Selecting the Right Respiratory Protection

Respiratory protective equipment (RPE) plays a crucial role in safeguarding workers from health hazards associated with airborne contaminants. In Germany, the accident insurance institution (DGUV) establishes guidelines for RPE through regulations such as DGUV Rule 112-190, which sets standards for the selection, use, and maintenance of respiratory protection.

Basics of Respiratory Protective Equipment

Respiratory protection is classified into two main categories: **Filtering devices** and **isolating devices**.

Selecting the appropriate type of protection is primarily determined by the nature and concentration of hazardous substances present in the air, as well as the specific nature of the task being performed. Both types of equipment have distinct use cases, benefits, and limitations as outlined in DGUV Rule 112-190.

Filtering Devices

Filtering devices are respiratory protective devices that filter harmful substances from inhaled air. They contain one or more filters to remove contaminants such as gases, vapours, particles, or aerosols before the air reaches the respiratory tract. Importantly, they rely on the surrounding atmosphere as the air source.

Types of Filtering Devices

A common example is a full-face mask fitted with the relevant filter or powered air-purifying respirators. The following is a brief overview of filter types and their typical applications:

- **Particulate Filters:** Protect against solid or liquid airborne particles such as dust or smoke (e.g., P3 filters—high-efficiency particulate filters).
- **Gas and Vapour Filters:** Protect against gaseous contaminants including chemicals or harmful vapours (e.g., A2 filter—for gases).
- **Combined Filters:** Offer protection against both particulates and gases/vapours (e.g., A2P3 filters—providing dual protection).

Filter codes follow a standard format: one or more letters indicating the category of contaminant, followed by a number corresponding to the protection class and efficiency.

According to DGUV Rule 112-190, filtering devices may only be used when **contaminant concentrations are below the maximum allowable limit** (the equivalent of the „MAK“ value in Germany), and only if the selected filters meet the necessary protection criteria. They are **unsuitable in oxygen-deficient or oxygen-free environments**. If the hazardous substance concentration is too high or oxygen levels are insufficient, isolating devices must be used instead.

Isolating Devices

Isolating devices provide complete protection from ambient air contaminants by supplying the wearer with independent breathing air. These systems usually consist of a mask or helmet, an air supply unit (e.g., a cylinder or compressor), and a hose system.

Types of Isolating Devices

- **Self-Contained Breathing Apparatus (SCBA)/Supplied Air Respirators:** Deliver breathable air from independent sources such as compressed air cylinders or external supplies. They ensure full protection in heavily contaminated environments.
- **Closed-Circuit Breathing Apparatus (Rebreathers):** Recirculate exhaled air and replenish oxygen, maintaining a supply of oxygen-enriched air for breathing.

Isolating devices are primarily used in extremely hazardous or life-threatening environments, where contaminant levels are too high for filtering devices to offer adequate protection. DGUV Rule 112-190 specifies that isolating devices are mandatory wherever filtering devices would fail to provide sufficient safety—particularly where contaminants are highly toxic, unknown, or present at very high concentrations. Their key advantage is their independence from the ambient atmosphere.

Selection Criteria in Accordance with DGUV Rule 112-190

When selecting isolating devices, the following factors should be considered:

- **Hazard Assessment:** What hazardous substances are present, and at what concentrations? Is an external air supply necessary?
- **Oxygen Content:** Does the environment contain enough oxygen for the use of filtering devices, or is an independent breathing air supply required?

Key Takeaways:

- Respiratory protective equipment is categorised into filtering and isolating devices.
- Filtering devices rely on ambient air for filtration.
- Isolating devices provide a self-contained breathing supply (from a cylinder/compressor).
- Multiple filter types are available for various filtering devices.
- Filtering devices must not be used where contaminant concentrations are too high or oxygen levels are insufficient—in those cases, isolating devices are mandatory (for safety: isolating devices > filtering devices).
- A thorough assessment of the working environment must always be undertaken before use.

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