

Installation and Maintenance Manual

HPS Terminator

Preface



Please read carefully and understand the contents of this manual.

Failure to read the manual may result in serious injury or even death, or serious damage to equipment.

Make sure this manual is always accessible for all users and ensure you have read and understood the contents.

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The English version of this document is the original version; this language version is verified by the manufacturer. All other language versions are translations of the original English language version.

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1 About this Manual

1.1 Symbols Used

The following marking conventions are used in this manual to draw attention to specific topics or actions.



indicates a hazardous situation that, if not avoided, will result in death or serious injury.



indicates a hazardous situation that, if not avoided, could result in death or serious injury.



indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

is used in this manual to indicate a situation that could result in damage to property or equipment.

The following symbols are used on equipment and in this manual to warn of potential hazards:



Danger of electrical shock or arc flash. Failure to observe this warning will result in serious injury or death.



Warning or Caution: where this symbol is used on the equipment, it is mandatory to consult the manual to find out the nature of potential hazards and any actions which have to be taken to avoid them.

1.2 Storing the Manual

This manual is a part of your product. Store the manual in a location that can be easily accessed by personnel working on the product.

It is the responsibility of the company operating this equipment to ensure that its personnel is provided with a copy of this manual.

1.3 Limitations of the Document

TKH Airport Solutions reserves the right to revise this document without notification.

The data provided in this document is based on the most recent information at the time of publication. TKH Airport Solutions is continually seeking to ensure that its products are developed to the latest technological standards. As a result, it is possible that there may be some differences between the product and the information in this manual.

For further information regarding adjustment, maintenance or repair which is not described in this document, please contact the Customer Service department of TKH Airport Solutions.

The information in this document concentrates solely on use of the products as intended by the manufacturer.

1.4 Terms and Abbreviations

This document may include the terms and abbreviations as listed below.

AGL	Airfield Ground Lighting
BUID	Basestation Unique Identification
CEDD	Contactless Energy and Data Distribution
EASA	European Aviation Safety Agency
HPS	High Power System
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Committee

1.5 Trademarks

CEDD® is a registered trademark of USE System Engineering Holding B.V. in the European Union. Other product names mentioned may be trademarks of TKH Airport Solutions B.V., USE System Engineering Holding B.V., or their affiliated companies.

1.6 Liability and Warranty

TKH Airport Solutions cannot be held responsible for injuries or damage resulting from non-standard, unintended use, faulty or improper installation of its equipment, or failure to follow the instructions and safety guidelines in this manual. The safety of any system incorporating the HPS Terminator is the responsibility of any site installation, commissioning, maintenance, and operational personnel using the system.

NOTICE Disregarding the safety instructions in this manual will result in the loss of warranty in case of damage.

Refer to the general TKH Airport Solutions Terms and Conditions document supplied with your sales order contract for a complete liability and warranty description.

1.7 Manufacturer Details

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1.8 Document Information

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For the latest version of this document see <https://www.tkh-airportsolutions.com/airfield-products/> or scan

2 Safety

When performing installation, maintenance or service activities, always carry out these activities with the greatest caution to avoid injuries or damage to the CEDD HPS Terminator. All activities may only be performed by qualified and authorized personnel (see below). It is the responsibility of those in charge of preparing and/or supervising such work to take the necessary actions to ensure safe working conditions.

Always work safely and comply with procedures, regulations and local standards. If any of the warnings or safety requirements in this document are in conflict with existing local regulations, then the strictest regulation must take precedence.

Thoroughly read and observe all safety instructions in this document.

⚠ WARNING Disregarding the safety instructions in this manual could result in serious injury or death.

2.1 Qualified Personnel

Only qualified and authorized personnel are allowed to install, operate or maintain this equipment.

The term "qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe installation, operation or maintenance. Qualified personnel are physically capable of performing the required tasks, are familiar with all relevant and local safety rules and regulations, and have been trained to safely install, operate or maintain the equipment. It is the responsibility of the company installing, operating or maintaining this equipment to ensure that its personnel meet these requirements.

2.2 Intended Use

The CEDD HPS Terminator is designed and intended only for the purpose of Airfield Ground Lighting (AGL) at airfields and airports as described in this manual. The CEDD HPS Terminator is placed at the end of each CEDD cable and prevents signal reflections that can interfere with the connection or cause power loss. It also acts as a watertight seal of the CEDD cable end.

Intended use also includes the observance of all procedures, inspection and maintenance instructions described in this manual.

