DIRAC INDUSTRIES
MORE THAN ELECTRIC HEATING
INNOVATION TOMORROW, TODAY +

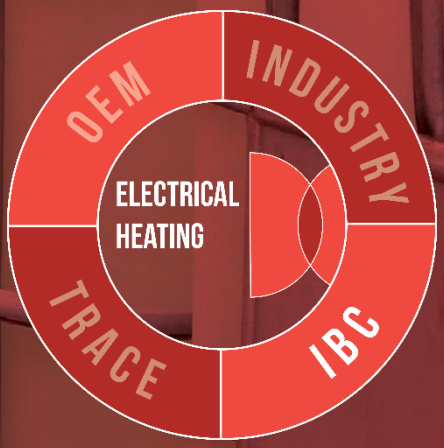
PCA IBC MANUAL

ELECTRICAL HEATING – Aluminium sheet heaters

Guidelines to ensure safe, consistent performance from your single-use aluminium sheet heaters — engineered as an efficient and cost-effective solution for heating products stored in IBC containers during transport or storage.

This handbook contains everything you need to maximize the performance and efficiency of your heated IBC system.

- **Step-by-step guidance for handling and installing a single-use sheet heater**
- **Supporting figures and illustrations for easy reference**
- **Comprehensive testing procedures**
- **Test results recording sheet**
- **Troubleshooting guidance and support information**



MORE THAN ELECTRIC HEATING

ELECTRICAL HEATING - CONTROL - METALWORKS - WIRE & CABLE

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Purpose and application

An IBC heater is designed to heat up temperature-sensitive products stored in Intermediate Bulk Containers (IBCs). The heater is positioned beneath the product liner so that heat transfers directly through the base of the liner into the product.

It is typically used for products that become viscous or solid at lower temperatures.
The heater gradually raises product temperature to improve flow and allow safe dispensing.

Who is this manual for

This manual is intended for all personnel involved in the preparation, handling, transport, installation, and use of a heated IBC system incorporating a DIRAC Industries heater. This includes IBC and BIB suppliers, product manufacturers, filling operators, logistics personnel, quality assurance teams, and end users responsible for operating or managing the heated container throughout its lifecycle.

What does ETL certification mean for you

ETL is a **third-party safety certification mark** issued by Intertek. It indicates that the product has been independently tested and found to comply with relevant North American safety standards (typically UL standards in the U.S. and CSA standards in Canada).

For electrical heating equipment, this usually means compliance with standards related to:

- Electrical safety
- Fire risk prevention
- Grounding and insulation integrity
- Construction and component suitability
- Labelling and traceability

1) For the Reseller

Regulatory Acceptance

ETL certification allows the reseller to legally market and distribute the heating equipment in the United States and Canada where certification to recognized safety standards is required.

Authorities Having Jurisdiction (AHJs), insurers, and industrial facilities generally accept ETL as equivalent to UL listing.

Reduced Liability Exposure

Because the product has been independently tested:

- The reseller reduces legal exposure related to electrical safety claims.
- There is documented evidence that the heater meets recognized safety standards.

However, certification does **not** remove responsibility for:

- Proper storage
- Correct voltage labelling
- Ensuring the product is not modified
- Providing accurate installation instructions

Market Access

Many industrial customers, food manufacturers, pharmaceutical sites, and chemical plants require third-party certification as a purchasing condition. Without ETL, the reseller may not be able to supply certain facilities.

Ongoing Compliance Obligations

ETL certification is not a one-time test:

- Manufacturing must remain consistent with the certified design.
- Intertek conducts periodic factory inspections.
- Any design changes may require re-evaluation.

2) For the End User

Electrical Safety Assurance

For the end user, ETL certification means the heater has been evaluated for:

- Proper grounding
- Adequate insulation resistance
- Acceptable leakage current
- Overheating risk
- Construction integrity

This reduces the risk of:

- Electric shock
- Electrical fires
- Component failure due to unsafe design

Insurance & Workplace Compliance

Many facilities require certified electrical equipment to satisfy:

- OSHA requirements (U.S.)
- Workplace safety regulations
- Insurance underwriting conditions
- Corporate EHS policies

Using non-certified heaters can:

- Void insurance coverage
- Create audit non-conformities
- Trigger safety violations

Confidence in Testing Standards

The user knows the heater was tested against defined safety criteria rather than self-declared compliance.

