Safety Advice.
9 – Handling and usage of dry ice.



Safe use of dry ice safely means being aware of its properties and the associated hazards.

1. Properties

Dry ice is Carbon dioxide (CO_2) in a solid state. Its temperature is –78,6C° (194,51K). At room temperature it will transfer directly into gaseous form without residues. This procedure is known as sublimation. It is connected to an important increase in volume: 1 kg of dry ice will lead to approximately 541 l of CO_2 gas.

CO_2 gas is not flammable and is without odour or taste. It is not toxic, approved as food additive.

Since CO_2 is 1,5 times heavier than air, it usually sinks down to the floor level of any room. This property leads to some important rules that consequently need to be taken into account when using dry ice.



Low temperature warning

2. Hazards

CO_2 is a typical metabolic substance present in body fluids and tissues. It is a component of most of metabolic reactions and acts as a control substance for various mechanisms of the circulation system, such as breathing, metabolism, ph-control in blood etc.



Danger of asphyxiation

The impact of breathing low volumes of CO_2 is physiologically negligible. But high concentrations of CO_2 may provoke asphyxiation.

The effect of CO_2 is totally independent of the impact of low oxygen concentrations. The oxygen concentration in air is by no means an efficient measurement of the potential hazard of high CO_2 concentrations: it is possible to have an acceptable (low) concentration of oxygen of for example, 18% but at the same time having a dangerous CO_2 concentration of higher than 5%.

It is highly recommended therefore to permanently measure CO_2 concentrations in risk areas e.g. by using a personal gas detector.

The Occupational Exposure Limit value is 5.000 ppm (0,5 vol-%) which is calculated as an average concentration in air during a period of 8 hours. The maximum allowable workplace concentration is 10.000 ppm (1 vol-%) for not more than twice an hour or 4 times a day.

Due to the high molecular weight of CO_2 it rapidly accumulates in lower levels of closed environments and will stay there unless the environment is equipped with effective ventilation or an extraction system.
Rescue of injured people in CO_2 enriched atmosphere is only allowed when using supplied air respiratory protective devices.

Dry ice has a temperature of –78,6°C and leads to frostbites if in direct contact with the skin. During the handling of dry ice it is mandatory to use insulated gloves and eye protection, in particular during blasting and cleaning activities.



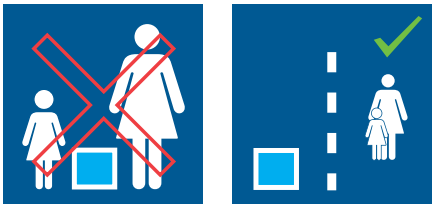
The following rules must be followed:

Never handle dry ice without insulated gloves. This will immediately lead to frostbite.



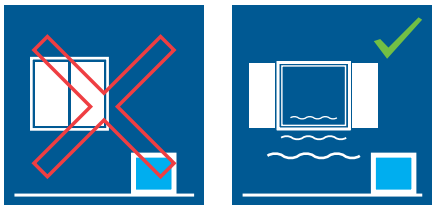
Always handle dry ice with insulated gloves or other appropriate tools. When it comes to special uses such as blasting or cleaning with dry ice, eye and face protection is highly recommended.

Make sure that children and other not authorized people are not in contact with dry ice.



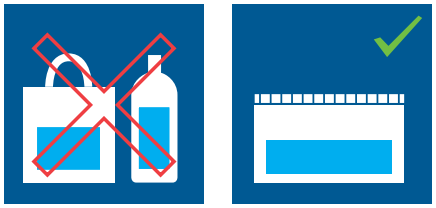
Store dry ice safely away from children. Dry ice is **not ice cream**! Swallowing dry ice is extremely dangerous!

Never store or use dry ice in cellars or small rooms without sufficient ventilation. CO_2 is significantly heavier than air and will accumulate constantly in lower levels of the room.



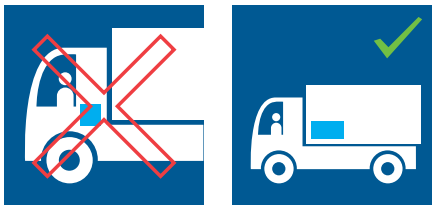
Handle and use dry ice only with sufficient ventilation including the floor. In case of doubt, use mechanical ventilation and gas detectors. Small areas like vessels and containers may only be entered with appropriate protective measures.

Never store dry ice in air tight vessels. Warm temperature causes formation of high amounts of gas. This may lead to the bursting of the vessel!



Only use appropriate storage vessels. Dry ice containers must be able to „breathe".

Dry ice should not be transported in the cabin of a car. If dry ice is left for longer than 30 minutes in a closed room (e.g. car, luggage – or loading space, container etc), the doors or windows should be opened for at least one minute prior to unloading in order to assure sufficient ventilation.



Dry ice should always be transported in a separate compartment from the driver. Never leave dry ice in the car for a long period of time.

Advice regarding vaporisation (sublimation):

Depending on the temperature and the insulation of the transport vessel, 2–20% of the material may sublimate per day. The resulting cold gas provokes the formation of water ice along the seals of the vessel. This is a normal procedure.
Further information regarding Carbon dioxide is available at the Safety Advice No. 12 – "Handling of Carbon dioxide".

Dry ice hotline: 0800 085 8155

DRY ICE SUPPLY.

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