Any other usage that is not described in this manual is considered unintended use. Unintended use includes but is not limited to the following actions:

- allowing unskilled personnel to perform any task on or with the equipment
- making changes to the equipment that have not been recommended or described in this manual or using parts that are not approved by TKH Airport Solutions.
- using materials or auxiliary equipment that are inappropriate or incompatible with TKH Airport Solutions equipment
- failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards, provided that they are not in violation of national regulations

⚠ WARNING Using this equipment in ways other than described in the manual could result in serious injury or death and/or material damage.

NOTICE The CEDD HPS Terminator may only be used with CEDD system components approved by TKH Airport Solutions:

- It is not allowed to connect the CEDD HPS Terminator to other cables than the CEDD cables approved by TKH Airport Solutions.
- The CEDD HPS Terminator must be installed in a watertight metal enclosure (for example a 12" shallow base with cover plate) approved by TKH Airport Solutions.
- Do not interchange CEDD HPS Terminators between CEDD AGL systems.

2.3 General Safety Rules

Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.

- Make this manual available to personnel installing, operating, or maintaining this equipment.
- Only qualified personnel are allowed to install, operate or maintain this equipment (see *Qualified Personnel* on page 7).
- Always use the required personal protective equipment (PPE).
- Always follow safe electrical work practices.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you to operate the system safely and efficiently.
- Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects.
- Protect equipment with safety devices as specified by applicable safety regulations.
- Use this equipment only in the environments for which it is rated.
- Never install or operate equipment with a known malfunction. If a malfunction occurs, turn the equipment OFF immediately.
- Always de-energize the CEDD AGL system before working on any component.
- In any of the following cases the equipment must be taken out of service and locked away from unauthorized use. This is necessary:
 - if the housing or the electrical wiring is visibly damaged
 - if the housing or the electrical wiring has loose parts
 - if the equipment malfunctions
 - after excessive transportation stress (for example in damaged or defective packaging)

2.4 Transport and Storage

If the equipment is stored before installation, it must be protected from the weather and kept free of condensation and dust. Keep the equipment in the original packing it was shipped in, until it is going to be installed.

2.5 Installation and Maintenance

Read the safety instructions in *section 5.1* and *section 6.1* before installing or maintaining the equipment.

3 About the Product

3.1 About CEDD

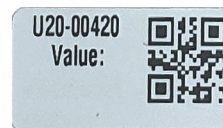
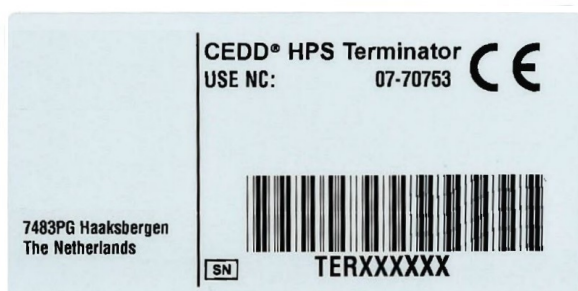
CEDD is an innovative contactless energy and communication technology. Energy and data transport are combined in a two-wire cable system, a basestation, and contactless user points. With this structured cable concept, lighting on airfields can easily be installed or replaced without making electrical contact with the power or data cable.

The CEDD system has been specifically designed for the operation of Airfield Ground Lighting (AGL) systems on airports, with the highest possible reliability.

3.2 About the CEDD HPS Terminator

Because the number of CEDD fixtures and the length of the CEDD cable in a typical setup are variable, the characteristic impedance of the CEDD AGL system varies. This causes signal reflections at the end of the cable. These reflections can produce interference or power loss in the CEDD AGL system. To prevent these reflections a CEDD HPS Terminator is placed at the end of every CEDD cable.

The CEDD HPS Terminators delivered with a CEDD AGL system are adjusted for the characteristic impedance in that system. The U20-##### number on the smaller label (see example below right) identifies the CEDD AGL system to which it is adjusted. The Value indicates the capacitance.