This is particularly important in:

- Food production environments
- Pharmaceutical facilities
- Chemical processing plants

Limitation of Scope

ETL certification does **not** guarantee:

1) That the heater is suitable for every product
2) That installation was done correctly
3) That local environmental conditions are appropriate
4) That operational misuse will not cause damage

The user is still responsible for:

- Proper installation
- Following testing procedures (Appendix B)
- Using correct voltage
- Maintaining minimum product coverage during heating

3) ETL Safety Design Features

- Flame-retardant construction materials used in the heater assembly.
- Elimination of combustible structural materials such as cardboard in the heater construction.
- Fail-safe heater design intended to automatically remove electrical power in the event of overheating or abnormal operating conditions.

Critical safety requirements

Improper installation or electrical connection may result in electric shock, overheating, liner damage, fire risk, or product contamination.

Always ensure:

- ✓ The heater matches the supply voltage (120V or 230V).
- ✓ A GFCI or RCD protective device is used.
- ✓ The heater is tested before installation, after installation, and after filling.
- ✓ The heater is never powered when insufficient product covers it (minimum 100 mm).
- ✓ The heater is not reused if designed for single-trip use.

1) Core safety rules you must follow

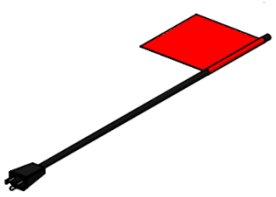
Incorrect use can create serious hazards. Before the heater is installed or energized, confirm the heater model is intended for the specific IBC and product type, and that it matches the local supply voltage. Any heater that does not pass the required checks must be removed from service and kept aside for investigation.

Minimum safety controls:

- ✓ Use only a heater specified for the IBC design and the material being heated.
- ✓ Confirm the heater supply voltage rating (typically 120 V or 230 V) is correct for the site.
- ✓ Perform pre-use testing (visual + electrical tests) before filling; repeat key tests after installation and after filling.
- ✓ Do not pull, jerk, or lift the heater by the power cord—cord damage can cause failure or unsafe operation.
- ✓ Power the heater through a protective device such as a GFCI (North America) or RCD (many other regions).
- ✓ Use only undamaged plugs/leads/connectors that are properly rated for the heater's current and voltage.

2) Read the heater label before use (voltage, power, identity)

Every heater includes an identification label attached to the power cord. Treat this label as primary source for confirming you have the correct unit. Check that it is present, legible, and not damaged.



The label information should be verified before installation:

- ✓ Voltage rating – must match the supply where the heater will be used.
- ✓ Rated power and model/reference – should align with IBC type and intended product heating requirement.
- ✓ Thermostat information (if fitted) - indicates temperature control characteristics.
- ✓ Unique serial number – use this to record test results and trace any issues.

If you encounter labels in different color schemes or formats (for example, some units may have white labels), do not assume the voltage – read the printed rating and confirm it matches the site supply before connecting power.

3) Why testing is required at multiple stages

IBC heaters may be handled by multiple parties (storage, assembly, transport, filling, end user). Because damage can occur at any step, the heater should be checked repeatedly – not only once at the factory. The purpose of staged testing is twofold:

1) Confirm electrical safety and regulatory compliance, and
2) Confirm the heater is still functional and likely to perform at the final destination.

Personnel performing inspections and basic electrical tests do not necessarily need to be licensed electricians, but they must be trained to use the correct equipment and follow the documented test method. Any modification to the test regime to satisfy local regulations should be performed or approved by a suitably qualified person.

4) Recommended tests and when to perform them

The handbook groups tests by when they should be completed. At minimum, complete the tests before installation, after installation, and again after filling. Prior to final use, repeat checks to confirm the heater and all electrical accessories are correct for the site.

Typical test set (summary):

1. Visual inspection — look for physical damage to the heater body and the power cord/plug.

2. Earth continuity (bond) - verify the protective earth path is intact (where applicable).
3. Insulation resistance - verify electrical insulation strength using the correct test voltage (commonly 500 V IR test).
4. Function/operation (circuit resistance/ohm check) - confirm the heating circuit is intact and within the specified range.

