

Instruction Manual for Transport System

LIOGUARD®

XS-Box 1/2 Basic/Advanced/Premium

S-Box 1/2 Basic/Advanced/Premium



Safety system for storage and transport in compliance with the ADR for lithium-ion and lithium-metal cells and batteries

Please read these instructions before use and keep them in a safe and accessible place.

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1 Product Description

1.1 Technical Data

	XS-Box 1	XS-Box 2	S-Box 1	S-Box 2
Outer dimensions in mm (L x W x H)	400 x 300 x 235	400 x 300 x 285	600 x 400 x 295	600 x 400 x 441
Maximum gross weight PG I (kg)	13		30	
Maximum gross weight PG II (kg)			45	
	Basic			
Inner dimensions in mm (L x W x H)	360 x 260 x 195	360 x 260 x 245	556 x 356 x 276	556 x 356 x 422
Volume (l)	18	23	56	84
Net weight (kg)	1,9	2,0	3,4	4,7
	Advanced			
Inner dimensions in mm (L x W x H)	298 x 198 x 135	297 x 195 x 190	492 x 292 x 196	492 x 292 x 341
Volume (l)	8,0	11	28	49
Net weight (kg)	3,7	4,0	6,8	9,0
	Premium			
Inner dimensions in mm (L x W x H)	302 x 202 x 131	-	492 x 292 x 196	492 x 292 x 341
Volume (l)	8,0	-	28	49
Net weight (kg)	4,7	-	14,3	21,1

1.2 Components



Fig. 1: transport container, Basic version

- | | | | |
|---|---------------|---|--|
| 1 | Cover | 6 | Locking hook |
| 2 | Toggle catch | 7 | Belt fastener |
| 3 | Locking lever | 8 | Lifting harness |
| 4 | Locking bolt | 9 | PE filler pads (only at Basic and Premium) |
| 5 | Locking lug | | |

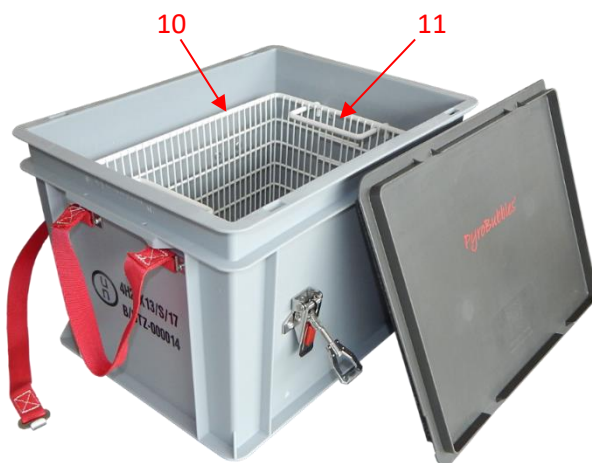


Fig. 2: transport container, Advanced version

- | | |
|----|------------|
| 10 | Gitterkorb |
| 11 | Korbgriff |

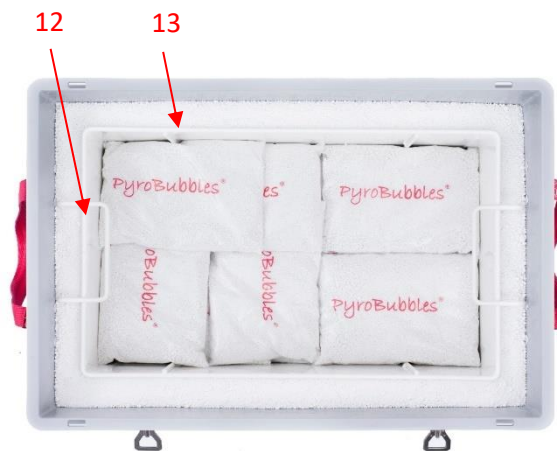


Fig. 3: transport container, Premium version

- | | |
|----|----------------|
| 12 | Einleger Griff |
| 13 | Einleger |

2 Safety Instructions

2.1 Proper intended use

The transport container is used for transporting and storing lithium-ion and lithium-metal cells and batteries. The transport container shall be used only in an undamaged and unmodified condition. The integrity of the transport container shall be checked before each use.

