

Personal Protective Equipment

General Introduction



GTIIT_EHS
2019-09-15



Brief Introduction :

- Topic 1 Safety Helmet
- Topic 2 Safety Glasses
- Topic 3 Mask
- Topic 4 Ear Plug and Muff
- Topic 5 Glove
- Topic 6 Cloth
- Topic 7 Safety shoes



Safety Helmet 安全帽

Domestic and International Regulations:

- Meet the requirements of the head protection safety helmet (GB 2811-2019) standard.
- ANSI/ISEA Z89. 1 2014 American National Standard for Industrial Head ProtectionL2
- EN 397:2012+ A1: 2012 Industrial safety helmets
- EN 50365: 2002 Electrically insulating helmets for use on low voltage installations



Safety helmets are classified with ordinary type (P) and special type (T) according to their performance.

Ordinary safety helmets are safety helmet products with basic protective performance used in general workplaces;

Such as:

- Campus workshop for special machine, construction site;
- Or there are potentially dangerous places where hard objects fall, small splashes and impact.

Special safety helmet In addition to basic protection performance, it also has one or more special performances, which is suitable for special work places corresponding to its performance.

Special safety helmets with electrical insulation properties are divided into G and E levels according to the withstand voltage.

The G-level electrical insulation test voltage is 2200V, and the E-level electrical insulation test voltage is 20000V

Applicable place as: High voltage power distribution room

Safety Helmet 安全帽

Safety Requirements for Helmets:

V-Gard Standard helmet:

- Lightweight and comfortable to wear;
- V-shaped top V design to prevent top impact;
- D-shaped chin strap to prevent second blow after impact;
- Slots on both sides and louvered vents on both sides can accelerate the exhaust of hot air;
- Slots on both sides, you can wear protective masks, earmuffs and flashlights to expand the protection range;
- The wide hat with curled edges can block the dazzling light and rain, and is suitable for a variety of working environments.



Safety Helmet 安全帽

Applicable place:



Mask 面罩&口罩

Respiratory protection type:





Mask 面罩&口罩

In GB/T 32610-2016 Technical specification of daily protective mask standard, for the first time, the protection level of masks is defined with four levels: A, B, C, and D according to the air pollution situation from low to high.

- Class A masks are suitable for use when the PM_{2.5} concentration reaches or exceeds 500 micrograms per cubic meter, that is, when the pollution is more than serious;
- Class B masks are suitable for serious pollution (PM_{2.5} concentration \leq 350 micrograms per cubic meter) and below;
- Grade C is suitable for severe pollution (PM_{2.5} concentration \leq 250 micrograms per cubic meter) and below;
- Class D is suitable for moderate pollution (PM_{2.5} concentration \leq 150 micrograms per cubic meter) and below.

At the same time, the corresponding protective effects at all levels are required to be no less than 90%, 85%, 75%, and 65%.



Mask 面罩&口罩 (For filter element material)

The N series is American standards, the KN series is Chinese standards, and the FFP series is European standards.

The following number refers to the protection capacity, the greater the number is, the higher protection level will be.

KN95 refers to the ability to filter out more than **95%** of non-oily particles, and the protective effect is roughly equivalent to the European standard mask **FFP2**.

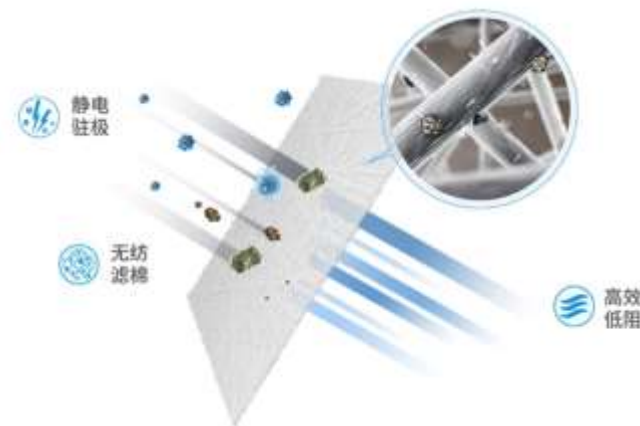
KP refers to the protection of oily particles.

In general, N95 series are sufficient to fight viruses and flu, and 90 series can resist more than 90%.

Use a formula to express: **FFP3 > FFP2 = N95 = KN95 > KN90**

According to Chinese standards, if you are a medical worker, you must use a medical KN95 mask that is GB19083-2010.

General population and medical personnel who are not exposed to high-pressure liquid sprays can use ordinary KN95 masks with the standard GB2626-2019.





Mask type

American NIOSH Respiratory Protection Equipment Standard Certification

N series: It can be used to protect non-oily particles, and there is no time limit for use. However, due to dust contamination and contact in the factory, it is not recommended to use more than one shift

Grade 95: the lowest filtration efficiency >95%

Grade 90: the lowest filtration efficiency >90%

The above filtration efficiency is based on the particle size of 0.3 microns as the test sample, and the detection flow rate of the European Standard is 85 liters/min.

In theory, the more airtight the protective material of the mask is, the better effect of blocking particles will be. On the other hand, if the mask is at higher airtight, it will be more difficult to breath.

If you don't wear it well, it may cause dizziness due to lack of oxygen. Wearing professional protective masks like N95 can easily cause breathing difficulties, especially for patients with cardiovascular diseases.

Compared with N95 masks, KN90 masks are more suitable for ordinary people. Whether it feels comfortable to wear also varies from person to person.





Mask 面罩&口罩

Choose respiratory protective equipment according to the harm level

Immediately Dangerous to Life or Health

Protection of IDLH environment Respiratory protection equipment suitable for IDLH environment is:

- a) Positive pressure type with full face mask SCBA (*Self-contained breathing apparatus*);
- b) On the premise of being equipped with suitable auxiliary escape-type respiratory protection equipment, a positive pressure supply type respiratory protection equipment equipped with a full face mask or aspirating hood.

Note: The auxiliary escape type respiratory protective equipment should be suitable for the IDLH environment.

- When the nature of the harmful environment is unknown, the lack of oxygen is unknown, and the oxygen-deficient environment, the selected auxiliary escape type respiratory protective equipment should be air-carrying, and the use of filter type is not allowed;
- In an environment where the air pollutant concentration exceeds the IDLH concentration without hypoxia, the selected auxiliary escape type respiratory protective equipment can be air-carrying or filtering, but it should be suitable for the type of air pollutant and its concentration level.

Mask 面罩&口罩

The protection of non-IDLH environment should choose respiratory protective equipment with APF greater than the hazard factor.

The APF of various types of respiratory protective equipment is shown in the following table:

Respiratory protective equipment type	Mask type	Positive pressure	Negative pressure
Self-priming filter	Half mask	Not applicable 不适用	10
	Full face mask		100
Air supply filter	Half mask	50	Not applicable 不适用
	Full face mask	>200 to <1000	
	Open mask	25	
	Aspirated hood	>200 to <1000	
Air supply	Half mask	50	10
	Full face mask	1000	100
	Open mask	25	Not applicable 不适用
	Aspirated hood	1000	
SCBA <i>(Self-contained breathing apparatus)</i>	Half mask	>1000	10
	Full face mask		100



Mask 面罩&口罩



Judging the degree of harm:

$$\text{Hazard factors} = \frac{\text{Hazardous vapor concentration in workplace } \text{mg/m}^3}{\text{National occupational health standards stipulated concentration } \text{mg/m}^3}$$

Choose respiratory protective equipment according to the degree of hazard and the type of air pollutants:

$$\text{Expected exposure concentration} = \frac{\text{Hazardous vapor concentration in workplace } \text{mg/m}^3}{\text{APF value of selected respiratory protective equipment}}$$



Mask 面罩&口罩

How to select?

