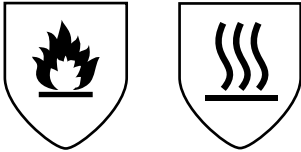




## THERMAL PROTECTION

Guidelines for gloves worn by workers who require protection from heat, cold, or fire and, other thermal conditions.

# EN 407:2020 / ISO 23407



## Glove Against Heat and/or Fire

The use of suitable protective equipment is crucial when dealing with hot materials or other thermal hazards. Understanding the way these gloves are tested and rated will help you select the right gloves for your needs. Ansell provides you the tools to help you familiarise yourself with all there is to know about the latest regulatory updates. The EN 407 was updated and the PPE Regulation 2016/425 was recently established to provide enhanced assessment of PPE for hand protective equipment.

OVERVIEW OF CHANGES	
<b>Title of standard:</b>	Modified to include private use hand protective equipment.
<b>EN 388 requirements adjusted</b>	Requirement to meet minimum EN abrasion 1 deleted; minimum EN tear Level 1 remains
<b>Private use hand protective equipment (e.g. oven gloves):</b>	Added to the scope
<b>Minimum length requirement added:</b>	For gloves claimed to protect against molten metal splashes, a minimum glove length is required, to be in line with the welders' gloves standard
<b>Test methods improved: To follow the state of the art</b>	<ul style="list-style-type: none"> <li>• For flame resistance (now also called Limited Flame Spread), test ignition time became 10 seconds (versus 15 seconds in old standard)</li> <li>• If Level 3 or 4 is claimed for flame resistance or for large quantities of molten metal, the glove should be removable within 3 seconds</li> <li>• Performance claims in all tests will be based on lowest individual result reported and not the mean</li> <li>• Other areas of gloves also to be tested. No sign of melting may occur</li> </ul>
<b>IFU</b>	Specific warning statements added
<b>New pictogram</b>	New pictogram added for non-flame resistant gloves

## Private protection equipment against thermal risks — examples



## ADOPTING THE REVISED EN 407:2020 STANDARD

- This standard specifies levels of thermal performance, test methods and marking for hand protective equipment against heat and/or fire
- Minimum glove length for protection against molten metal splashes (small splashes & large quantities)
- The protective gloves shall meet the EN 407:2020 requirement
- Gloves of Level 3 and 4 for the flammability & large quantities of molten metal test shall be manufactured and lab tested to ensure they can easily be removed, within 3 seconds, in case of emergency

*If this is not achieved, a clear warning is to be mentioned in the IFU*

- Gloves shall meet at least EN tear Level 1

Glove Size	Minimum glove length (mm)
6	300
7	310
8	320
9	330
10	340
11	350

Glove length for protection against molten metal splashes

Performance Level		1	2	3	4
<b>A</b>	<b>Limited Flame Spread</b> After flame time and after glow time (finger & seams areas)	<15 s no require	< 10 s < 120 s	< 3 s < 25 s	< 2 s < 5 s
<b>B</b>	<b>Contact Heat (10°C increase)</b> Contact temperature and Threshold time (glove palm and, where relevant, other areas)	100 °C > 15 s	250 °C > 15 s	350 °C > 15 s	500 °C > 15 s
<b>C</b>	<b>Convective Heat (24°C increase)</b> Heat Transfer index (glove palm & back)	> 4 s	> 7 s	> 10 s	> 18 s
<b>D</b>	<b>Radiant Heat (24°C increase)</b> Heat transfer (back of glove)	> 7 s	> 20 s	> 50 s	> 95 s
<b>E</b>	<b>Small Drops Of Molten Metal (40°C increase)</b> Number of droplets (glove palm & back & cuff)	> 10	> 15	> 25	> 35
<b>F</b>	<b>Large Quantities Of Molten Metal (damage to a simulated PVC skin)</b> Mass of molten iron (glove palm & back & cuff)	30g	60g	120g	200g



## 1. Test method as per EN ISO 15025: Burning (Flammability Resistance)

The first test subject the gloves to an ignition and is measured by how long the gloves continue to burn and glow after the source of ignition is removed.

### Test Principle

- A burner is placed below the glove.
- Glove is tested after an ignition time of 10 seconds.
- After flame time and After glow time are recorded.



## 2. Test method as per EN ISO 12127-1: Contact Heat Resistance

The second test is to test the capability of the glove to resist heat upon contact based on a certain temperature range.

