

# GRADUS

## **Lighting**

Step and Aisle Safety Lighting

## **Technical Installation Manual**

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# Equipment Required



**1** SDS Hammer Drill

**2** Combi Drill

**3** Tape Measure

**4** Hacksaw

**5** Adhesive Gun

**6** Conduit Cutters

**7** Nylon Hammer

**8** Silicone Sealant

**9** Mitre Saw

**10** Crimping Tool

**11** Circuit Cutters

**12** Wire Strippers

**13** Wire Cutters

**14** Stanley Knife

**15** Multimeter

## Installation Detail

When materials are supplied, the Gradus marked packaging clearly states the product code contained within. The power supplies are clearly marked with the input and output voltage ranges, frequency and power rating. The Interlock strips are also marked 12V DC only.

**NB: A qualified competent electrician must install the power supply unit, and run cable to the junction box for the connection of the lighting.**

## Planning

1. From the plan / drawing, calculate the number and length of steps, and length of Aisle on the floor to be illuminated.
2. Decide on whether the floor profiles are carpet to wall, carpet to floor or carpet to carpet profiles.  
**(Take care to ensure the height of any profile or nosing is compatible with the height of the carpet to be used!)**
3. Take templates of any curved nosing that is required
4. Calculate your electrical requirements:  
IAV/600/6 strip           = 0.25A / 3W per metre  
SMLOOM                   = 0.075A / 1W per metre  
Continuity                 = 0.025A per LEDASSY
  - Calculate complete cable size
  - Circuit loading should not exceed rating of P.S.U.
  - The loading must be calculated, and divided between the power supplies evenly.
  - The Power Supply units must be Class 2, 12VDC, correctly rated for the applied load.
5. It is recommended that every circuit on the secondary side of the power supply is fitted with a quick blow type fuse. The rating of this fuse must be calculated to be as close as possible to the nominal current rating of the circuit.  
The circuit current can be calculated from the figures given above, or preferably, taken from a site measurement with a suitable ammeter.

The number of feed points will depend on the quantity of power supplies, the location of the lighting and the volt drop of any circuit.

From the volt drop calculations, ensure if the voltage is dropping below 9V, then the lighting is refreshed from another feed point.

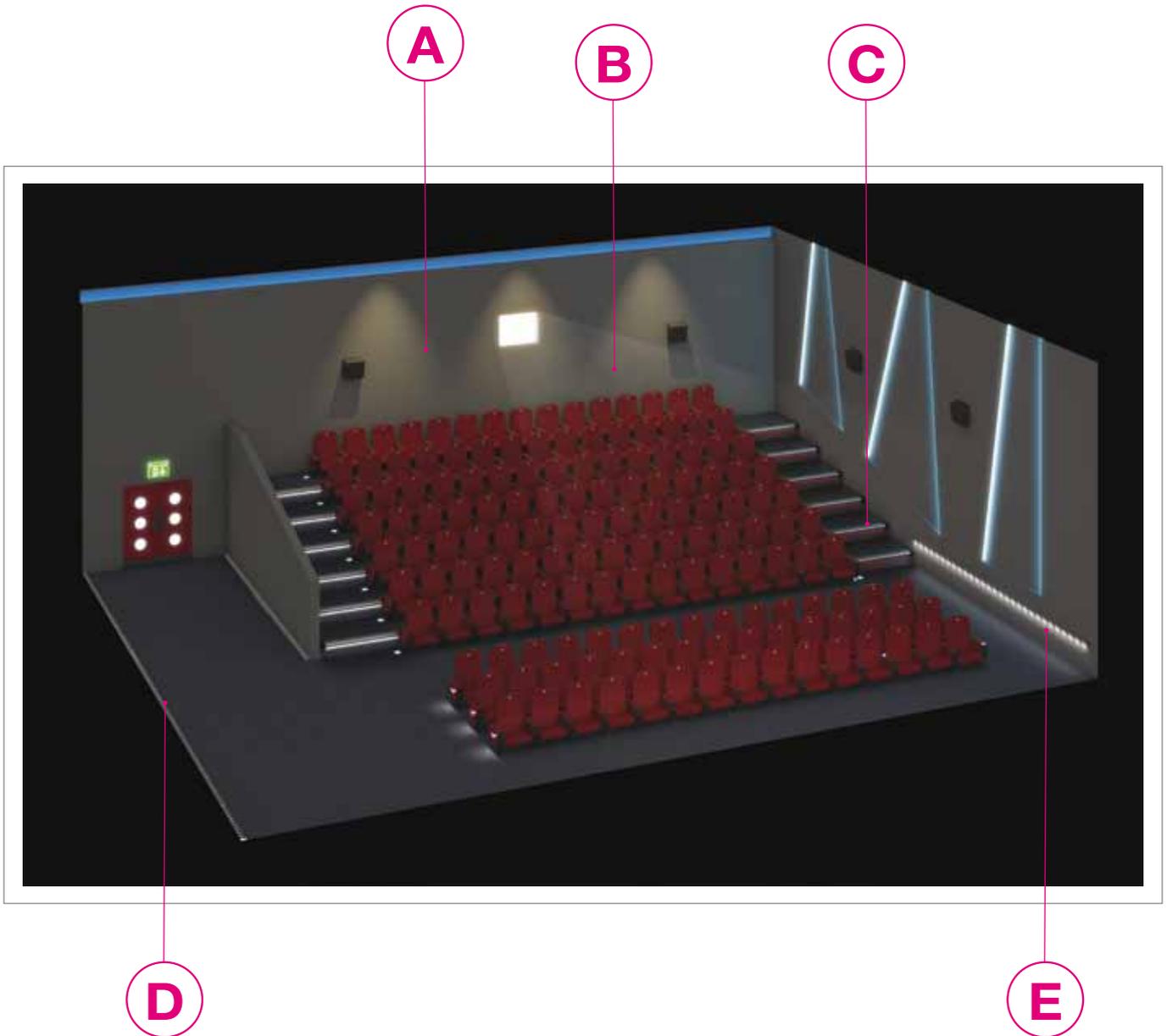
Voltage Drop =  $65\text{mV} / \text{A} / \text{M}$