Use a test record sheet to capture outcomes against the heater's serial number. Any failed result should trigger immediate removal from use and quarantine for follow-up, rather than attempting to 'see if it works anyway'.

5) Final pre-power checklist (practical reminder)

Immediately before energizing a heater at the user site, re-check: the voltage rating, the condition of the cord and plug, and the presence of a functioning GFCI/RCD. Ensure all extension leads/adapters are rated for the heater current and are compatible with the local mains configuration.

If any doubt exists about the heater identity, voltage, physical condition, or test outcomes, do not connect it to power until the issue has been resolved.

TEST RESULTS

Product reference : .....

Inspection date : ..... /..... /.....

Inspector name : .....

Company name : .....

	Serial n°	Visual inspection (pre-install) ☑	Earthing Continuity < 1.0Ω ☑	Insulation Resistance > 50MΩ ☑	Circuit Resistance XX.X << XX.X Ω	Visual inspection (post-install) ☑	Test operator initials
1							
2							
3							
4							
5							
6							
7							
8							
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10							
11							
12							
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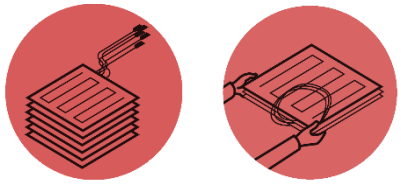
Handling IBC heaters

1) Preventing Mechanical Damage During Handling

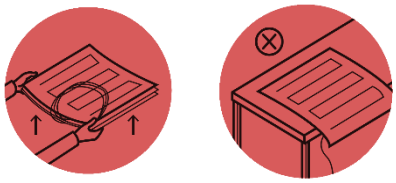
IBC heaters are thin, layered electrical assemblies. Although robust when installed correctly, they can be damaged by bending, twisting, impact, or stress applied to the power cord. Careless handling is one of the most common causes of heater failure.

When removing heaters from packaging:



- Start from the top layer if stacked in cartons.
- Separate power cords carefully before lifting.
- Avoid pulling cords free with force - ease them out gently.

When lifting or moving heaters:



- Lift from the outer edges rather than the center surface.
- Allow a gentle natural curve while carrying – do not bend.
- Coil the power cord on top and support it with your hand.
- Never allow the cord to hang freely off a table edge; as the weight can deform the heater.

Heaters must always be placed down flat on a clean surface. Lower them evenly to avoid localized stress points that may crease or weaken the internal heating element.

2) Preparing the IBC Base Before Installation

Before inserting the heater into the IBC, the base of the container must be inspected.

- Any debris, sharp edges, moisture, or contamination may damage the heater backing or create uneven heat transfer.
- Ensure the base surface is clean and dry.
- Remove any foreign objects that could puncture or abrade the heater.
- Confirm there are no protrusions or irregularities that could concentrate pressure.

3) Correct Heater Orientation and Positioning

Proper positioning is critical for safe operation and optimal heating performance. The heater must be placed beneath the liner with the designated top side facing upward. Incorrect orientation may lead to ineffective heating or liner damage.

- Ensure the marked side (installation indicator) faces upward.
- Confirm the aluminum heating surface sits directly against the liner.
- Do not trap debris or packaging materials between heater and liner.

Direct contact between the heater surface and the product liner ensures efficient heat transfer. Air gaps, folds, or obstructions can create hot spots or reduce performance.

4) Power Cord Management Inside the IBC

Incorrect cable positioning is a major cause of heater failure. The cord must be arranged to avoid crushing, stretching, or tension during filling, transport, and use.

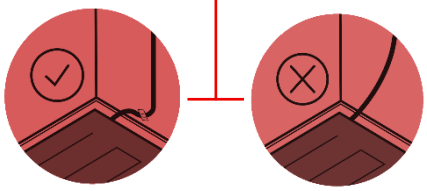
- Position the inlet so it will remain accessible after filling.
- Ensure the cord will not be trapped or compressed during transport.
- Create a small 'S' curve in the cord to allow movement during filling.
- Secure the cord to the IBC wall or cassette flap using tape.
- Never pull on the cord to adjust heater position.

The purpose of the 'S' curve is to provide slack that absorbs movement when the liner expands during filling. Without this relief, stress may transfer directly to the heater connection point and damage the internal wiring.

