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|  | | **Operating instructions** | Medizinische Universität Innsbruck | | |
| Work equipment - Equipment - Apparatus - Device | | | | | |
| **Cryogenic, liquefied nitrogen** | | | | | |
| Dangers for humans and environment | | | | | |
|  | **lack of oxygen**  During evaporation, about 1 liter of LIN produces about 700 liters of gaseous nitrogen. By enrichment of nitrogen in the air, the oxygen concentration decreases, i. Lack of oxygen can arise, which is not detectable with the human sensory organs. Persons who are in an oxygen-deficient atmosphere (less than 17 vol.% O) can unconsciously and quickly become unconscious and suffocate. This risk rarely occurs outdoors. In rooms with LIN systems, especially with open cryogenic containers, this danger must be taken into account.  **Overprint**  ÜLIN unavoidably absorbs heat from the environment and thereby turns into the gaseous state. The evaporation of LIN under confinement leads to a pressure increase. If the pressure is not relieved, the relevant part of the system can burst.  **Cold**  Refrigerated liquefied nitrogen has a temperature of approx. - 196 ° C (boiling point at an ambient pressure of 1 bar absolute). If the deep cold liquid hits the human skin (especially eyes!), Frostbite ("cold burns") can occur. Large-scale frostbite is life-threatening. | | | | |
| Protective measures and rules of contact | | | | | |
| http://www.ziegler-metall.at/.img/KAT0/016/690/originalf.png  https://www.conrad.at/medias/global/ce/8000_8999/8800/8870/8877/887796_BB_00_FB.EPS_1000.jpg | **General information**  Ban on smoking, eating, drinking, etc. Secure LPG tank against overturning, protect against shock, impact and heating; Ventilate rooms sufficiently. The filling of LIN in cryocontainers must, as far as it does not happen automatically, be permanently monitored and stopped in time, so that no liquid leaks into the room or into the open air. Equipment intended for direct handling of LIN must be made of cold-resistant material (e.g., austenitic stainless steel = "stainless steel", copper, aluminum). Organic materials, such as wood, plastic, rubber are unsuitable. LIN should not leak on concrete floors because concrete is destroyed by the cold. In the area of ​​a filling station, the floor can be protected with a stainless steel tub in which dripping LIN is collected and evaporated.The floor under uninsulated LIN equipment must be made of non-combustible material to avoid the risk of fire due to oxygenation.  For bottling, a written operating manual from the employer must be available, which contains instructions on the safe handling of LIN and the avoidance of hazards and health risks. When creating the operating instructions, the operating instructions of the manufacturer of the cryogenic containers must be taken into account. This contains information on the intended use and the proper maintenance of the cryocontainers. Cryogenic containers filled with LIN may only be carried in vehicles if they have been approved for road transport and if they are secured against falling over in the vehicle. The cargo compartment must be open or adequately ventilated.  **https://images-na.ssl-images-amazon.com/images/I/31EUgB9bJzL.jpgPersonal protective measures**   * Wear safety goggles, face shield and lab coat. * Wear protective goggles with adequate side protection. * Safety gloves (preferably made of leather). * When the system is kept open and used, oxygen is condensed from the surrounding air by heat exchange, with gradual enrichment with strongly oxidizing oxygen. This risk of spontaneous inflammation in contact with highly flammable materials. | | | | pE |
| http://www.wolkdirekt.com/images/600/110631/gebotsschild-gesichtsschutzschild-benutzen.jpg  **Use** Read the operating instructions of the corresponding device carefully! | | | |  | |
| **Disruptions and dangers** | | | | | |
| https://image.hagebau.at/web_list/gabelschluessel-6-x-7-mm--18763011.jpg | In case of failure immediately remove heat sources, then ventilate the equipment and last stop the pump | | | |  |
| **Accidents and first aid** | | | | | |
| 81 | • Move the injured person out of the danger area • Provide first aid, paying attention to self-protection • Inform first responders (see separate notice board), send emergency call • instruct rescue personnel • In the case of injuries, only allow broken glass fragments to be removed by the doctor • After skin contact: Treat as burn or frostbite. Do not rub but cover with sterile dressing. • After inhalation: Move to fresh air or bring. • After contact with clothing: Immediately remove soaked clothing and allow to air. | | | |  |
| **Tests, Maintenance and Disposal** | | | | | |
| * Do not put laboratory glassware made of Duranglas in the glass container, but dispose of it as residual waste.   The same applies to mirrored glasses (Dewar vessels). | | | | | |
| Signatures | | | | | |
| **Supervisor: Signature:**  **Town: Date:** | | | |  | |