

# Information Sheet

## Personal Protective Equipment

### Respiratory Protection

***Personal protective equipment (PPE) is a pillar of the so-called STOP Principle. It must be implemented whenever a risk cannot be prevented through means of Substitution, Technical measures or Organizational measures (in this order).***

#### **Legal basis**

The Employer is obligated by law to provide the necessary protective equipment free of charge and the Employees are obligated to use these (OR, UVG, ArG).

#### **General information on respiratory protection**

Respiratory protection is always required when the risk of inhalation of dust, gas, fumes or mist containing hazardous substances, radioactive materials or micro-organisms cannot be excluded.

A distinction is made between particle filters, gas filters and combination filters according to the extent of protection. Respiratory masks come in full masks and half masks. Workstations at which respiratory protection is required should be indicated with the corresponding pictogram. If work that demands the wearing of protective equipment is being performed, all persons in the danger zone must do so.



Fig. 1: Mandatory sign “use respiratory protection”

Protection is only achieved when the masks are used properly and sit tight. Beards and sideburns in the sealing area of the breathing connection will cause leaks! Therefore the mask should not be used. Persons wearing glasses cannot wear full masks except they wear special mask spectacles.

### Important notice

- **Prior to use, check** that the respiratory mask complies with the respective requirements (type, filter class, filter type).
- **Prior to use** check leak-tightness / fit.
- Defective masks and expired filters may not be used.
- All potentially exposed persons must wear respiratory protection.
- Filters can only be used for a limited time. Disposable filters may not be reused. Reusable particle filters must be replaced at the latest when the resistance to breathing becomes noticeably greater; gas and combination filters are generally intended for one-time use only as (air) moisture can significantly impair the filtering effect.
- Gas filters must be replaced immediately when odor, taste or irritation becomes noticeable inside the mask.
- Gas filters should not be used for odorless substances as saturation will not be recognized – **life threatening!**
- For some gases (e.g. natural gas, liquid gas, CO<sub>2</sub>, dichloromethane) there is no suitable filter.
- Filter devices may not be used in an oxygen-deficient environment (< 17% vol.) or when the maximum concentration of the harmful substance in the filter is exceeded.
- Self-rescuers (“escape hoods“ per EN 404) may not be used as respiratory protection; they are only for escape purposes!
- The use of self-contained breathing apparatus is prohibited at ETH! SSHE may grant special permission in exceptional cases.

### Particle filter (light respiratory protection) (Norm EN 149:2001(2009) and EN 143)

#### When do I need a particle filter?

Particle-filter masks must be worn for all work in which there is a risk of inhalable particles or dust (concentration over the MAK (Max. Workplace Concentration) value). Respiratory protection in the form of a particle filter is also required for all work with unbound nanoparticles, as well as for activities in which microorganism-containing aerosols are produced.

#### What types of particle filters are there? Which mask is suitable?

Particle-filter masks are generally half masks. Particle filters are categorized in different classes (FFP1, FFP2, FFP3) according to their filtering effect. Disposable masks also bear the designation “NR“. The masks are marked accordingly, e.g. EN 149:2009 FFP3 NR.

Tab.1: Overview particle-filter masks

| Filter class | Particle retention (95L /min air flow) | Maximum dust/particle quantity in the ambient air |
|--------------|--|---|
| FFP1 / P1    | > 80%                                  | 4 x MAK value                                     |
| FFP2 / P2    | > 94%                                  | 10 x MAK value                                    |
| FFP3 / P3    | > 99%                                  | 50 x MAK value                                    |

**Important:** So-called surgeon or operating masks are not particle filters and may not be used as respiratory protection!

### Where can I get particle filters?

Particle-filter masks are available in a variety of versions and filter classes in the HCI Shop.

### Gas filter and combination filter (Norm EN 136, EN 141 and EN 143)

#### When do I need a gas or combo filter?

Gas-filter masks must be worn for all work in which there is a risk of inhalable gases, vapors or mist from hazardous substances (concentration over the MAK (Max. Workplace Concentration) value). If there is an additional risk of dust or particles, a combo filter must be used.

#### What types of gas and combo filters are there? Which mask is suitable?

Depending on the hazardous substance, different types of filter must be used. The designation and color coding is indicated on each filter.

Tab.2: Overview filter types based on hazardous substances

| Filter type |            | Protects against  |
|-------------|------------|---|
| A           | brown      | Vapors from organic compounds with boiling point > 65°C   |
| AX          | brown      | Vapors from organic compounds with boiling point < 65°C   |
| B           | grey       | Inorganic gases and vapors, e.g. chlorine, hydrogen sulfide, hydrocyanic acid, not against carbon monoxide! |
| E           | yellow     | Acidic gases like sulfur dioxide, hydrogen chloride   |
| K           | green      | Ammonia and organic derivatives of ammonia  |
| HgP3        | red-white  | Mercury   |
| NOP3        | blue-white | Nitrogen oxides   |
| CO          | black      | Carbon monoxide   |

For the types A, B, E and K there is no subdivision according to filter capacity:

Tab. 3: Subdivision according to filter capacity

| Class   | Capacity |                       |
|---------|----------|-----------------------|
| Class 1 | low      | up to 1000 ppm (0.1%) |
| Class 2 | medium   | up to 5000 ppm (0.5%) |
| Class 3 | high     | up to 10000 ppm (1%)  |

Example of a designation:

A2P2 → Combo filter: gas filter type A with medium capacity and a class P2 particle filter.

**Important:** Only use gas filters when you are certain that the gas concentration in the air does not exceed the capacity of the filter. For higher gas concentrations, saturation may occur very rapidly or the filter may fail without warning – **life threatening!**

**Where can I get gas and combo filters?**

Gas and combo-filter masks in a variety of versions and filter classes are available in the HCl Shop. If you do not need a mask on a regular basis, you can also borrow a full mask with filter from SSHE.

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