Ensure the power cord inlet is easy accessible once the filling process has been completed

Don't leave hanging / unsupported !

Positioning of power cord in base of the IBC with enough slack to avoid damage



Clean the box if necessary and ensure the heater mat is facing the correct way up ⚠

5) Cassette Assembly Considerations (if used)

In cassette-based systems, the heater is mounted to a corrugated insert with the liner attached above it. This configuration helps the liner unfold evenly during filling and provides additional base insulation.

Even in cassette systems, the same handling rules apply: avoid folding outside intended assembly points, avoid crushing the cord, and ensure direct surface contact.

6) Key Risk Prevention Summary

Most heater failures linked to handling occur due to mechanical stress rather than electrical defects. Following correct lifting, placement, and cord management practices significantly reduces the likelihood of premature heater malfunction, liner damage, or heating inconsistency.

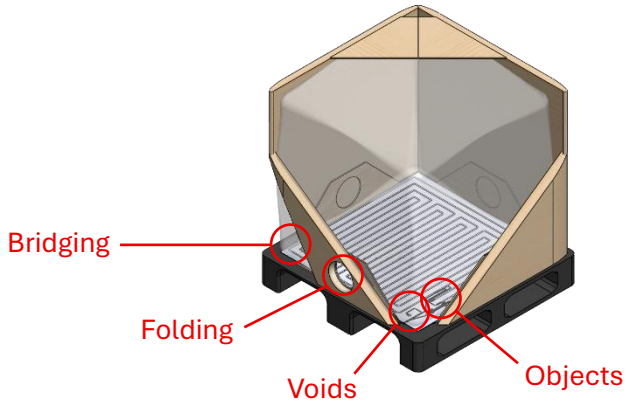
Filling & Dispensing

1) Filling the IBC – Critical Risk Areas

Incorrect filling is one of the primary causes of heater malfunction or liner leakage. The heater must remain in full, even contact with the liner to ensure proper heat transfer. Any irregularity between the heater and liner can create localized overheating.

During filling, avoid the following conditions:

- ⚠ Foreign objects trapped between heater and liner.
- ⚠ Air pockets or voids under the liner.
- ⚠ Excess liner folds directly above the heater surface.
- ⚠ Air gaps or folded material reduce heat transfer and may create concentrated hot spots.
- ⚠ Bridging at the IBC corners can prevent the liner from settling evenly onto the heater surface.

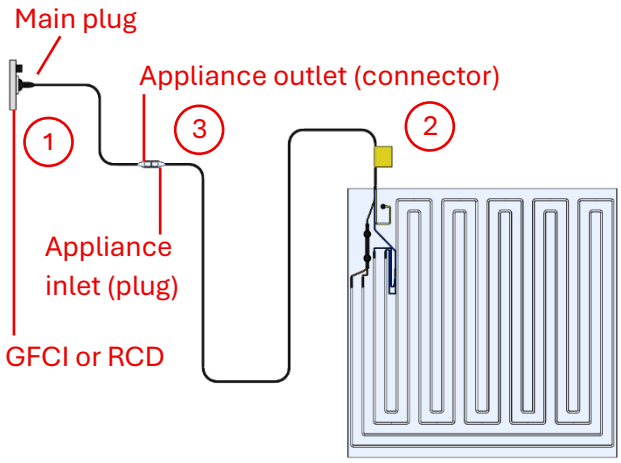


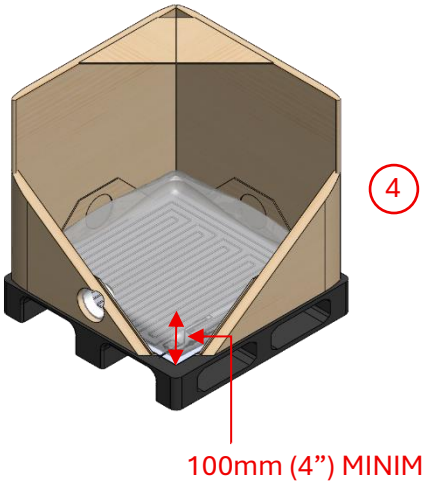
2) Electrical Checks Before Energizing

Before connecting the heater to a power source at the user site, perform final electrical safety checks.

