3	Aromatic hydrocarbon
	G	Diethylamine	109-89-7	Amine
	H	Tetrahydrofuran	109-99-9	Heterocyclic and ether compound
	I	Ethyl acetate	141-78-6	Ester
	J	n-Heptane	142-82-5	Saturated hydrocarbon
	K	Sodium hydroxide 40%	1310-73-2	Inorganic base
	L	Sulphuric acid 96 %	7664-93-9	Inorganic mineral acid, oxidizing
New	M	Nitric acid 65%	7697-37-2	Inorganic mineral acid, oxidizing
	N	Acetic acid 99%	64-19-7	Organic acid
	O	Ammonium hydroxide 25%	1336-21-6	Organic base
	P	Hydrogen peroxide 30%	7722-84-1	Peroxide
	S	Hydrofluoric acid 40%	7664-39-3	Inorganic mineral acid
	T	Formaldehyde 37%	50-00-0	Aldehyde

EN 374-4: 2013
Resistance to chemical degradation

Degradation is the deleterious change in one or more properties of a protective glove material due to contact with a chemical. Indications of degradation can be delaminating, discolouration, hardening, softening, dimensional change, loss of tensile strength, etc. It is determined by measuring the percentage change in puncture resistance of the glove material after a continuous contact for 1 hour of the external surface with the challenge test chemical. The results of the degradation test must appear in the information leaflet for all three glove types.

EN 374-5: 2016
Protection against microorganisms



VIRUS

The new standard introduces testing for protection against viruses. The previous standard covered only fungi and bacteria.

New markings on packing will indicate whether gloves protect against bacteria and fungi only, or against bacteria, fungi and viruses. The biohazard pictogram is used to mark gloves protecting from bacteria and fungi. The pictogram will be accompanied by the word 'VIRUS' if the glove meets the requirements of the virus test method.

EN 511:2006
Cold-related risks

Gloves giving protection against cold are tested for two different cold situations: penetrating or convective cold (a) and contact cold (b), i.e., direct contact with cold objects. Testing resistance to permeability by water (c) is done when relevant.

EN 511 — Testing

Level of protection	0	1	2	3	4
A. Convective cold (isolation ITR/m²)	I<0.10	0.1<I <0.25	0.15<I <0.22	0.22<I <0.30	0.30<I
B. Contact cold (termic resistance R/m²)	R<0.025	0.025<R <0.050	0.050<R <0.100	0.100<R <0.150	0.150<R
C. Water penetration, 5 min	Penetration	No penetration			

EN 407:2004
Protection against thermal risks

Gloves marked with this pictogram give protection against one or more of the thermal risks. Glove performance has been tested in terms of the following risks:

- Resistance to burning behaviour
- Contact heat resistance
- Convective heat resistance
- Radiant heat resistance
- Resistance to small splashes of molten metal
- Resistance to large quantities of molten metal

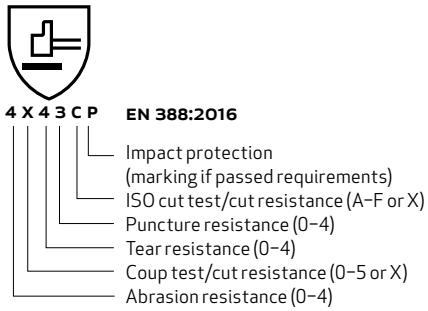
Level of protection	1	2	3	4
A. Burning behaviour (s) After flame time After glow time	⩽20 (no requirement)	⩽10 ⩽120	⩽3 ⩽25	⩽2 ⩽5
B. Contact heat (s)	100°C ⩾15	250°C ⩾15	350°C ⩾15	500°C ⩾15
C. Convective heat (s)	⩾4	⩾7	⩾10	⩾18
D. Radiant heat (s)	⩾7	⩾20	⩾50	⩾95
E. Small splashes of molten metal (no)	⩾10	⩾15	⩾25	⩾35
F. Large quantities of molten metal (g)	30	60	120	200

WARNING
The glove must not come into contact with fire if it does not attain performance level 3 when tested for resistance to flammability.

EN 16350: 2014
Electrostatic properties

The use of antistatic (dissipative) gloves is important in environments with hazards related to fire and/or explosion. The phenomenon to avoid is the electric potential difference between user and environment that is triggered during contact, what we colloquially call getting a 'shock'.