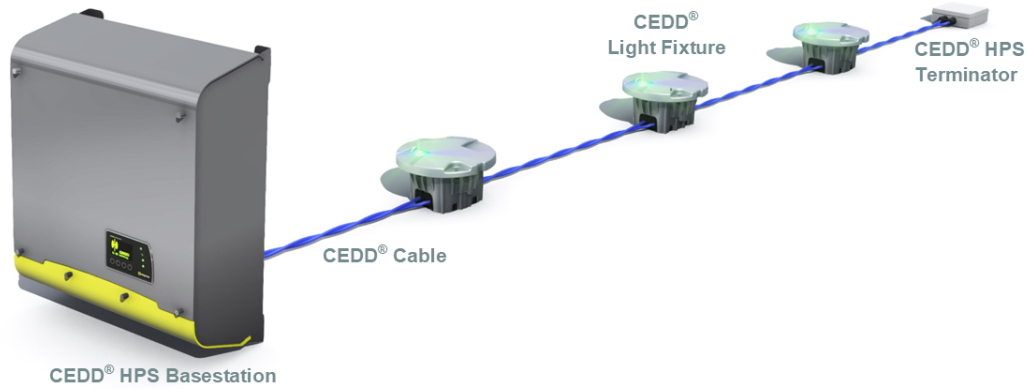
The CEDD HPS Terminator also acts as a watertight seal of the CEDD cable end.

The CEDD HPS Terminator is connected to the CEDD cable during in-field installation. The exact location will be somewhere in or near the pavement.

NOTICE Do not interchange CEDD HPS Terminators between CEDD AGL systems. Each HPS Terminator is adjusted for a particular CEDD AGL system. Unauthorized interchanging of the HPS Terminators will interfere with proper functioning of the CEDD AGL system.

3.2.1 Position in the CEDD AGL System

A typical CEDD AGL system consists of a CEDD HPS Basestation that provides power to the CEDD AGL LED fixtures, and bidirectional communication to all the CEDD AGL LED fixtures connected to the CEDD cable. A CEDD HPS Terminator at the end of each CEDD cable matches the characteristic impedance of the CEDD cable with the connected CEDD AGL LED fixtures.



A CEDD AGL system can have multiple CEDD HPS Basestations that communicate with one or multiple CEDD Masters.

4 Inspection

Before installation, the transport box and CEDD HPS Terminator must be inspected for damage and defects.

4.1 Inspect the Transport Box

If the transport box appears to be damaged, keep the transport box until the contents of the box have been checked for completeness, and the equipment has been checked mechanically and electrically.

NOTICE If the CEDD HPS Terminator has been damaged during transport, put the product and all other parts back into the transport box and contact your shipper and carrier.

4.2 Inspect the Contents of the Transport Box

The transport box must contain the following items:

- CEDD HPS Terminator
- 2 CEDD Cable kits; each kit, in a sealed bag, contains:
 - 1 compression connector
 - 1 cold shrink tube
 - 1 Vinyl Mastic Tape strip
 - 2 cleaning wipes
- CEDD HPS Terminator Installation and Maintenance Manual 03-70091 (this manual)
- Factory Acceptance Test Report 03-70103

Inspect the contents of the transport box. If any item is missing, contact TKH Airport Solutions Customer Service department service@tkh-airportsolutions.com.

4.3 Visually Inspect the CEDD HPS Terminator

Unpack and inspect the CEDD HPS Terminator and accessories. If there is any mechanical damage or defect, contact TKH Airport Solutions Customer Service department service@tkh-airportsolutions.com.

5 Installation

This chapter contains instructions for mounting the CEDD HPS Terminator.

Before installing the CEDD HPS Terminator read the *Safety Instructions* below.

NOTICE

- Disregarding these safety instructions will result in the loss of warranty in case of damage. TKH Airport Solutions is not liable for any injuries to personnel or any equipment damage.

5.1 Installation Safety Instructions

⚠ WARNING

- The CEDD AGL system includes high voltage, internal capacitors which must be discharged before working on the system components.
- Before installing the CEDD HPS Terminator, the CEDD HPS Basestation must be switched off, and must be protected against accidental re-energizing. See *De-energizing Procedure* on page 12.
- High voltage may still be present in the system after switching off. Wait for at least 15 minutes before starting installation.

⚠ WARNING

- The CEDD AGL system must be installed in a restricted access area.
- In any of the following cases the equipment must not be installed and must be kept out of reach from unauthorized use:
 - if the CEDD cable or HPS Terminator is visibly damaged
 - after storage under unfavourable circumstances (for example, outdoors or in moist environments)
 - after excessive transportation stress (for example in damaged packaging)
 - if the equipment is not in the original packaging

NOTICE

- Do not open the CEDD HPS Terminator. Opening the device may damage the product irreparably and will void the warranty.