These checks confirm that the installation is electrically safe and that all components are compatible:

- ✓ Confirm a functioning GFCI (Ground Fault Circuit Interrupter) or RCD is installed. (1)
- ✓ Verify the heater voltage rating matches the local power supply. (2)
- ✓ Ensure adapter leads, connectors, plugs, and sockets are correctly rated. (3)
- ✓ Confirm current rating of extension leads matches heater demand.
- ✓ All connectors should be free from visible damage and properly seated.
- ✓ Mismatched or underrated cables may overheat and create a fire hazard.





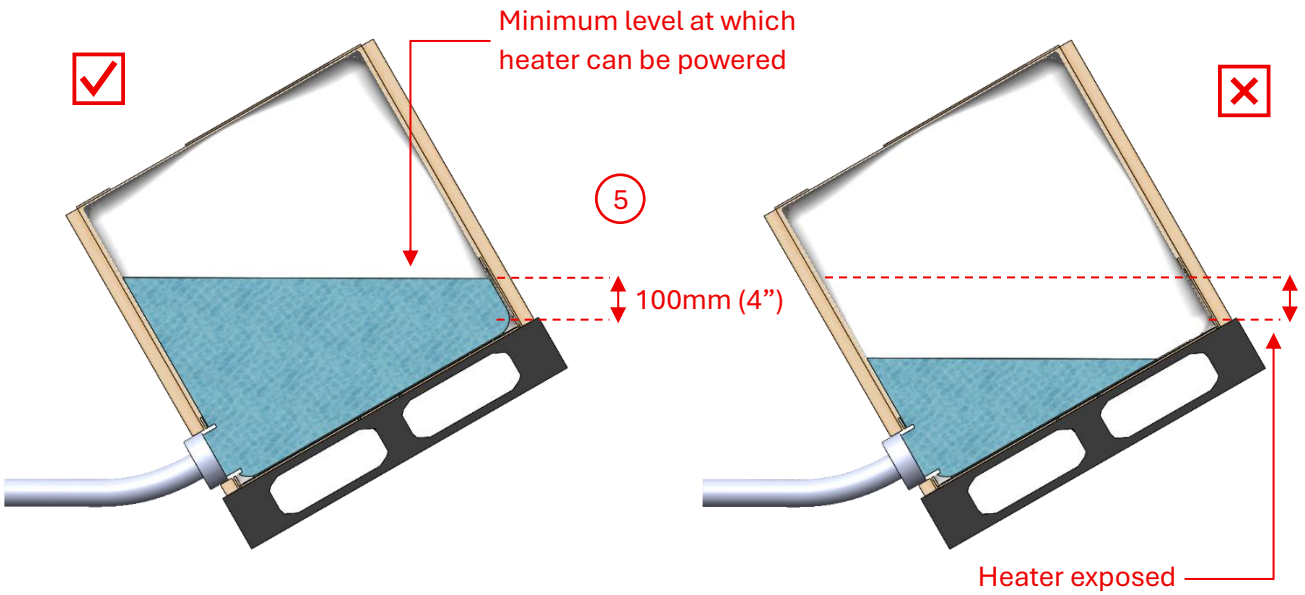
3) Safe Operation During Dispensing

The heater must never operate without sufficient product covering its surface. Exposed heating sections may overheat and damage both liner and product.

Operational rule:

- ✓ Maintain a minimum of 100 mm (4 inches) of product above the highest point of the heater. (4)
- ✓ If the product level drops below this minimum, switch the heater off immediately.
- ✓ Apply the same rule if the IBC is tilted forward during dispensing. (5)
- ✓ When product levels fall too low, the rear portion of the heater may become exposed.

An uncovered heater section can reach higher temperatures due to reduced heat absorption, increasing the risk of liner weakening or thermal damage to the product.



4) Operational Risk Control Summary

Proper filling ensures uniform heat transfer. Proper electrical verification ensures safe energization. Maintaining adequate product coverage during dispensing prevents localized overheating.

These controls collectively protect the liner integrity, preserve product quality, and prevent premature heater failure.

