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Information and Operating Instructions for Dewar Vessels Type 131 up to 135 boxed shaped

Type 131

Roller base

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1 Structure of a Dewar vessel Type 131 up to 135 boxed shaped

1.1 Description

The container comprises two parts:

a) The inner container made of borosilicate glass 3.3 for the storage of LN2, CO2 or other coolants or liquids ranging from +150°C to -196°C

b) The protective outer cover made of blue coated metal with a handle, clip and lid.

1.2 Inner glass container with technical data

The inner container is made of borosilicate glass 3.3 in accordance with DIN/ISO 3585 (DURAN).
The glass has the following characteristics:

Chemical characteristics	**Water resistance: in accordance with DIN - ISO 719 (98°C)** **Water resistance: in accordance with DIN-ISO 720 (121°C)** **Acid resistance: in accordance with DIN - ISO 1776** **Alkali resistance: in accordance with ISO 695 - A2**
Optical characteristics	**Spectral range: 310 - 200 nm in which the absorption is negligible.**
Physical characteristics	**Linear coefficient of expansion:** **3.3×10^{-6} 1/K (at 20-300°C)** **Density: 2.23 g/cm^3** **Specific heat capacity: 910 J/kg K** **Transformation temperature: 525 °C**

Permissible operating conditions for the inner glass container with no lid

Dewar temperature range	**- 196 to + 150 °C**
Pressure range	**Pressure-less**

Standard Dewar vessels are not suitable for using with liquid and gaseous helium.

Standards and guidelines

The standard glass Dewar vessels, manufactured by KGW-ISOTHERM, are produced in compliance with the "Pressure Equipment Directive," Directive 97/23 EC (N4 with Annex 1) and in accordance with DIN EN ISO 16496 "Equipment with Vacuum Insulation."

1.3 The blue coated metal protective cover

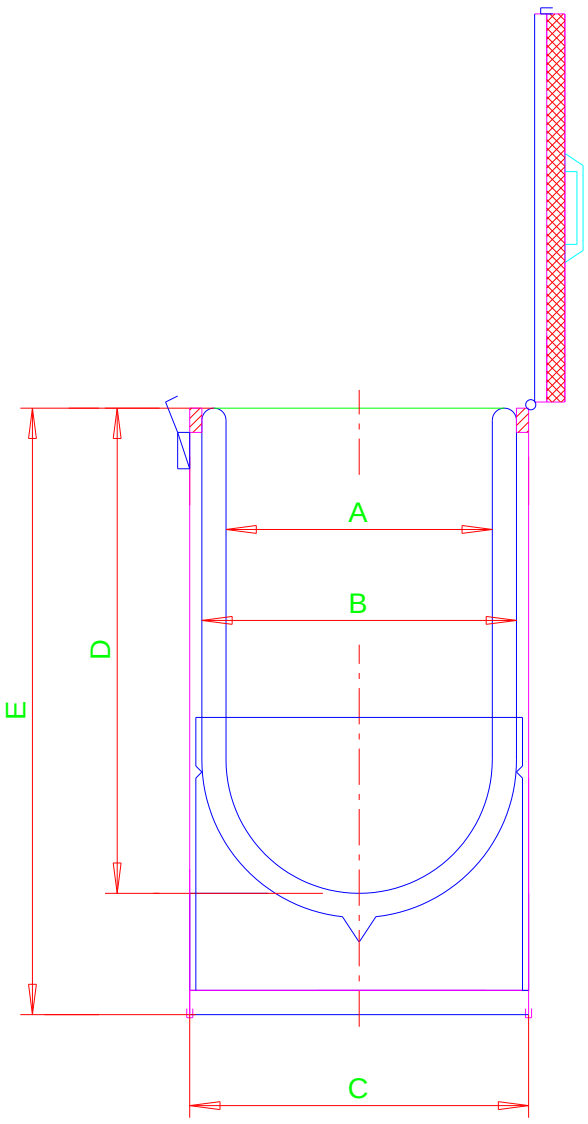
The outer blue coated metal cover is purely a protective cover that protects the inner glass container from mechanical influences.