### Test Principle

- 3 test specimens are cut from the palm area of three gloves. Reinforcements where applicable shall be removed. Front of fingers also need to be tested if these are different from the palm.
- Other areas of the gloves are to be tested if they are different from the palm and claimed against contact heat.
- Each specimen of material is placed on a calorimeter and a hot plate is heated up to the required contact temperature.
- The heated plate is put in contact with the test specimen.
- The threshold time is determined after a 10°C increase of the calorimeter (= second degree burn) after > 15 seconds



## 3. Test method as per EN ISO 9151: Convective Heat Resistance

The third test is based on how long the glove is able to delay the transfer of heat from a flame.

### Test Principle

- 3 test specimens (from each material assembly from both palm & back of glove) are subjected to a heat source coming from the flame of a gas burner. Reinforcements on the gloves, where applicable, shall be removed.
- The heat passing through the specimen is measured by means of a small copper calorimeter on top of and in contact with the specimen.
- The threshold time is determined after a 24°C increase of the calorimeter



## 4. Test method as per EN ISO 6942: Radiant Heat Resistance

This fourth test determines how long the glove is able to delay the transfer of heat when exposed to a radiant heat source.

### Test Principle

- 2 specimen taken from the back of a pair of gloves. Reinforcements on the gloves, where applicable, shall be removed.
- Test specimen is exposed to a radiant heat source
- The heat passing through the specimen is measured through the calorimeter which is in contact with the specimen.
- The threshold time is determined after a 24°C increase of the calorimeter.



## 5. Test method as per EN 348: Resistance to Small Drops of Molten Metal

The fifth test measures the number of molten metal drops that are required to heat the glove to a certain level.

### Test Principle

- 4 test specimens are taken from palm, back and cuff. Reinforcements on the gloves, where applicable, shall be removed.
- The number of molten metal drops required to cause a 40°C temperature rise in a sensor behind the specimen is measured.



## 6. Test method as per EN ISO 9185: Resistance to Large Quantities of Molten Metal

The sixth test measures the weight of molten metal that is required to cause smoothing or pinholing on a simulated skin placed directly behind the glove sample.

### Test Principle

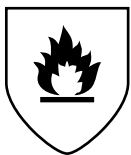
- 3 test specimens are taken from palm, back and cuff. Reinforcements on the gloves, where applicable, shall be removed.
- Samples are tested by pouring molten iron onto it.
- Damage is assessed by placing a PVC skin simulant directly behind the test specimen and noting damage to the skin simulant after pouring.
- The minimum quantity to cause damage to the skin simulant is observed and used to attribute the performance level.

## PERFORMANCE REQUIREMENTS

- **Limited flame spread test** is failed if signs of melting would occur inside the glove, or if holes appear, or if seams come apart.
- For **contact/convective/radiant heat & small splashes**, maximum performance Level 2 can be claimed if the test on Limited flame spread does not achieve at least Level 3. No signs of melting nor holes should appear on innermost layers. For small splashes, also no signs of melting on outer layer.
- For **large quantity test**, also maximum performance Level 2 can be claimed if the test on Limited flame spread does not achieve at least Level 3. No signs of melting nor holes should appear on innermost layers, and also no materials shall ignite during the test.

## MARKING AND INFORMATION

- 2 pictograms would be applicable but cannot be used together
- If limited flame spread is claimed (= at least Level 1 in the flammability test):
- If no limited flame spread is claimed:



A B C D E F

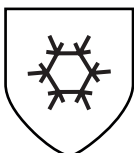


X B C D E F

- **Marking of gloves and first packaging enclosure as per EN 407:2020**
- **Instructions for Use as per EN 407:2020, with following additions:**
  - Clear information about the **area of protection**
  - A **clear warning** that the products must not come in contact with a naked flame if no flame protection is claimed
  - A **clear warning** that the gloves cannot be easily removed in case of an emergency, if they fail the removal test
  - If the removal test is only done in dry conditions, a warning that the glove should not be used in wet conditions
  - Information about reinforcements where applicable
  - When the glove is claimed to protect against large quantities of molten metal, a **warning** to leave the working place and take off the glove in the event of a molten splash, including an indication that the glove may not eliminate all risks of burns

# EN 511:2006

EN 511



abc

## SCOPE

This standard applies to any gloves that protect, against convective and contact cold down to -50°C.

## DEFINITIONS & REQUIREMENTS

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 3-digit number:

### a. Resistance to Convective Cold (performance level 0–4)

Based on the thermal insulation properties of the glove, which are obtained by measuring the transfer of cold via convection.

### b. Resistance to Contact Cold (performance level 0–4)

Based on the thermal resistance of the glove material when exposed to contact with a cold object.

### c. Penetration by Water (0 or 1)

0 = water penetration

1 = no water penetration

All EN 511-rated gloves must achieve at least performance level 1 for abrasion and tear.