1. Understand the hazards in the work area;
2. Form and concentration of hazardous factors;
3. According to the control method, choose the right protective equipment;
4. Type and grade selection of protective equipment;
5. Maintenance of protective equipment;
6. Disposal of protective equipment.

Can choose isolated type or filter type respiratory protective equipment (see Table 3). If you choose a filter type, you should choose an effective filter element or a combination of filter elements.

Table 3 Choose respiratory protective equipment according to harmful environment

Harmful environment	Applicable types of respiratory protection equipment																					
	Isolated									Filtered												
	Airborne						Supplied Air			Air supply filter						Self-priming filter						
	正压式		负压式		正压式		负压式	防毒		防尘		防尘防毒		防毒	防尘		防尘防毒					
	H	F	H	F	H	T	L	H	F	H	T	L	H	T	L	H	F	H	F	H	F	
The oxygen concentration is unknown		✓																				
Hypoxia: oxygen concentration <18%		✓																				
空气污染物和浓度未知		✓																				
不缺氧且空气污染物浓度已知 IDLH 环境 Air pollutants are toxic gases and vapors Air pollutants are particulate matter Air pollutants are toxic gases, vapors and particulate matter	IDLH 环境																					
	◎																					
	Air pollutants are toxic gases and vapors	<10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		>1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Air pollutants are particulate matter	<10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		>1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Air pollutants are toxic gases, vapors and particulate matter	<10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		<1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		>1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note 1: v means that it is allowed to be selected; ◎ means that it is allowed to be used in accordance with 4.2.3.1b of this standard.
 Note 2: H stands for half face mask; F stands for full face mask; T stands for full face mask and aspirating hood; L stands for open face mask.
 Note 3: See Appendix D for examples of selection of respiratory protective equipment.



Masks_standards and selection instructions

Respiratory protection Self-priming filter anti-particulate respirator GB 2626-2019 (for filter element material)

Masks that meet the requirements of the above standards may not meet the bacterial filtration and blood penetration effects required by medical masks;

Pharmaceutical industry standards YY/T 0969-2013 Single-use medical face mask 、 Q/JYHC 001-2020 Disposable protective mask

Pharmaceutical industry standards **YY 0469-2011** Medical surgical masks (most recommended for the epidemic, please pay attention to distinguishing when buying)

GB/T 18664-2002 Selection, use and maintenance of respiratory protective equipment

GB/T 32610-2016 (Non-mandatory national standards) Technical specification of daily protective mask, The requirements are basically the same as the technical requirements of GB19083-2010 medical protective masks.

Medical protective masks are mandatory nationally labeled **GB19083-2010** Technical requirements for medical protective masks (the highest level of protection)

Index	China		
	Ordinary medical mask	Medical surgical mask	Medical protective mask
Bacteria filtration efficiency (%)	≥ 95%	≥ 95%	/
Particle filtration efficiency (%)	/	≥ 30%	≥ 95%
Synthetic blood penetration resistance (mmHg)	/	120	80
Breathable resistance	≤ 49 Pa	≤ 49 Pa	≤ 343.2 Pa

Data source: China mask standard core indicators collation

Mask 面罩&口罩



Classification	Standard name	Standard encoding	Standard nature	Standard status	Standard application scope
Medical masks	Technical requirements for medical protective masks	GB19083-2010	Mandatory national standard	Currently valid	Self-priming filter medical protective mask suitable for filtering particulate matter in the air and blocking droplets, blood, body fluids, secretions, etc. in a medical working environment
	Medical surgical mask	YY 0469-2011	Mandatory Industry Standard	Currently valid	Suitable for disposable masks (surgical masks) worn by clinical medical staff during invasive operations
	Disposable medical mask	YY/T 0969-2013	Recommended industry standard	Currently valid	It is suitable for covering the mouth, nose and chin of the user, and is used in a general medical environment to form a disposable mask for exhaling or spraying out pollutants from the oral cavity and nasal cavity. Not suitable for medical protective masks and medical shell masks.
Civil protective mask	Self-priming filter anti-particulate respirator	GB 2626-2019	Mandatory national standard	Currently valid	Self-priming filter type respiratory protective equipment suitable for protecting all kinds of particles. Not suitable for respiratory protection of harmful gases and vapors; not suitable for respiratory protection for hypoxic environment, underwater operation, fire escape.
	Daily protective mask technical regulations	GB/T 32610-2016	Recommended national standard	Currently valid	Self-priming filter type respiratory protective equipment suitable for protecting all kinds of particles. It is not suitable for respiratory protection of harmful gases and vapors; it is not suitable for respiratory protection for special industries such as hypoxic environment, underwater operation, fire escape, medical and industrial dust prevention. It is also not suitable for infants and children's respiratory protection.
Civilian ordinary masks	Knitted mask	FZ/T 73049-2014	Recommended industry standard	Currently valid	It is suitable for identifying the quality of masks made of knitted fabrics. Not suitable for medical and labor protection masks
	Ordinary skim gauze mask	GB 19084-2003	Mandatory national standard	Invalid	Suitable for masks made of ordinary degreasing gauze