Troubleshooting

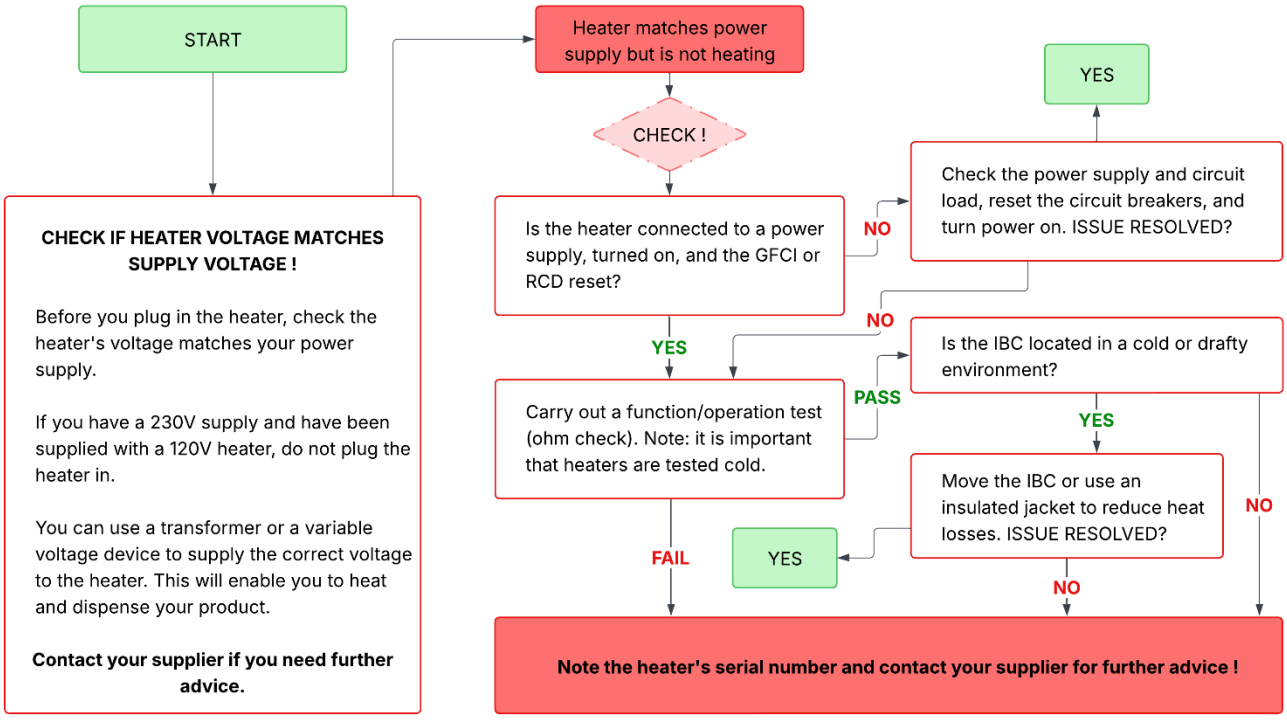
1) Common Causes of Heater Performance Issues

When a heater does not warm the product as expected, the root cause is often related to electrical supply conditions, environmental factors, or circuit damage rather than a manufacturing defect.

- Supply voltage does not match the heater rating.
- Circuit breaker has tripped or insufficient electrical capacity is available.
- GFCI/RCD protection device has not been reset.
- Heating circuit is open or electrically damaged.
- Ambient temperature is near the thermostat set point.
- Excessive heat loss due to cold or drafty surroundings.

A systematic check of voltage compatibility, power availability, and circuit integrity should always be performed before concluding that the heater is faulty.

2) Troubleshooting Flowchart



Appendix 1

Test 1 – Visual Inspection

A visual inspection must be completed before installation and again after installation into the IBC. The purpose is to detect mechanical damage or labeling issues that may compromise safe operation.

Inspection checklist:

- ✓ Heater surface free from tears, punctures, or creases.
- ✓ No sharp edges or exposed conductive areas.
- ✓ Power cord undamaged with intact insulation.
- ✓ Cord positioned so it will remain accessible after filling.
- ✓ Product identification label present, readable, and correct voltage confirmed.
- ✓ If any defect is identified, the heater must be removed from service and quarantined. Do not attempt to repair or modify the heater.