Permissible operating conditions for the protective cover with lid

Operating temperature of the protective cover: 0 to + 80 °C

Operating temperature of the lid: -196 to + 60 °C

1.4 Dimensions and consumption data of cylindrical Dewar vessels Type 131 up to 135



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Technical Data

Type	max. content approx. [L]	A mm	B mm	C mm	D mm	E mm
131	10	200	230	290	350	500
132	14	200	230	290	500	635
133	21	250	280	360	480	630
134	28	250	280	360	620	765
135	40	280	330	410	650	800

Type	max. content approx. [L]	weight approx. [kg]	evaporation rate CO2 approx. [kg / d]
131	10	17	0,4
132	14	19	0,4
133	21	24	0,6
134	28	27	0,6
135	40	35	0,9

Type	Art. No.
131	1262
132	1263
133	1264
134	1265
135	1266

2 Set up Instructions

2.1 Safety precautions when setting up the container.

Before setting up or first using the container, read through and apply the safety regulations listed in point 7.

The following important points in particular should be noted:

a) Wear appropriate protective equipment.

b) Dry ice is neither toxic nor flammable but can lead to a lack of oxygen in closed rooms.

It is therefore recommended that containers filled with dry ice are only used in an area with sufficient ventilation.

Always seal containers with the loose fitting lid.

It is important to make sure that with the employment by gassing materials such as CO2 a degassing hole is in the lid, so that no positive pressure can form in containers.

Always place the container securely. Avoid carrying the vessels by hand when transporting them via stairways as stairways always present a trip hazard and therefore coolant solutions could escape should you stumble. Therefore, always use a lift for safety reasons.

3. Operating Instructions

3.1 Transport

The cylindrical Dewar vessels should only be used for in-house transportation. There is no ADR approval for road transportation.

Wear protective gloves, goggles and clothing if necessary when transporting the vessels. Furthermore, the internal in-house safety information or guidelines of the Employers' Liability Insurance Association should be observed.

3.2 Handling

The containers were designed in such a way that the glass insert is not damaged by minor knocks that cannot be avoided during handling. However, we strongly recommend the following in order to keep the CO2 evaporation low and ensure that the glass container has a long service life:

a) Avoid any hard knocks.

b) Always transport the container in an upright position.

c) Transport the container in such a way that any serious mechanical influences are avoided.

A mobile roller base or transport trolley can be used to make it easier to transport containers within a laboratory.

3.3 Inspection before Use

Before using a Dewar container, a complete inspection must be made for scratches, cracks, chips or other flaws. Containers with surface flaws that will be subjected to mechanical or thermal stresses cannot be used due to the threat of implosion.

3.4 Filling and emptying

Protective gloves, clothing and goggles should generally be worn when handling liquid gases.

3.4.1 Filling

When filling the container with CO2 is to make sure that the CO2 is brought carefully into the container. For Dewar vessel Type 133 up to 135 you have Line-bags to bring CO2 carefully into the container.

A surface damage of the glass is to be avoided.

3.4.2 Emptying the CO2

Remove the lid from the container and take the dry ice carefully out of the container.

Please carry protective gloves and safety goggles

4. Maintenance

Vessels are largely maintenance-free.
Only the check, as described under point 3.3 should be done.
If protective casing is damaged (deformed), the glass Dewar must get removed from the protective casing and checked for scratches or other mechanical damages.

5. Checking the Evaporation Rate

The evaporation rate of LN2 is checked by weighing the container with its liquid nitrogen content. This requires scales with a reading area that corresponds to the weight of the filled container and that provide sufficient accuracy when weighing.

Procedure:

Seal the container with its lid.

Weigh the empty container (M1).

Fill the container with liquid nitrogen and wait 3 to 4 hours until the temperature of the container has stabilised. Then fill it completely.

Weigh the full container (M2).

Read off the weight every hour. Deduct the weight of the empty container (M1) from the weighing result and log the data. This generates a stream of data from which the average weight loss in grams per hour can be determined for the period of time measured. If this value is converted with the specific weight of CO2 at approx. 800 grams = 1 litre, this gives the average evaporation rate per hour.

Note:

The room must remain at a constant temperature of 20°C and the atmospheric pressure must be held at 1,013 mbar during the measuring interval so that the measurement can be reproduced. The condition and age of the container obviously have a significant effect on the evaporation rate.