Mask selection instructions



- **YY 0469-2011**
- **GB/T 32610-2016**
- **GB19083-2010**

GB/T 32610-2016 、 GB2626-2006 KN95滤芯

Inhibition rate of filter material >99%

Polyurethane layer
Soft and skin-friendly
Not easy to be allergic

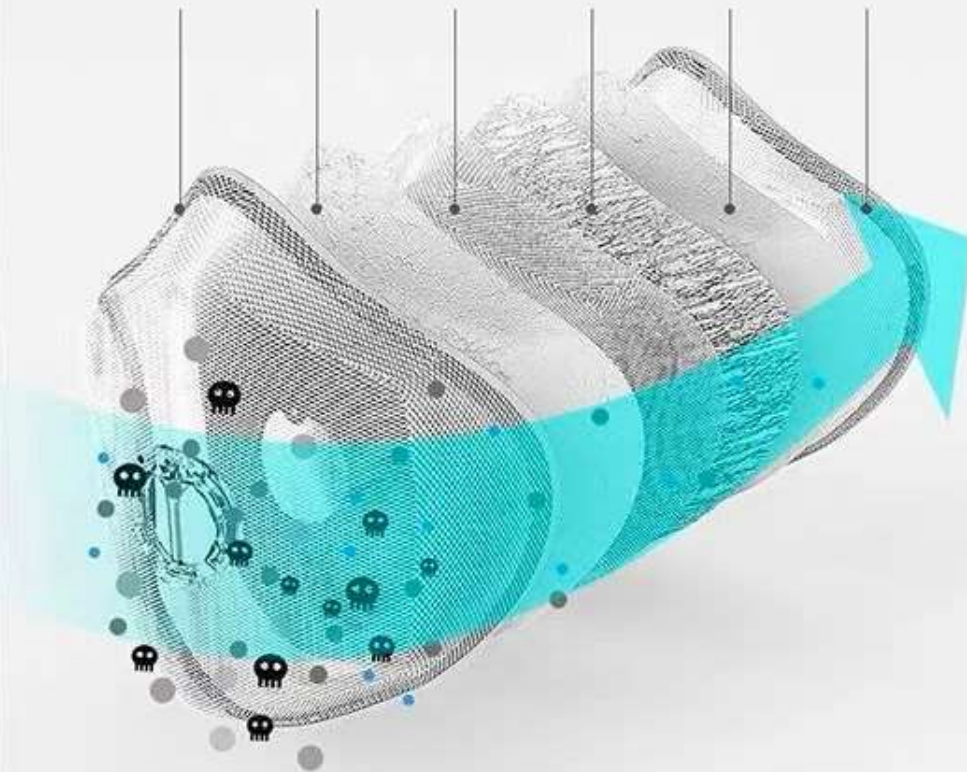
Dust-holding cotton
High dust-holding
Low resistance
breathable

Melt blown layer
superfine fiber
Physical filtration

Antibacterial layer
Suppress breeding
Keep fresh

Dust-holding cotton
High dust-holding
Low resistance
breathable

Polyurethane layer
Soft and skin-friendly
Not easy to be allergic



Mask type

Applicable place:

A working environment with particulate pollutants and hazardous gas environments.



3M 7502 Half mask

off gas Filter Cartridge 3M 6001 Organic gas filter cartridge	Use with 3M 7502 Can protect against organic gases and vapors, such as benzene and its homologues, gasoline, acetone, carbon disulfide, ether, etc. Packing: 2 pcs/bag, 30 bags/carton
6003 Organic and Acid Gas Filter Cartridge	Can protect against organic vapor, chlorine, hydrochloric acid, sulfur dioxide, hydrogen sulfide, hydrofluoric acid Packing: 2 pcs/bag, 30 bags/carton
off gas Filter Cartridge 3M 6006 Multi-purpose gas/vapor cartridge	Can protect against organic vapor, chlorine, chlorine dioxide, hydrogen chloride, sulfur dioxide, hydrogen fluoride, hydrogen sulfide, hydrogen, methylamine, and formaldehyde Packing: 2 pcs/bag, 30 bags/carton
Filter cotton 3M 5N11 N95 filter cotton	Use with 3M 7502 Filter all kinds of non-oily particles used to fix 5N11 filter cotton on the 6000/7000 filter box Packing: 10 pcs/box, 10 boxes/carton

Mask 面罩&口罩



wearing method:



step1

Unfastened with
bottom buckle
Cover your mouth
and nose



step2

Pull up the upper
headband and place the
headband comfortably on
top of your head



step3

Hold the headband
buckle with both
hands behind the neck



step4

Adjust the tightness of the
headband so that the
mask fits well with the
face. First adjust the front
headband, and then adjust
the headband behind the
neck



Emergency PPE

US EPA Integrated Protection Combining Components of PPE

	Level A	Level B	Level C	Level D
Respiratory protection	Positive pressure, SCBA	Positive pressure, SCBA	Full-face or half-mask, air-purifying respirator	Not required
Protective clothing	Fully encapsulating chemical protective suit	Chemical resistant clothing, liquid-tight	Chemical resistant clothing, liquid-tight	Coveralls or uniforms
Hand protection	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Disposable gloves
Foot protection	Boots, chemical resistant, steel toe and shank	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Safety shoes/boots or Boot-covers



Protective Gloves

GB/T 12624-2006 General specification for labor protective gloves



EN388

Mechanical protection

EN374

Working with chemicals

Cut protection

EN407

Special risks
(e.g. heat protection)



EN ISO 374-1:2016/Type A



JKLMNO

Permeation resistance of type A:

at least 30 minutes each with at least 6 test chemicals.

EN ISO 374-1:2016/Type B



JKL

Permeation resistance of type B:

at least 30 minutes each with at least 3 test chemicals.

EN ISO 374-1:2016/Type C

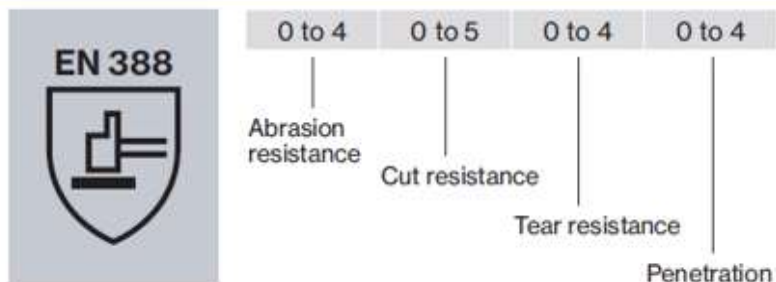


Permeation resistance of type C:

at least 10 minutes each with at least 1 test chemical.

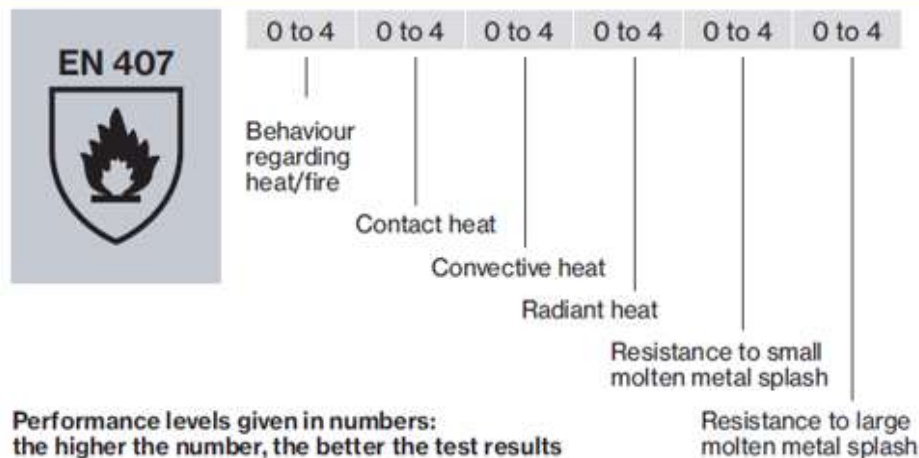
Types of glove information

EN 388 – Mechanical risks



Performance levels given in numbers:
the higher the number, the better the test results

EN 407 – Heat and fire



Performance levels given in numbers:
the higher the number, the better the test results

EN374(1-3) – Chemical risk

EN 374



J K L

Letter | symbol

A
B
C
D
E
F
G
H
I
J
K
L

Test chemicals

Methanol
Acetone
Acetonitrile
Dichloroethane
Carbon disulfide
Toluene
Diethylamine
Tetrahydrofuran
Ethyl acetate
N-heptane
Sodium hydroxide (concentration 40%)
Sulfuric acid (concentration 96%)



Represents waterproof gloves, but has a lower level of protection against chemical hazards.