5.2 De-energizing Procedure

⚠ WARNING

- Use appropriate personal protective equipment during the de-energizing procedure.
- Use equipment suitable for >1000 V.
- Do not assume that a capacitor is adequately discharged until it has been tested.

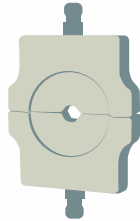
1. Switch off the CEDD HPS Basestation and lock out the switch to prevent accidental re-activation.
2. Wait 15 minutes.
3. Use a suitable voltmeter to measure the DC voltage across the capacitor.
4. If the voltage level is below $1 V_{RMS}/V_{DC}$ it is safe to disconnect the CEDD HPS Terminator.
5. Short the cable ends (towards the CEDD HPS Basestation).

5.3 Installation Tools and Materials

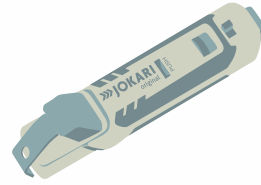
Tools Needed



Crimping tool
(for example Klauke - EK354ML)



Crimping tool insert
(for example Klauke - HD4/6)

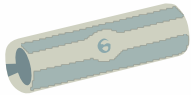


Cable knife

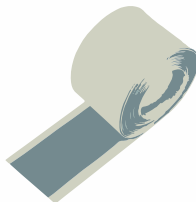


Pair of scissors

Materials included in the CEDD Cable Kit



Compression connector
6 mm² according to DIN 46267
(Klauke - 121R)



Vinyl Mastic Tape strip
38 x 160 mm (3M - VM386)



2 Cleaning wipes

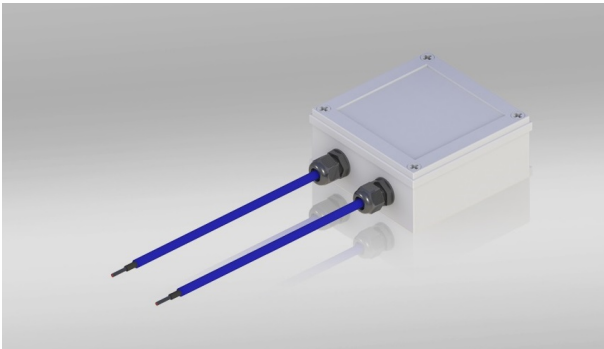


Cold shrink tube (3M - EPDM 8423-6)

NOTICE Additional cable kits for repairing or extending CEDD cables can be ordered directly from TKH Airport Solutions, order code: U20-00499.

5.4 Installation Instructions

This section describes how to connect the CEDD HPS Terminator to the end of the CEDD cable.



NOTICE Make sure the copper wires do not show any signs of discoloration. This could indicate oxidation of the cable's core.

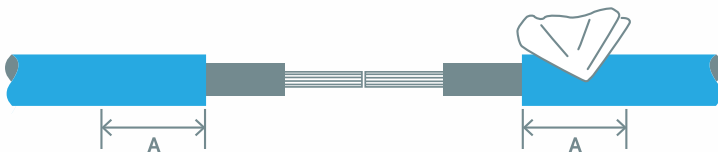
To connect the equipment, follow the steps below:

1. Use a voltmeter to check that the CEDD AGL system is de-energized. If it is not, follow the *De-energizing Procedure* on page 12.
2. Record the U20-number from the label on the underside of the CEDD HPS Terminator.
3. Remove the cable caps.
4. Remove 35 mm (C+D) of the outer jackets from the cable ends (A) and (B)¹ and remove the insulation for 15 mm (D) at both ends of the cable.



NOTICE Do not damage the copper wires.

5. Clean both cable jackets for a length of 45 mm (A) with a cleaning tissue.



6. Mark each cable jacket at a distance of 80 mm (A) from the end of the cable.



¹ One of the cable ends is the cable connected to the CEDD HPS Terminator.

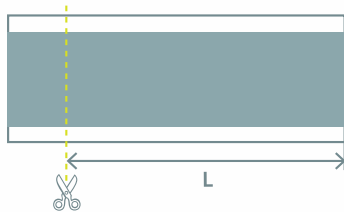
- Slide the EPDM cold shrink tube (A) around one of the cables. Pull the loop on the zip core (B) to release the loose end of the core (C).