6 Spare Parts and Accessories

Type	Art. No.	Glass refill	Art. No.	Roller base Art. No.
131	1262	43	1234	1268-131
132	1263	44	1235	1268-132
133	1264	45	1236	1268-133
134	1265	46	1237	1268-134
135	1266	47	1238	1268-135

Linen-bags for Type	Art. No.	Insulating disc for Type	Art. No.
131	1632	131	1642
132	1633	132	1643
133	1634	133	1644
134	1635	134	1645
135	1636	135	1646

Mounting instruction for boxed-shaped Dewar vessels

Types: 131 to 135

Safety instructions

When handling and working with Dewar containers, safety goggles/face protection and protection gloves must be worn!

1) **Before mounting the Dewar vessel with bottom cap type A (No. 4) into the box-shaped casing (No. 2), a complete inspection must be made for transport damages (scratches, cracks, chips or other flaws).**

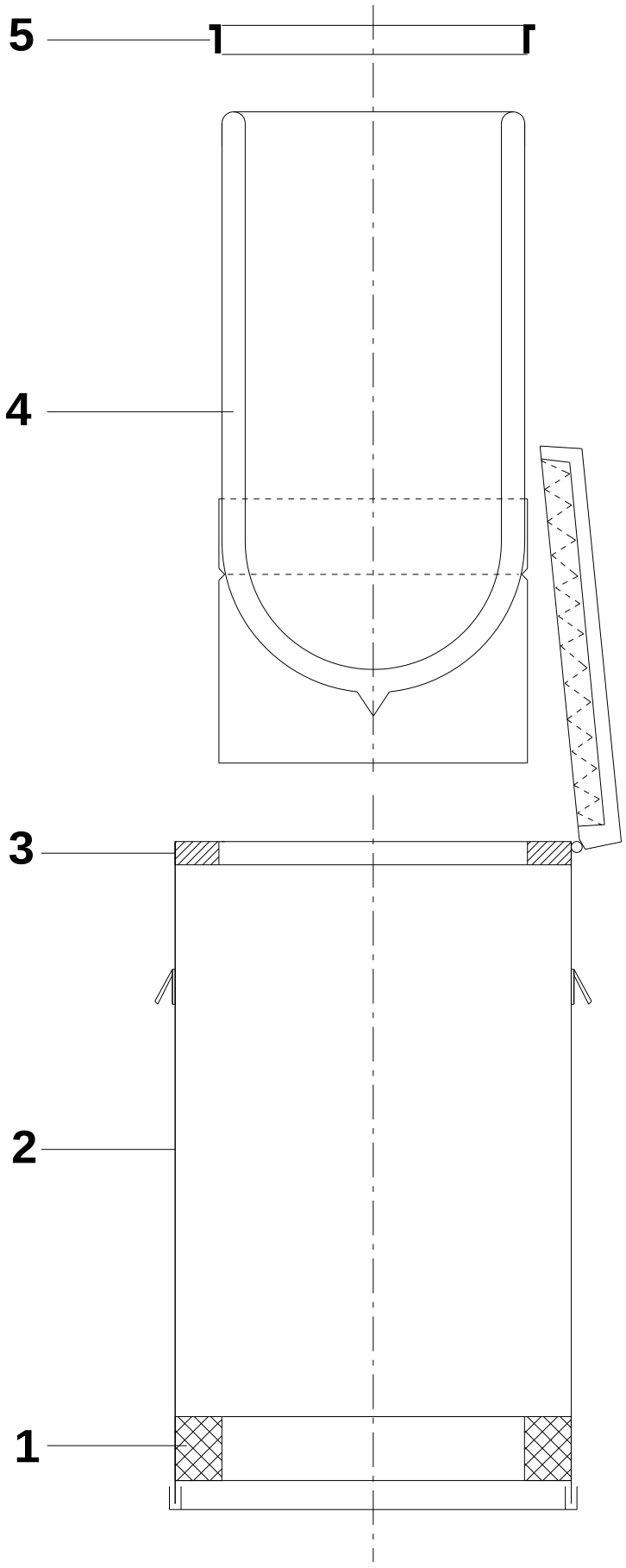
2) **At first lay the cellular buffer (No. 1 - if any) into in the casing and centre it.**

3) **The Dewar vessel with bottom cap is pushed slowly and carefully through the white top frame of casing (No. 3) until the vessel stands on its bottom cap. The rim of the vessel (seal of glass vessel) must be about 8 to 10 mm above the white top frame (No. 3).**

4) **Then, an adhesive is applied on the inner edge of the white top frame (No. 3), so that it can hold the mounting rubber (No.5) afterwards.**

5) **The mounting rubber (No.5 - grey) for the box-shaped Dewar vessels is now lied carefully between the white top frame of casing and the Dewar vessel itself so that it is pushed against the edge with adhesive.**

6) **Now the adhesive in between wooden top frame and mounting rubber should dry for several hours by room temperature. After that period of time the vessel can be used again.**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7 General Safety Regulations with CO2

This document contains general safety instructions in general, when using with dry ice.