Please refer to the relevant instructions.

Chemical-resistant gloves must pass at least the above three chemical tests and have a protection level of 2, that is, the penetration time is greater than 30 minutes.



EN 388 Glove selection instructions

European protection standards

Read instructions	Anti-chemical protection	Low temperature protection
Mechanical hazard protection	Low concentration chemical protection	Radioactive contamination protection
Microbial protection	Thermal hazard protection	Ionizing radiation protection

Fiber used	Improved performance
Cotton	Comfort
Polyester	Toughness
Nylon	Stretchability
Lycra®	Elasticity
Acrylic fiber	Isolation
Kevlar®	Resistance to cutting and heat
Dyneema®	Anti-cutting, comfortable to wear, anti-wear
HPPE (High Performance Polyethylene)	Anti-cutting, comfortable to wear, anti-wear
Stainless steel	Anti-Cutting
Glass fiber	Anti-Cutting
Spectra®	Anti-Cutting



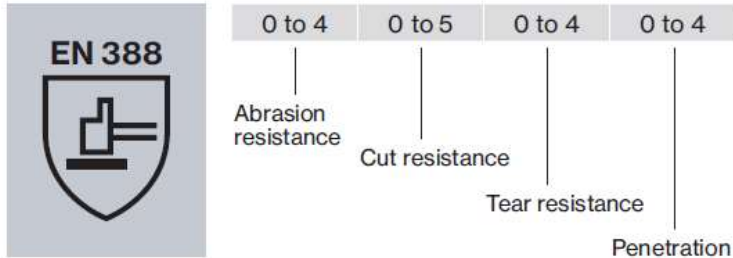
10 — Glove size
 uvex PROFAS — Manufacturer
 RUBIFLEX S NB 27 S — Glove name
 EN 374 EN 388 — EN standard icon
 JKL 0121 2121 — Mechanical performance level
 CE — Compliant with CE mark
 0121 — Testing agency code
 See instructions for use

The letter represents that the glove has been chemically tested and has reached at least level 2 of penetration

Types of glove information

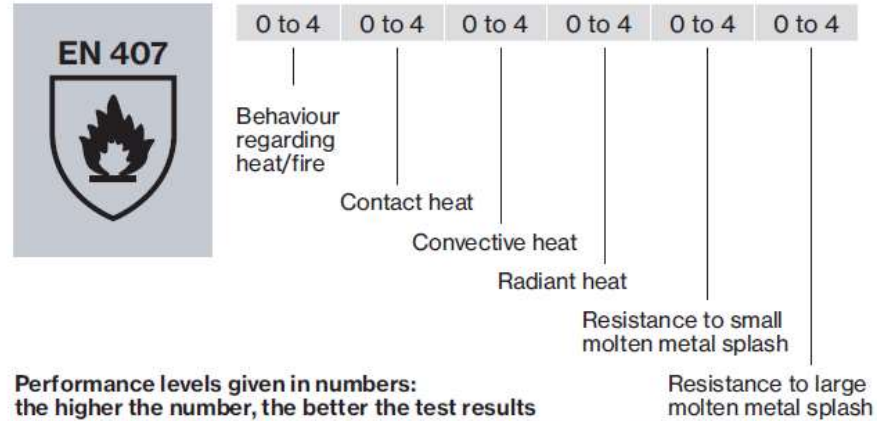


EN 388 – Mechanical risks



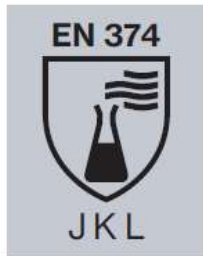
Performance levels given in numbers:
the higher the number, the better the test results

EN 407 – Heat and fire



Performance levels given in numbers:
the higher the number, the better the test results

EN 374 (1-3) – Chemical risks



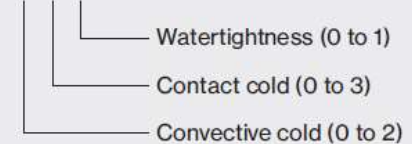
Letter symbol	Test chemical
A	Methanol
B	Acetone
C	Acetonitrile
D	Dichloromethane
E	Carbon disulphide
F	Toluene
G	Diethylamine
H	Tetrahydrofuran
I	Ethyl acetate
J	n-heptane
K	Sodium hydroxide 40%
L	Sulphuric acid 96%

A glove is considered to be resistant to chemicals if it attains a protection index of at least Class 2 (i.e. > 30 min) with three test chemicals.



The pictogram with the beaker stands for waterproof safety gloves with low protection against chemical dangers.

EN 511 – Cold



Mechanical protection

Performance level	Abrasion resistance (Unit: circle)	Cut resistance (Unit: times)	Tear resistance (Unit: Newton)	Puncture resistance (Unit: Newton)
1	100	1.2	10	20
2	500	2.5	25	60
3	2000	5.0	50	100
4	8000	10.0	75	150
5	-	20.0	-	-

Mechanical protection	
Application Classification	
	Multipurpose
	Cut protection
	Heat
	Oil resistant
	Special Purpose



uvex unidur 6659


The HPPE fibre and glass fibre of the uvex unidur 6659 ensures very high cut protection. These mottled grey safety gloves are ideal for clean and dirty environments.

Characteristics

- High flexibility
- High abrasion resistance
- High cut protection

Applications

- Metal industry
- Automotive industry
- Packaging


4541

Art. no.	60588
Art. code	6659
EN	388 (4 5 4 1)
Sizes	7, 8, 9, 10
Construction	Knitted cuff, polyurethane coating on palm and fingertips
Base glove	HPPE*, glass, polyamide, elastane
Coating	Polyurethane
Colour	mottled grey/black
Resistance	For dry areas and slightly moist areas

Task level	
	Extra lightweight
	lightweight
	Medium type
	Weight type



EN374 -

Anti-chemical protection
and/or microbial
protection standards



Microbial protection



Chemical protection



EN level ≥ 2

microbial protection

Acceptable quality standards for liquid penetration.
The higher the index, the worse the quality, the
lower the index, the better the quality.

Performance level

1	4.0
2	1.5
3	0.65



XYZ

Anti-chemical protection

At least 3 chemicals in the table have a penetration
time > 30 minutes (XYZ represents the coding letters of
the 3 chemicals that require time > 30 minutes to
penetrate the glove).

Performance level

Minute

0	<10
1	10
2	30
3	60
4	120
5	240
6	>480

A. ₁ Methanol. ₁	G. ₁ Diethylamine. ₁
B. ₁ Acetone. ₁	H. ₁ Tetrahydrofuran. ₁
C. ₁ Acetonitrile. ₁	I. ₁ Ethyl acetate. ₁
D. ₁ Dichloroethane. ₁	J. ₁ N-heptane. ₁
E. ₁ Carbon disulfide. ₁	K. ₁ Sodium hydroxide 40%. ₁
F. ₁ Toluene. ₁	L. ₁ Sulfuric acid 96%. ₁



Chemical resistance to selected chemicals (AQL<4.0)

This diagram can be used for gloves that do not meet the above requirements and whose
AQL score is equal to or lower than 2.