EN 388:2016 + A1:2018
Protective gloves against mechanical risks



In the revised version of EN 388:2016, there are two cut resistance tests available. The coup method is the same as before and is used for materials that do not dull the blade. For materials that will affect the blade, e.g. most cut resistant materials, TDM test is required. In these cases, the TDM result is the real reference performance while the coup result is only indicative and will therefore be marked with an X.

a. Abrasion resistance (level of protection 0–4)
Number of cycles required to abrade a hole using abrasive paper in a circular sample of glove material under constant pressure and motion. The highest performance level is 4, which corresponds to 8,000 cycles.

b. Cut resistance, coup test (level of protection 0–5)
This measures the number of turns required for a rotating circular knife at a constant rate to cut through the glove. The result is compared with a reference material to get an index. The highest level of protection is 5, which corresponds to an index of 20.

c. Tear resistance (level of protection 0–4)
Force required to propagate a tear in a rectangular sample of a glove with a starting incision, to a maximum force of 75N.

d. Puncture resistance (level of protection 0–4)
Measuring the amount of force required to pierce the glove with a standard sized point and at a given speed (10 cm/min).

Level of protection	1	2	3	4	5
a) Resistance to abrasion (No. of revolutions)	100	500	2 000	8 000	
b) Resistance to cutting (Index)	1.2	2.5	5.0	10.0	20.0
c) Tear resistance (N)	10	25	50	75	
d) Puncturing resistance (N)	20	60	100	150	

e. Cut resistance by ISO cut test (level of protection A–F)
Force in newtons (N) required to cut through a sample using a rectangular blade in a specified cut test machine such as Tomodynamometer (TDM). This test is optional unless the blade in Coup test becomes dull, whereupon it becomes the reference for cut resistance.

Level of protection	A	B	C	D	E	F
e) Cut resistance (N)	2	5	10	15	22	30

f. Impact protection (level of protection P)
The test for protection against impact is carried out per a standard for protective gloves for bikers, EN 13594:2015. The area with protection is tested, but because of its limited surface, the area around the fingers cannot be tested using this method. The impact force is 5 J and the transmitted force must be in accordance with the highest level, in this case level 1, with an individual result of ≤ 9.0 kN and mean force ≤ 7.0 kN.

Level of protection	P
f) Impact protection, EN 13594:2015	Pass (Level 1 ≤ 9 kN)

EN 12477:2001+ A1:2005
Protective gloves for welders

This standard describes how gloves should be designed to provide hand and wrist protection in welding and similar work situations. Welding gloves shall be tested according to EN388:2016+A1:2018 and EN 407:2004.

According to test result in EN 388 and EN 407 the gloves are classified as type A and/or type B:
- Type A refers to gloves with higher resistance but with lower flexibility and dexterity.
- Type B refers to gloves with lower resistance but with greater flexibility and dexterity.

Welding gloves should be longer than standard protective gloves, the sizes should correspond to the below table:

Hand size	6	7	8	9	10	11
Minimum length of glove (mm)	300	310	320	330	340	350

Gloves intended for arc welding shall be tested for electrical vertical resistance according to EN 1149-2. The electrical vertical resistance for gloves type A and B shall be $>10^5$ Ω.

RISKS RELATED TO FOOD CONTACT

This is applied to materials and articles that, at finished state, are intended to come into contact or are brought into contact with foodstuffs or with water that is for human consumption. According to Regulation 1935/2004:
'The materials and articles must be manufactured in accordance with good manufacturing practice so that, under normal or foreseeable conditions for their use, they do not transfer their constituents to food in quantities which could:
- Present a danger to human health,
- Result in an unacceptable change in the composition of the foodstuffs or a deterioration in the organoleptic characteristics thereof.'

All Ejendals gloves with the 'food contact' logo are conform to Regulation (EU) No. 1935/2004 and the Regulation (EU) No. 2023/2006, and Regulation (EU) No. 11/2011.

ESD
IEC 61340-5-1
IEC 61340-4-3

ESD stands for electrostatic discharge. Products that are marked ESD meet current criteria and standards for ESD protection. The ESD approval must not be confused with electrical safety properties. If work is to be performed close to live voltages, requirements according to national regulations shall be obeyed. If ESD gloves and footwear are to work satisfactorily, both personal equipment and the workplace must be conductive.

TEST METHOD
The international standard IEC 61340-5-1 is used to ensure that an ESD glove is capable of handling the resistance requirements of the system, which means that the resistance from operator to ground is less than 10^9 Ω. The test is performed at 12% humidity. Shoes are tested in accordance with the standard IEC 61340-4-3 which ensures that the shoes have a resistance to ground of less than 10^8 Ω.