2.2 Hazard potential of lithium ion cells and batteries

With today's manufacturing standards, it can be assumed that lithium-ion cells and batteries, when properly used and handled, are safe. However, damage can lead to an irreversible, destructive reaction, a so-called thermal runaway. Such damage could be, for example:

- mechanical damage
- heat stress
- overcharging
- outer short circuit
- total discharge
- ageing (dendrite formation)

Such damage can cause the cell to heat up, resulting in a decomposition reaction of cell components. This decomposition reaction in turn leads to further heating, which then causes the decomposition process to accelerate uncontrollably. These reactions also lead to the formation of large quantities of toxic and flammable gases, which in interaction with the high temperatures of the cell can lead to severe fire events. This intense release of heat can consequently cause thermal runaway in the adjacent cells, so that under certain circumstances the entire battery reacts.

The escaping gases include carbon monoxide (CO), hydrogen (H₂), carbon dioxide (CO₂) and oxygen (O₂). It is also possible that hydrogen fluoride (HF) escapes, which can react with the air humidity to form hydrofluoric acid. If the escaping reaction gas does not ignite, it can mix with the air oxygen to form an explosive atmosphere.

Due to the high hazard potential ensuing from damage that may not always be visible from the outside, we recommend that returned batteries should always be stored in corresponding safety containers.

2.3 Information about PyroBubbles®

PyroBubbles® are multi-cellular hollow glass spheres, which are not hazardous in their solid form (delivery condition). Continuous contact with high concentrations of respirable dust can impair lung functioning. The general dust limits of 1.25 mg/m³ for respirable (A dust) and 10 mg/m³ for inhalable (I dust) fractions must be observed. An individual time-weighted average must not exceed the value of 3 mg/m³ for the A-dust fraction. For details, refer to TRGS 900 (or respective nationally applicable technical rules for hazardous substances). If the dust concentration at the place of work exceeds the specified occupational exposure limit values, approved and suitable respiratory protection must be used (filter type P2).

It is recommended to wear eye protection in the case of dust formation, and to wear gloves in the case of skin contact.

PyroBubbles® that no longer correspond to their condition at the time of delivery, must be disposed of in accordance with the disposal instructions (see section 5) and shall not be used further, because they no longer meet the requirements with respect to sorption capacity and thermal insulation.

3 Use

Caution

Before each use, check the integrity of the container and the other components.

3.1 Storage

3.1.1 Safety instructions



Danger

Danger of poisoning due to toxic, partially odourless gases

Injuries ranging from severe to fatal

In the event that the cells or batteries suffer a thermal runaway, leave the hazardous area as quickly as possible.



Danger

Danger of explosion due to explosive gases

Injuries ranging from severe to fatal

In the event that the cells or batteries suffer a thermal runaway, avoid ignition sources. If possible, provide sufficient ventilation.

3.1.2 Storage instructions for storage without hazardous content

PyroBubbles® must be stored in a dry location.

The transport container must be stored protected from direct sunlight, to prevent ageing of the plastic material. The recommended storage temperature range is +15°C to +30°C.

3.1.3 Storage instructions for the storage of cells and batteries

When storing cells and batteries, the lid of the container must be kept free, so that any reaction gases that may develop can escape and a resulting pressure build-up inside the transport container is avoided.

3.2 Transport

3.2.1 Safety instructions



Danger

Danger of poisoning due to toxic, partially odourless gases

Injuries ranging from severe to fatal

In the event that the cells or batteries suffer a thermal runaway, leave the hazardous area as quickly as possible.



Danger

Danger of explosion due to explosive gases

Injuries ranging from severe to fatal

In the event that the cells or batteries suffer a thermal runaway, avoid ignition sources. If possible, provide sufficient ventilation.

3.2.2 Transport instructions

During transport, observe the relevant legal regulations. This also applies for any additional markings or labels.

Make sure that the transport containers are securely closed by means of the belt fasteners.

Lift the transport container only by means of the lifting harness provided.

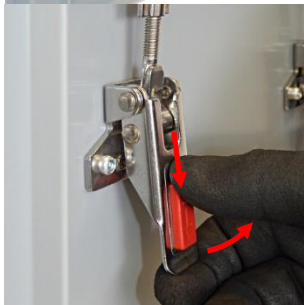
When transporting dangerous goods, the space above the transport container must be kept free, so that in the event of a thermal runaway the reaction gases have adequate space to vent.