Note: CE mark is a compulsory conformity mark, indicating that the product has reached the EU's consumer protection, safety and environmental protection requirements

EN 374 (1-3) – Chemical risks



Letter symbol	Test chemical
A	Methanol
B	Acetone
C	Acetonitrile
D	Dichloromethane
E	Carbon disulphide
F	Toluene
G	Diethylamine
H	Tetrahydrofurane
I	Ethyl acetate
J	n-heptane
K	Sodium hydroxide 40%
L	Sulphuric acid 96%



Chemical and liquid protection

Polymer classification

PI	Polisoprene
NLR	Natural rubber
NBR	Nitrile rubber
NE	Neoprene
PVC	Polyvinyl chloride
BU	Butyl synthetic rubber
VB	Fluorine rubber Viton [®] /butyl
BL	Mixture
PVA	Polyvinyl alcohol
LF	Composite film (polyethylene nylon)

Exposure classification

	Soak
	Splash

Gloves used for chemical protection must comply with EN374:2003. The following icons describe the compliance requirements of each standard:

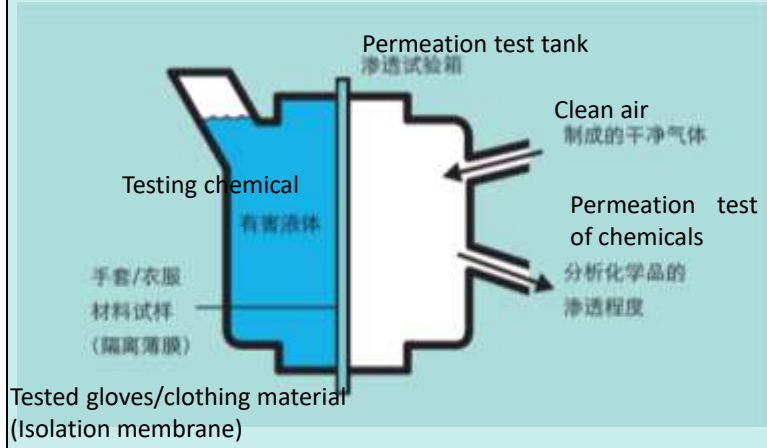
Pictogram Claim

	Protective gloves against chemical penetration							
	Penetration index	0	1	2	3	4	5	6
	Penetration time (minutes)	<10	10	30	60	120	240	>480

Protective Gloves

Degradation test

Tested material is made into a piece of membrane. Take the dimension and weight of the tested piece before soaking it into the solvent. Take the dimension again after 30 mins. Blow-dry the tested piece then take the weight. Mark down both variations in percentage as well as noticeable physical changes. The degradation grade is determined based on various criteria.



uvex u-chem 3000

- full chemical protection glove, certified in line with EN 374 (AJKLOT)
- good mechanical protection
- good chemical resistance
- good mechanical resistance
- long service life

- Areas of application:
- repair work
 - metal working
 - cleaning
 - chemical industry
 - printing industry



uvex u-chem 3100

- the perfect combination of chemical protection and grip
- very good mechanical protection
- comfortable fit due to seamless cotton liner
- good resistance to many chemicals
- very good grip in wet and oily conditions
- highly flexible

- Areas of application:
- chemical industry
 - automotive industry
 - metal working
 - mechanical industries, sand blasting

For accidents of Level A/B/C, double-layer protective gloves must be worn, e. g. gloves with composite membrane as inner layer and Nitrile as outer layer for Level B.

The data in this form only applies to Anse11 gloves

						
复合膜	丁腈橡胶	氯丁橡胶 无内衬	聚乙烯醇 针织布内衬	聚氯乙烯 (乙烯基)	天然橡胶	氯丁橡胶/ 天然橡胶混合物
BARRIER™	SOL-VEX™	NEOPRENE™	PVA™	SNORKEL™	PREMIUM PINK™	CHEM-PRO™
降解等级	降解等级	降解等级	降解等级	降解等级	降解等级	降解等级
渗透时间	渗透时间	渗透时间	渗透时间	渗透时间	渗透时间	渗透时间
渗透率	渗透率	渗透率	渗透率	渗透率	渗透率	渗透率



Chemical substance name

56. Ethyl Alcohol 乙醇	▲	>480	E	E	240	VG	E	113	VG	NR	—	—	G	60	VG	E	37	VG	E	20	G
57. Ethylene Dichloride 二氯乙烯	▲	>480	—	NR	—	—	NR	—	—	E	>360	E	NR	—	—	F	—	—	F	—	—
58. Ethylene Glycol 乙二醇	▲	>480	E	E	>360	E	E	>480	—	F	120	VG	E	>360	E	E	>360	E	E	—	—
59. Ethylene Oxide Gas 环氧乙烷气	▲	234	E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60. Ethyl Ether 乙醚	▲	>480	E	E	120	G	F	<10	P	G	>360	E	NR	—	—	NR	—	—	NR	—	—
61. Ethyl Glycol Ether 乙二醇醚	▲	>480	E	G	210	G	E	120	F	■	75	G	P	—	—	E	25	VG	E	—	—
62. Formaldehyde 甲醛	▲	>480	E	E	>360	E	E	105	G	F	—	—	E	80	VG	E	10	G	E	—	—
63. Formic Acid, 90% 甲酸 90%	▲	>480	—	F	240	—	E	>480	—	NR	—	—	E	>360	—	E	150	—	E	—	—
64. Furfural 糠醛	▲	>480	E	NR	—	—	E	30	P	F	>360	E	NR	—	—	E	15	VG	E	—	—
65. Glutaraldehyde, 25% 戊二醛 25%	—	—	—	—	>360	—	E	>480	E	F	—	—	E	>360	E	E	210	VG	E	—	—
66. Gasoline (hi-test) 汽油	■	170	E	E	>360	E	NR	—	—	G	>360	E	P	—	—	NR	—	—	NR	—	—
67. HCFC-141b 二氯一氟乙烷	▲	>480	E	E	92	F	F	33	P	P	—	—	NR	—	—	NR	—	—	NR	—	—
68. Hexamethyldisiloxane 六甲基二硅氧烷	▲	>480	E	E	>360	—	E	15	—	G	>360	—	P	—	—	F	15	F	F	—	—
69. Hexane 己烷	▲	>480	E	E	>360	E	E	40	F	G	>360	E	NR	—	—	NR	—	—	NR	—	—
70. HFE 7100	▲	>480	E	E	>480	E	E	>480	E	F	—	—	E	>480	E	E	120	E	E	—	—
71. HFE 71DE	▲	164	E	F	10	F	F	<10	F	F	>480	E	NR	—	—	NR	—	—	NR	—	—
72. Hydrazine, 65% 肼 65%	—	—	—	E	>360	—	E	380	—	NR	—	—	E	>360	—	E	150	VG	E	—	—
73. Hydrobromic Acid 氢溴酸	▲	>480	—	E	>360	E	E	>480	—	NR	—	—	E	>360	E	E	>360	E	E	—	—
74. Hydrochloric Acid, conc. 盐酸浓液	▲	>480	—	E	>360	—	E	>480	—	NR	—	—	E	>300	—	E	290	—	E	—	—
75. Hydrochloric Acid, 10% 盐酸 10%	—	—	—	E	>360	—	E	>480	—	NR	—	—	E	>360	—	E	>360	—	E	—	—
76. Hydrofluoric Acid, 48% 氢氟酸 48%	▲	>480	—	E	120	—	E	5	—	NR	—	—	G	40	—	E	190	—	E	—	—
77. Hydrogen Fluoride Gas 氟化氢	▲	>480	E	■	<15	P	—	—	—	—	—	—	—	—	—	■	<15	F	■	—	—