The following instructions shall be respected while working with dry ice. To minimise the risk of accident and their consequences a few precautions should be taken, particularly related to:

- Oxygen deficiency
- Cryogenic burns
- Risks of explosion
- Oxygen enrichment

Once the users have been informed of risks and environmental conditions, all of them must be able to use liquid nitrogen and dry ice in a safe way.

7 SAFETY INSTRUCTIONS

7.1 OXYGEN DEFICIENCY

The approximate composition of air by volume is as follows for its main components:

Oxygen O_2 21 %
Nitrogen N_2 78 %
Argon Ar 1 %

This gases are not toxic, but changes in their relative constituents, and particularly oxygen, have an effect on life and combustion processes. Therefore it is essential that the air we breathe should contain sufficient oxygen (> 19 %).

Our senses are incapable of detecting changes in the concentration of the constituents of air
sufficiently quickly, since they are odourless and colourless.

7.1.1 Dangers

The risk of suffocation is high due to normal evaporation of dry ice to gas that displaces oxygen in the inhaled air. For example, under standard temperature and pressure conditions (20° C; 1013 mbar), 1 Kg. dry ice evaporates to 550 litres gas . The critical limit of oxygen can be easily reached.

Oxygen deficiency is dangerous and can cause death from suffocation.
The reaction of the organism to oxygen deficiency is different from one person to another. It is impossible to give any valid information in general about symptoms of a starting oxygen deficiency.

7.1.2 Causes

To protect yourself from risks of oxygen deficiency pay attention to following points:

- usage of liquid or gaseous
- natural evaporation rate
- refilling
- tipping over the vessel

This list is not complete.

7.1.3 Recommendation

Proceed as follows to prevent the risks of oxygen deficiency:

- keep always the vessel in the vertical position
- close the vessel with an suitable lid
- do not put the vessel in bright sunshine or close to a heat source
- do not transport the vessel by car
- premises must always be well ventilated
- prevent strokes, avoid shocks and sudden movements
- wear always individual protective equipment (suitable gloves, safety goggles or protection visors and closed shoes)
- check the oxygen content continuously
- carry an oxygen meter
- train personnel

This list is not complete.

7.1.4 General behaviour to be followed in case of accident

Proceed as follows:

- mark the environment to prevent secondary accidents
- take action quickly: the rescuer must have taken individual protective measures (independent breathing protection apparatus)
- move the victim(s) away as quickly as possible
- pay attention to internal first aid rules of your plant
- ventilate the room sufficiently
- find out the reason of accident

This list is not complete.

7.2 CRYOGENIC BURNS

Dry ice (-78,5° C) are extremely cold

7.2.1 Danger

Cryogenic cooling solids can:

- cause burns on the human body
- make materials (metallic or plastic) brittle in case they are not suitable for low temperatures
- cause strong nebulosity, depending on the air humidity of premise

7.2.2 Causes

There are two kinds of cryogenic burns:

7.2.2.1 Burns by CO2 fragment

It is important to protect yourself against the risk of splashes while using CO2, especially when handling with samples. A fragment can cause cryogenic burns that can have serious consequences, especially when hitting eyes or face.

7.2.2.2 Contact burns

Contact between skin and cold materials causes frostbites or cryogenic burns. Never touch or
grip the inner side of vessel or samples with a bare hand.

7.2.3 Recommendation

Proceed as follows to prevent the risks of burns:

- prevent skin contact with cryogenic liquids
- never touch the cold walls of vessel, or un-insulated or frosted equipment
- wear individual protection equipment (suitable gloves, safety goggles or protective visors and closed shoes)
- always hold the vessel in the vertical position
- use only suitable equipment (metal or PTFE hose) for refilling the container
- train personnel

This list is not complete.

7.3 safety data sheets

Pay attention to the notes and guidelines of the safety data sheets of your gas supplier to the gas CO2 (dry ice)