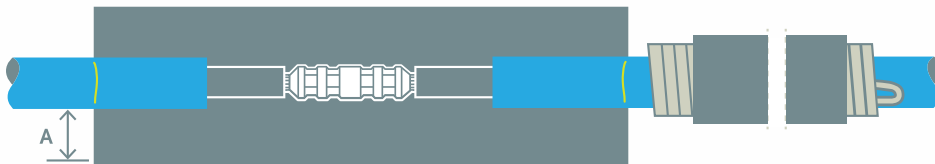
- Push one of the two cable ends into the Compression connector (A) and use the crimping tool to crimp it at position 1 and 2. following the sequence of crimp indents shown below. Repeat for the second cable end and crimp at position 3 and 4.



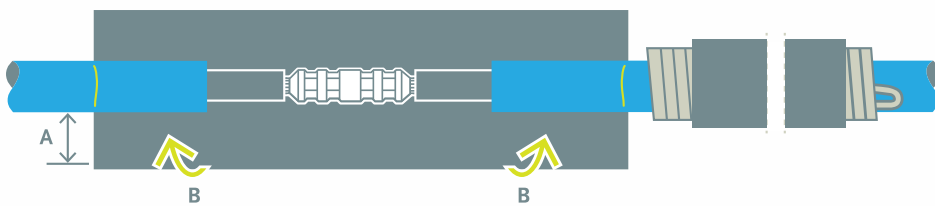
- Cut a 160 mm (L) pad of VM tape and remove the liner².



- If necessary, clean the cable jackets again. Place the compression connector in the center and at 10 mm (A) from the bottom of the tape. The ends of the tape should match the marks made in step 6.



- Fold (B) the short pad side (A) around the cables without folds or wrinkles.

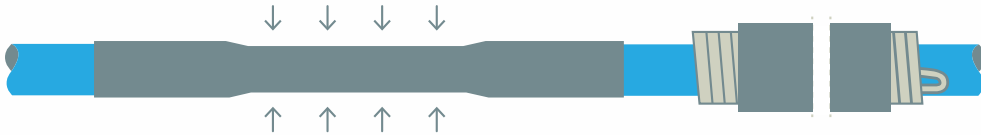


- Roll the cables over the tape pad or fold the pad around the cable until the tape pad covers the cables evenly.



² When using the CEDD Cable kit the tape is already cut to the right length.

13. Press the VM tape firmly around the cable.



14. Move the cold shrink tube (A) over the VM tape.



⚠ CAUTION Make sure the cold shrink tube covers the VM tape completely to prevent water ingress.

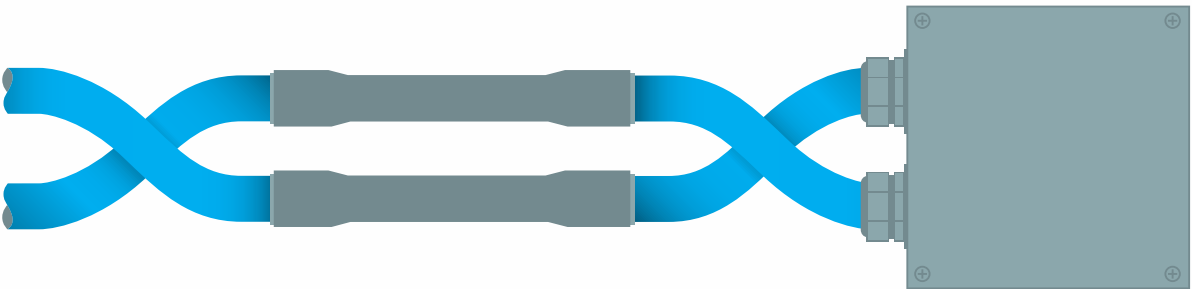
15. Hold the cold shrink tube and cable firmly with one hand and unwind the zip core (A) in a counter-clockwise direction with the other hand.



16. Continue shrinking until the cold shrink tube is fully shrunk.



17. Repeat steps 4 to 16 for the other cable.



NOTICE It is important that the 2 cables are twisted, as shown above.

18. The CEDD HPS Terminator may now be installed in a 12" shallow base with cover plate and O-ring, or other watertight metal enclosure.

NOTICE Avoid damaging the cable jackets on sharp edges when feeding the CEDD cables through the shallow base.

6 Maintenance

There are no serviceable parts inside the CEDD HPS Terminator. The CEDD HPS Terminator does not require any preventive maintenance. Repairs in the field are not allowed.

When it is necessary to replace the CEDD HPS Terminator it should be de-installed and returned to TKH Airport Solutions Customer Service.