REPRESENTATIVE DATA FOR CHEMTEC

CHEMICAL	DEGRADATION RATING	PERMEATION BREAKTHROUGH	PERMEATION RATE
	38-428	BUTYL	
Acetic Acid	E	>480	—
Acetone	E	>480	E
Acetonitrile	E	>480	E
Ammonium Hydroxide 28%	E	>480	—
Amyl alcohol	E	>480	E
Benzene	E	20	F
Butyl Acetate	E	80	G
Butyl alcohol	E	>480	E
Butyl Cellosolve	E	>480	—
Carbon Disulfide	■	7	F
Chloroform	P	14	—
Cyclohexane	G	30	F
Cyclohexanol	E	>480	E
Cyclohexanone	E	>480	—
Diethylamine	G	18	—
Dimethylformamide	E	>480	E
Ethanol 100%	E	>480	E
Ethyl Acetate	E	147	G
Gasoline	G	20	F
Heptane	P	—	—
Hexane	P	10	F
Hydrofluoric acid 48%	E	>480	—

Applicable environment

Without lining

Barrier™

Barrier™ compound film gloves are laminated with five layers of flat film. They are superbly crafted and have extensive chemical resistance. The inner lining of the Barrier™ gloves is made of non-woven polyethylene to increase its comfort and Provides strong sweat absorption performance.

Type	Specification	Thickness	Length	Size	Grade
2-100	Five-layer flat film laminated type, Having properties against various chemicals	Five layers	38-40cm	7-11	

Characteristic:

- Broad anti-chemical properties;
- Strong adaptability and sensitive touch;
- Can be used under thicker gloves;
- Better comfort.

Scope of application:

- General chemical industry;
- Automobile, aviation manufacturing and aerospace industry;
- The pharmaceutical industry and laboratories;
- Environmental cleanup.

Suitable for hydrofluoric acid HF



FreshTouch™

FreshTouch™blue and transparent gloves are disposable gloves made of high-grade powder-free PVC materials. Comfortable and durable, excellent touch. The powder-free nitrile construction provides comfort, cleanliness and dexterity. And powder-free gloves will not cause Contamination due to powder. Only suitable for basic chemicals and splash-proof applications.

Type	Specification	Thickness	Length	Size	Grade
850_	Disposable PVC gloves, Powder-free, transparent	0.12mm	245mm	S/M/L	
851_	Disposable PVC gloves, Powder-free, blue,	0.12mm	245mm	S/M/L	

Characteristic:

- Regardless of left and right hand design;
- Comfortable to wear and easy to wear;
- High-quality thick disposable gloves.

Scope of application:

- Food handling;
- Public catering industry;
- Food service industry.

Suitable for food

Thermal insulation



EN407 -

Thermal hazard protection standards



Performance level	1	2	3	4
A. Fire resistance (time after burning and preheating)	< 20秒 无规定	< 10秒 < 120秒	< 3秒 < 25秒	< 2秒 < 5秒
B. Heat resistance (contact temperature and threshold time)	100℃ < 15秒	250℃ < 15秒	350℃ < 15秒	500℃ < 15秒
C. Heat-resistant convection (delayed heat transfer)	> 4秒	> 7秒	> 10秒	> 18秒
D. Heat-resistant radiation (delayed heat transfer)	> 7秒	> 20秒	> 50秒	> 95秒
E. Resistance to sputtering of small spots of ficus metal (number of sputtering)	> 10	> 15	> 25	> 35
F. Resistance to sputtering of large-point habitual metal (quality)	30克	60克	120克	200克



Cold gloves



EN511 -
Low temperature protection standard



ABC	0	1	2	3	4
Performance level	0	1	2	3	4
A. Anti-cold convection insulation performance (ITR per m ² .°C/W)	< 0.10	0.10 < < 0.15	0.15 < < 0.22	0.22 < < 0.30	0.30 <
B. Resistance to cold contact and thermal resistance (R per m ² .°C/W)	R < 0.025	0.025 < R < 0.050	0.050 < R < 0.100	0.100 < R < 0.150	0.150 < R
C. Water seepage test	Failure	Pass	-	-	-

Note: 0 is the lowest level, 4 is the highest level.

- Waterproof and windshield lining
- Lining and extended wrist brace
- PVC reinforced palm and finger parts
- Can be washed in a washing machine
- Choose whether to waterproof according to the actual applicable environment



Operating ultra-low temperature liquid nitrogen



Radiological protection



EN421 -

Radioactive pollution protection + ionizing radiation protection standards



Glove protection when directly contacting radioactive materials



Glove protection when directly exposed to radiation (X-light, alpha rays, beta rays, gamma rays or neutron radiation)

product requirement:

- Soft imported lead-free material X-ray protective clothing series products, light weight and comfortable to wear. To
- Product physical properties and long service life.
- The lead glue is evenly distributed, the protection is even, the surface material is wear-resistant and easy to clean.
- Made of multi-layer materials with a humanized structural design.
- Excellent manufacturing: exquisite workmanship, durable, ensuring quality and safety.



X-ray protective handguard-lead equivalent 0.35



Applicable Scene:

Suitable for radiological places, such as X-ray

Glove cleaning instructions



DuPont™ Kevlar® gloves/sleeves

Goldknit™: cut-resistant gloves and sleeves

HyFlex®: 11-500, 11-501

NitraSafe™: all styles

Powerflex®: 80-602, 80-813

- Use industrial soap or detergent (do not use dry cleaning liquid or bleach).
- Wash in warm water, the water temperature does not exceed 50 °C.
- Wash for 10 minutes.
- Rinse off with warm water.
- If the dirt is particularly thick, wash and rinse repeatedly.
- Rinse off in cold water.
- Tumble dry—the highest temperature is 60°C.

Spectra® and Dyneema® gloves/sleeves

Safe-Knit™: All gloves and sleeve styles.

Polar Bear®: gloves and sleeves.

- Use industrial soap or detergent (which can be rinsed to restore whiteness).
- Wash in warm water for 10 minutes, and the water temperature should not exceed 50° C.
- Rinse off in cold water.
- The best effect can be obtained by adopting the high-speed rotating elution method.
- Tumble drying—The temperature does not exceed 70° C. Or dry for more than 10 minutes.

Cotton, polyester, polyester/cotton, nylon knit styles

HyFlex®: Glove series

Powerflex®: 80-100

Other Ansell lining styles:

Hycron®, Hynit®, Scorpio®.

Sol-Knit™, Neox™, etc.