3.3 Opening the transport container

3.3.1 Work procedure



1. The transport container is delivered in a closed condition, secured by means of the belt fasteners.



2. Press the locking bolt of one toggle catch downwards, and at the same time move the locking lever upwards.



3. Remove the locking lug from the locking hook.



4. Repeat steps 2 through 3 for all toggle catch.



5. Lift the cover off.

3.4 Packaging the hazardous goods

3.4.1 Safety instructions



Warning

Danger of poisoning due to toxic substances leaking from the cells or batteries

Injuries ranging from severe to fatal

Use protective equipment suitable for the hazardous goods involved.

3.4.2 Packaging instructions

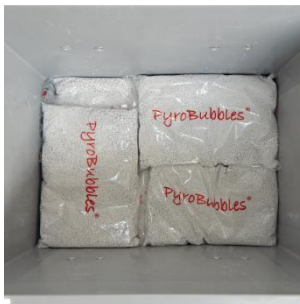
The required safety distances between the battery and the container walls, resp. the upper edge of the container, depend on the respective battery (design, energy content, condition, etc.). If the minimum distances are not defined in the transport specifications, then, depending on the respective model design, the safety distances described in point 3.4.3 are recommended.

3.4.3 Recommended Safety Distances

	XS-Box 1	XS-Box 2	S-Box 1	S-Box 2
Container, upper edge	6 cm		8 cm	
	Basic			
Container base	4 cm		6 cm	
Container, side walls				
	Advanced			
Container base	1 cm		2 cm	
Container, side walls				
	Premium			
Insert base	1 cm	-	2 cm	
Insert, side walls				

3.4.4 Workflow


1. Open the transport container (see section 3.3.1).



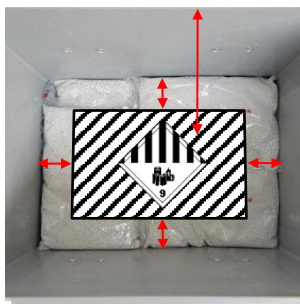
2. At Basic: Remove all PE filler pads from the transport container. Depending on the model, next insert the PE filler pads flat out into the transport container up to the minimum height recommended in point 3.4.3.



2. At Advanced: Enter an evenly distributed layer of PyroBubbles® with a minimum filling height of 1 cm above the grid floor.



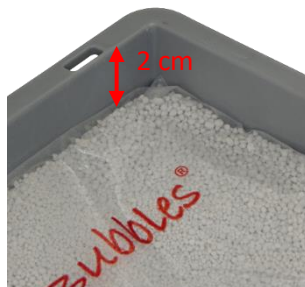
2. At Premium: Remove all PE filler pads from the transport container. Depending on the model, you can then place the PE filling pads flat in the transport container up to the minimum height recommended in point 3.4.3.



3. Place the hazardous substance in such a way that the recommended minimum distances are guaranteed. When loading multiple batteries, there must also be a sufficient all-round safety distance between the batteries.



4. Enclose the hazardous goods with additional PE filler pads. If you want to place several layers of hazardous goods into the transport container, you need to make sure that there is a sufficient padding thickness between the individual layers.



5. At Basic and Premium: Fill PE filler pads into the transport container, up to approx. 2 cm below the top edge of the container.

Caution

Only when the transport container is completely filled with PE filler pads, is an adequate level of protection ensured.



5. At Advanced: Cover the introduced hazardous goods with the PyroBubbles® supplied, filling them up to 2 cm below the upper edge of the container. If you want to place several layers of hazardous goods into the transport container, you need to make sure that there is a sufficiently thick padding of PyroBubbles® between the individual layers.

Caution

Only when the transport container is completely filled with PyroBubbles® is an adequate level of protection ensured.



6. Close the transport container (see section 3.5.1).

Caution

Make sure that the container lid is resting firmly on top of the upper edge of the container and is not tilted.

3.5 Sealing the transport container

3.5.1 Changing the clamping stroke of the toggle catches



1. Turn the locking lug counter-clockwise to reduce the clamping stroke. Turn the locking lug clockwise to increase the clamping stroke.