Before de-installing the CEDD HPS Terminator read the *Safety Instructions* below.

6.1 Maintenance Safety Instructions

- ⚠ WARNING** • The CEDD AGL system includes high voltage, internal capacitors which must be discharged before working on the system components.
 - During replacement of a CEDD HPS Terminator, the CEDD HPS Basestation must be switched off and protected against accidental re-energizing. See *De-energizing Procedure* on page 12.
 - High voltage may be present after switching off the CEDD HPS Basestation. Wait for at least 15 minutes after de-energizing before working on the equipment.
-
- NOTICE** • Do not open the CEDD HPS Terminator. Opening the device may damage the product irreparably and will void the warranty.

6.2 Replacing a CEDD HPS Terminator

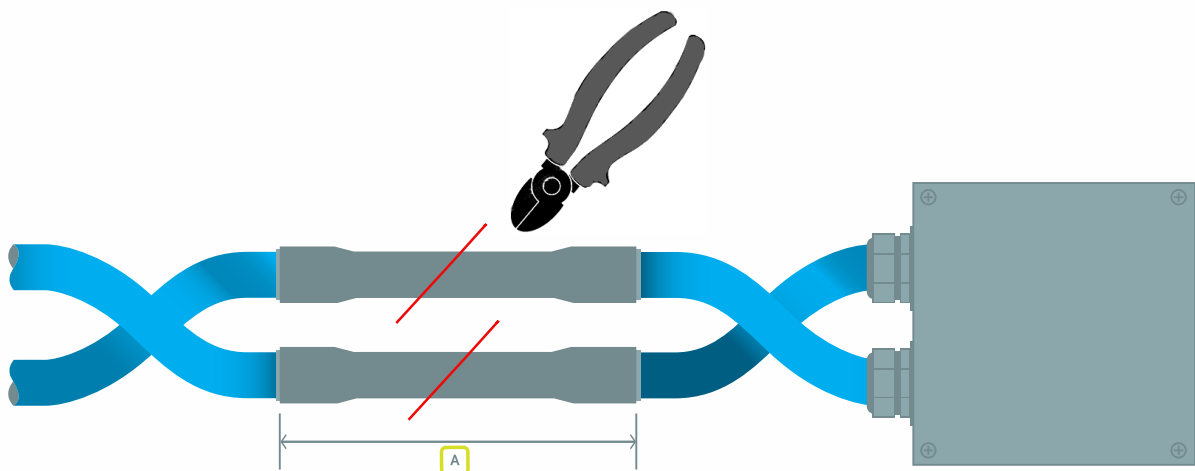
NOTICE When you remove a CEDD HPS Terminator from the CEDD AGL system, it is important to record the U20-number from the label on the underside of the CEDD HPS Terminator. The replacement CEDD HPS Terminator must have the same U20-number to match the characteristic impedance of this CEDD AGL system.

To safely disconnect and remove the CEDD HPS Terminator, follow the steps below:

1. With a voltmeter, check that the CEDD AGL system is de-energized. If not, follow the *De-energizing Procedure* on page 12.

⚠ WARNING Wait for at least 15 minutes after switching off the CEDD Basestation before you start to work on the CEDD HPS Terminator.

2. Cut the CEDD cables using insulated cable-cutting pliers.



3. Remove the tape, shrink tube, and crimped part of the cables.
4. Clean the cable ends with a cleaning tissue.
5. Do one of the following:
 - a. If you are going to replace the CEDD HPS Terminator, follow *Installation Instructions* on page 14.
 - b. If the CEDD AGL circuit will remain out of service, place a cap over each cable end.



NOTICE Additional cable kits for repairing or extending CEDD cables can be ordered directly from TKH Airport Solutions, order code: U20-00499.

7 Taking Out of Service

1. De-install the CEDD HPS Terminator as described in *Replacing a CEDD HPS Terminator* on page 18.
2. Contact TKH Airport Solutions Customer Service (service@tkh-airportsolutions.com) if you need to return a CEDD HPS Terminator.

7.1 Disposal

All electrical and electronic products must be disposed of separately from normal waste at the end of their useful life.



Company profile:

TKH Airport Solutions offers a complete range of LED-based airfield ground lighting products that are designed to be easy to install, operate, and maintain, and are compliant with international aviation standards. Our products meet the needs of our customers and contribute to a better future for the aviation industry. Being part of the TKH Group, our company can build on a history of more than 90 years in smart connectivity, energy distribution and AGL.

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