- Use industrial soap or detergent (not bleachable).
 - Wash in warm water, the water temperature does not exceed 40 °C.
 - Wash for 10 minutes.
 - Rinse off with warm water.
 - If necessary, repeat washing and rinsing.
 - Rinse off in cold water.
 - Tumble dry-the highest temperature is 40°C.
- **Toxic or dangerous pollutants require special treatment or disposal.**
 - **Please do not use bleach or chlorine during washing**
 - **When cleaning dirty or oily gloves, the friction between the canvas and the gloves can remove the deep dirt**

Emergency PPE

US EPA Integrated Protection Combining Components of PPE

	Level A	Level B	Level C	Level D
Respiratory protection	Positive pressure, SCBA	Positive pressure, SCBA	Full-face or half-mask, air-purifying respirator	Not required
Protective clothing	Fully encapsulating chemical protective suit	Chemical resistant clothing, liquid-tight	Chemical resistant clothing, liquid-tight	Coveralls or uniforms
Hand protection	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Disposable gloves
Foot protection	Boots, chemical resistant, steel toe and shank	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Safety shoes/boots or Boot-covers





Type of protective clothing

EN1149-1 Protective clothing with anti-static properties,
(Anti-static performance can only be guaranteed when the
air humidity is greater than 25%)

EN1073-2 Prevent radiation particle pollution,
(But does not have the function of preventing radiation exposure)

EN14126 Anti-infective media protective clothing.

DIN EN ISO 20743: 2007 The fiber surface has active antibacterial function

DIN 32781 Insecticide protective clothing



3B型, 3B vibatec型, 4B型,
4B vibatec型, 5/6型



3B型, 3B vibatec型, 5/6型



3B型, 3B vibatec型, 4B型,
4B vibatec型



3B vibatec型, 4B vibatec型



4B型

Excerpts from Biochemical Prevention Regulations

The risks of biochemical agents are divided into four categories according to their risk level or their own spread of infection:

Risk category 1: Biological agents are not easy to cause human diseases.

Risk category 2: Biological agents are not easy to cause human diseases, but may be harmful to workers. It is not easy to spread among people and can usually be prevented and treated.

Risk category 3: Biological agents may cause serious human diseases and cause great harm to workers. They are easy to spread among people, but they can be prevented and treated.

Risk category 4: Biological agents can cause serious human diseases and cause great harm to workers. They are easy to spread among people and usually cannot be prevented and treated.

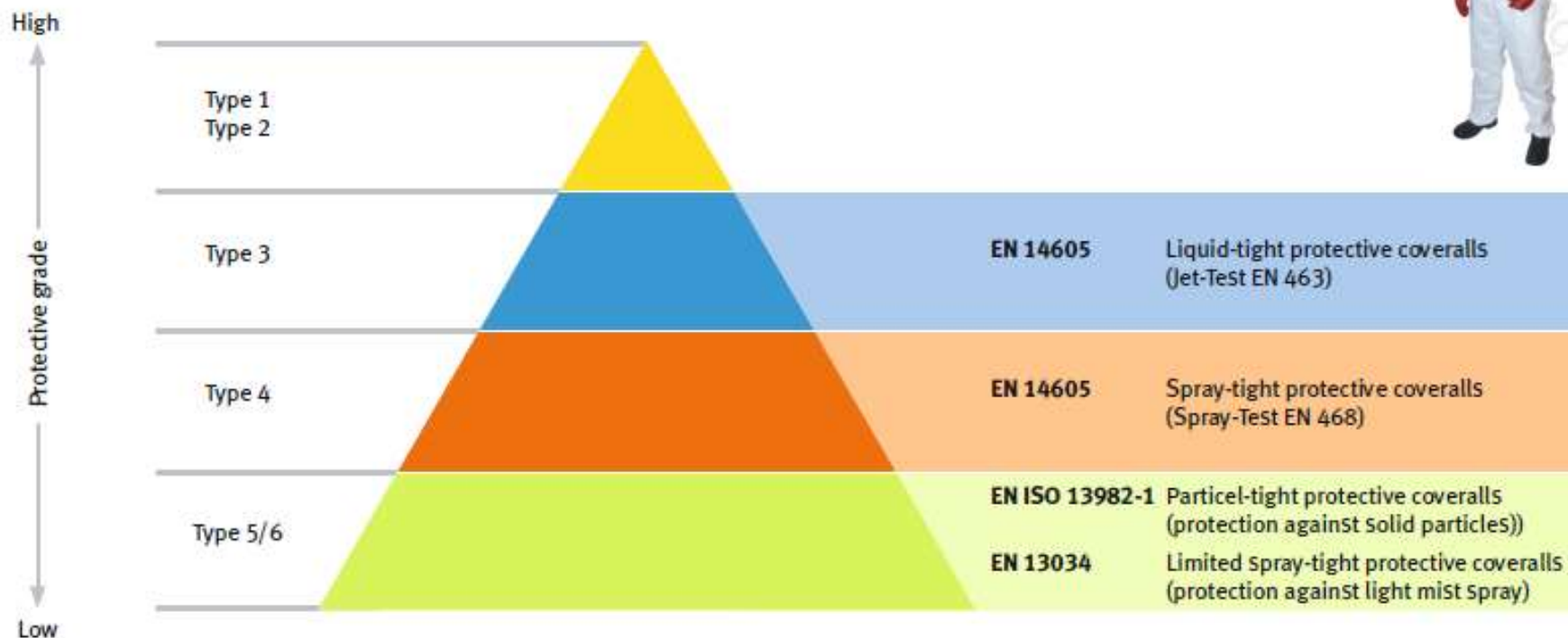
Topic 6 Cloth

protective cloth

EEC guideline 89/686 on personal protective equipment (PPE)

Depending on the hazard potential the protective clothing is intended to protect against, PPE is divided into 3 categories:

- Category I:** Basic PPE protects against minimal risks.
- Category II:** PPE that cannot be clearly classified under Category 1 or 3 is assigned to Category 2.
- Category III:** PPE of complex design is intended to protect against mortal danger or serious and irreversible injury to health.