Test 2 – Earth Continuity (Bond Test)

The earth continuity test verifies that the protective earth conductor is intact and capable of safely carrying fault current in the event of insulation failure.

This test must be carried out using a Portable Appliance Tester (PAT). A standard multimeter is not acceptable for this procedure.

Procedure summary:

- Connect the PAT device to the heater plug.
- Attach the test clip to the exposed heater edge.
- Apply the test current (typically 10A as per test standard).
- Confirm resistance is 1 ohm or less.

If the measured resistance exceeds the acceptable limit, the heater must not be used.

Test 3 – Insulation Resistance (IR Test at 500V)

The insulation resistance test ensures that live conductors are adequately insulated from the protective earth and that no breakdown in insulation has occurred.

Testing must be performed using a PAT tester or megohmmeter set to 500V DC.

Measurements required:

- Live to earth resistance.

- Neutral to earth resistance.
- Minimum acceptable value: greater than 50 megaohms.

Any reading below the minimum threshold indicates compromised insulation and the heater must be withdrawn from use.

Test 4 – Functional / Circuit Resistance Test

The function test confirms that the heating element circuit is intact and capable of producing the rated power output.

Using an ohmmeter or multimeter, measure the resistance between the live and neutral pins of the heater plug.

Acceptance criteria:

- ✓ A resistance reading must be displayed (no open circuit).
- ✓ The value must fall within the specified range printed on the heater label or specification sheet.

This test should be performed before installation, after installation, and again after filling the IBC to ensure no damage occurred during handling.

Test Documentation and Authorization

All test results must be recorded against the heater's unique serial number. The person conducting the test must sign or initial the record to confirm completion.

Only heaters that pass all required tests may proceed to operational use.

Appendix 2

1) Purpose of the External Heating Kit

The external heating kit provides an alternative method for warming product inside an IBC when additional heat input or reduced heat loss is required. It allows the user to safely bring the product to the desired temperature without removing it from the container.

This solution is typically used when environmental conditions are colder than expected or when faster heat-up performance is necessary.

2) Main Components of the Kit

The external heating kit consists of two primary elements:

1) **Insulated IBC Heating Jacket**
   Wraps around the outer walls of the IBC to provide controlled surface heating.

2) **Insulated Lid**
   Covers the top of the IBC to reduce upward heat loss during operation.

ATEX

The heating jacket is typically available in configurations compatible with either 120V or 230V supply systems. Depending on model, temperature control may be provided through a built-in thermostat or a PID controller.

3) Heating Jacket Function

The heating jacket surrounds the sides of the IBC and functions as an external heat source. By applying heat to the container walls while simultaneously reducing lateral heat loss, it creates a controlled warming environment similar to a localized heated enclosure.

The jacket construction typically includes a durable outer layer and internal insulation. Maximum power output can reach several kilowatts depending on the model, enabling effective heat transfer even under colder ambient conditions.

4) Insulated Lid Function

The insulated lid minimizes heat escaping from the top of the IBC, which is often the largest area of thermal loss. By reducing vertical heat escape, the lid improves overall heating efficiency.

Many lid designs include a central opening or flap to allow access to the filling or discharge nozzle while maintaining insulation coverage during heating.

5) Operational Considerations

The external heating kit should be installed according to manufacturer instructions and connected to a properly rated electrical supply with appropriate protective devices. Voltage compatibility must be confirmed prior to energizing.

This system enables users to recover product temperature at the point of use, minimizing delays and avoiding the need to return the IBC to the supplier.

Certification & Compliances

PCA IBC

UL certified for US and Canada Market: **ETL 5024997**

PCA BIB UL

UL certified for US and Canada Market: **ETL 5024997**

About DIRAC Industries

DIRAC Industries designs and manufactures engineered heating solutions for controlled bulk liquid applications. Our focus is on safety, reliability, and technical performance in demanding industrial environments. Each heater system is developed to integrate seamlessly with IBC and liner configurations, supporting consistent heat transfer and operational control throughout filling, transport, storage, and end use. DIRAC combines practical field experience with disciplined engineering standards to deliver heating systems that meet regulatory requirements and perform predictably in real-world conditions.

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CONNECT WITH US

At DIRAC Industries we are always open to new collaborations and ambitious projects.

If you'd like to work with us, we'd love to hear from you !

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