3.5.2 Work procedure



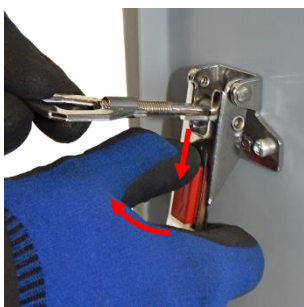
1. Place the cover on the container.



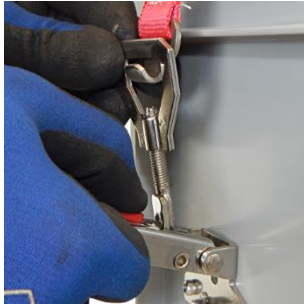
2. Place a belt fastener over the cover, using the corresponding slots in the lid as a guide.

Caution

Make sure that the belt fastener is not twisted.



3. Press the locking bolt of the corresponding toggle catch downwards, and at the same time move the locking lever upwards.



4. Place the locking hook into the locking eyelet. It may be necessary to alter the clamping stroke of the toggle catch (see section 3.5.1).



5. Press the locking lever of the toggle catch downwards.

Caution

Make sure that the belt fastener is tightly strapped.



6. Repeat steps 2 through 5 for the other toggle catch.

3.6 Removing the hazardous goods

3.6.1 Safety instructions

If the transport container shows any signs of deposits, discolouration or a piercing smell, you must assume that the electrolyte has leaked or there has been a thermal runaway in the battery.



Danger

Danger of poisoning due to toxic, partially odourless gases and toxic substances
Injuries ranging from severe to fatal

In the event of electrolyte leaking from the cells or batteries, or a thermal runaway, the transport container must be opened only by personnel wearing protective equipment appropriate to the type of hazardous substance involved.



Danger

Danger of poisoning by inhalation of contaminated dust
Injuries ranging from severe to fatal

In the event of electrolyte leaking from the cells or batteries, or a thermal runaway, the transport container must be opened only by personnel wearing protective equipment appropriate to the type of hazardous substance involved.



Warning

Danger of explosion due to explosive gases
Injuries ranging from severe to fatal

In the event that the cells or batteries suffer a thermal runaway, avoid ignition sources. If possible, provide sufficient ventilation.

3.6.2 Work procedure for Basic and Premium

1. Open the transport container (see section 3.3.1).
2. Remove the PE filler pads until the battery becomes visible.
3. Remove the battery.

3.6.3 Work procedure for Advanced

Variant 1

1. Open the transport container (see section 3.3.1).
2. Remove the PyroBubbles® by skimming or vacuuming them off until the batteries are visible.
3. Remove the batteries.

Variant 2

1. Open the transport container (see section 3.3.1).
2. Use the basket handles to remove the mesh basket. The PyroBubbles® remain in the container while the hazardous goods remain in the mesh basket.
3. Remove the batteries.

4 Maintenance and Repair

4.1 Maintenance

4.1.1 Safety instructions



Warning

Danger of poisoning due to toxic substances that have leaked from the cells or batteries

Injuries ranging from severe to fatal

Use protective equipment suitable for the hazardous goods involved.

4.1.2 Maintenance and cleaning instructions

Contamination by substances leaking from the cells or batteries on to the transport containers must be removed. For this purpose, use only cleaning materials that do not attack the material of the transport container (PP).

PyroBubbles® can generally be reused, provided that they show no visual changes and the granules are odour-neutral. Damaged PE filler pads must be replaced.

4.2 Repairs

Do not use damaged transport containers; they no longer meet the requirements of the approved type. Repairs shall be made exclusively by the manufacturer or by a specialist authorized by the manufacturer.

5 Waste Disposal/Environmental Protection

The materials used in manufacturing the transport container are recyclable and can be recycled through commonly available recycling programs.

Uncontaminated PyroBubbles® can be forwarded to recycling programs for building materials.



Danger

Danger of poisoning by inhalation of contaminated dust

Injuries ranging from severe to fatal

Wear protective equipment suitable for the respective contamination.

Contaminated PyroBubbles® must be properly disposed of in accordance with the applicable national regulations and in accordance with their respective contamination.

6 Contact Information

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