Type of protective clothing

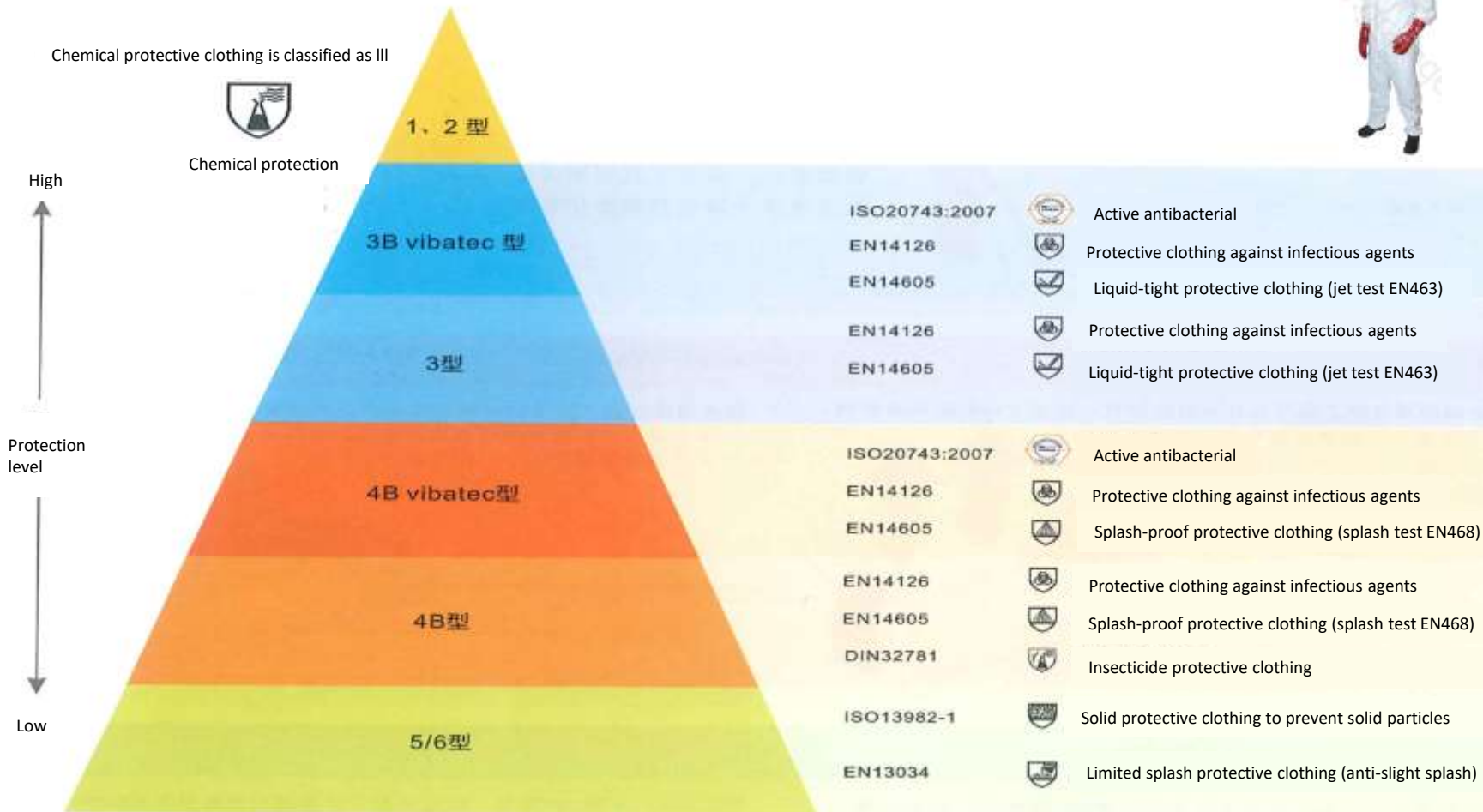
Personal Protective Equipment European Standard Outline EEC 89/686

According to the potential risks and the scope of the protective clothing, PPE is divided into three categories:

Class I: The most basic risk of basic PPE equipment protection.

Class II: No clear and clear risk definition can be made in both Class I and Class III, and is classified as Class II.

Class III: PPE equipment to protect against fatal risks or unavoidable serious injuries.



Type of protective clothing



For example:

Disposable non-woven coverall chemical protective suit with hood (white) 5/6 type coverall:

- Disposable coveralls made of non-woven fabric with elastic cap, cuffs, back and ankles.
- Anti-static, EN1149-5 has anti-static performance.
- Waterproof; diamond crotch design. The front is a two-way zipper with a tape placket.
Laminated microporous membrane 65gsm, with internal stitching.
- It can protect the body from airborne solid particles, liquid chemicals, infectious factors, and chemical and radioactive pollution.
- The zipper is designed to be pulled from the neck to the top of the chin to protect the exposed neck.
- EN13982-1 (type 5) can protect the body from the damage of solid particles.
- EN141126 can protect the body from infectious factors.
- EN1073-2 can protect the body from radioactive pollution.
- EN13034/05 can provide limited protection against damage from liquid chemicals (type 6).



Emergency PPE

US EPA Integrated Protection Combining Components of PPE

	Level A	Level B	Level C	Level D
Respiratory protection	Positive pressure, SCBA	Positive pressure, SCBA	Full-face or half-mask, air-purifying respirator	Not required
Protective clothing	Fully encapsulating chemical protective suit	Chemical resistant clothing, liquid-tight	Chemical resistant clothing, liquid-tight	Coveralls or uniforms
Hand protection	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Disposable gloves
Foot protection	Boots, chemical resistant, steel toe and shank	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Safety shoes/boots or Boot-covers



Safety shoes type

GB21148-2007 Personal protective equipment, safety shoes

EN 50321:2000 Electrically insulating footwear for working on low voltage installations

EN 12568:1998 Foot and leg protectors- Requirements and test methods for toecaps and metal penetration resistant inserts

Generally used for electricians or work that requires safety shoes (such as construction sites)



Water-repellent fabric --- can effectively repel the accumulation of water on the upper

The water repellent layer is actually a layer of special treatment covering the surface of the fabric, so that water cannot penetrate and roll off quickly after falling on the surface.

Indian buffalo leather upper, leather thickness greater than 2.0 mm, new Indian high-quality dual-density PU injection sole, non-metallic synthetic material to protect the toe cap and puncture-resistant midsole, anti-smashing, anti-puncture, **insulation 14KV (electrical shoes)**, wear-resistant, oil-resistant, Heel energy absorption, SRC-grade anti-skid, light and comfortable.

Anti-static shoe cover防静电鞋套

- Dust-free boots with comfortable soles
- The sole is very light and uses cushioning PU (polyurethane) materials
- Fabric/Polyester with conductive material
- Impedance: $1.0 \times 10^9 \Omega$
- Correspond to dust-free class 100 or choose according to clean room class

Applicable scene:

Daily operation and emergency treatment of clean room



Chemical Resistant Shoe Covers 防化鞋套

- The outer layer of the fabric is a high-quality microporous membrane, and the inner layer is a spunbonded polypropylene non-woven fabric, which can provide liquid and dust protection
- The fabric material is soft, comfortable to wear and has good moisture vapor breathability (MVT) performance
- Coveralls meet the European standard category 5 and category 6 applications
- Unlike many other one-piece microporous film protective clothing, this series of protective clothing uses biaxially stretched film, which has good strength
- With antistatic performance, meet EN1149 antistatic standard

Applicable scene: Can be used for common chemical leakage treatment

Protective boot-covers may be used under the circumstance that NO massive contamination or tainting will occur.



Chemical Resistant Boots 防化靴

chemical resistant boots

- Hit resistant
- Puncture resistant
- Anti-static
- Antiskid
- Oil-proof
- Acid and alkali resistant
- PVC safety boots



Applicable scene:

Used for rescue activities such as general fire fighting, chemical leakage accident handling, etc.

Emergency PPE

US EPA Integrated Protection Combining Components of PPE

	Level A	Level B	Level C	Level D
Respiratory protection	Positive pressure, SCBA	Positive pressure, SCBA	Full-face or half-mask, air-purifying respirator	Not required
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Hand protection	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Gloves, inner & outer, chemical resistant	Disposable gloves
Foot protection	Boots, chemical resistant, steel toe and shank	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Boots, chemical resistant, steel toe and shank, or Boot-covers, chemical resistant	Safety shoes/boots or Boot-covers





“Nothing we do is worth getting hurt for !”