## **Adhesives, sealants and crimps**

In the installation details that follow, there are several references to adhesives, silicone and crimps;

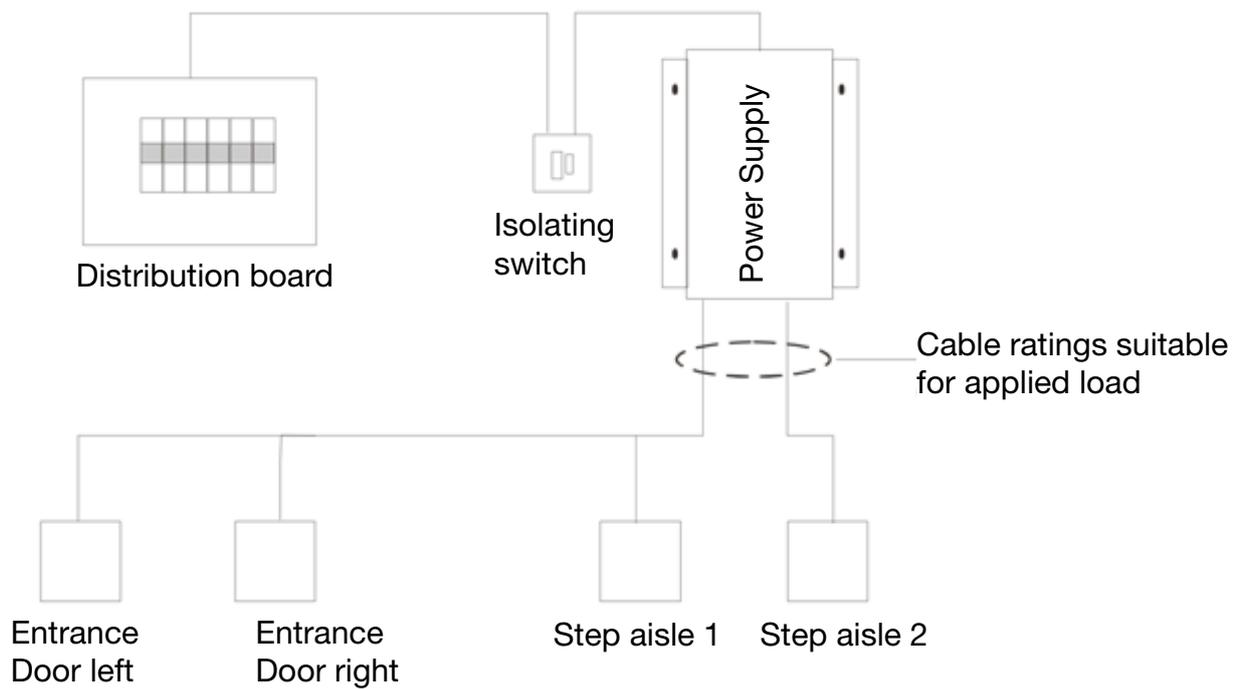
- Where references are made to adhesives for fitting nosings or trims, this should be a high performance gap filling adhesive.
- Superglue is used to hold the endcaps to the nosings, and this should be of the cyanoacrylate type.
- Silicone sealant refers to a clear acetoxo, silicone rubber compound equivalent to 732 RTV.
- Crimps should be the butt splice type, UL approved and suitable for 14AWG cable.

## General Cinema Layout

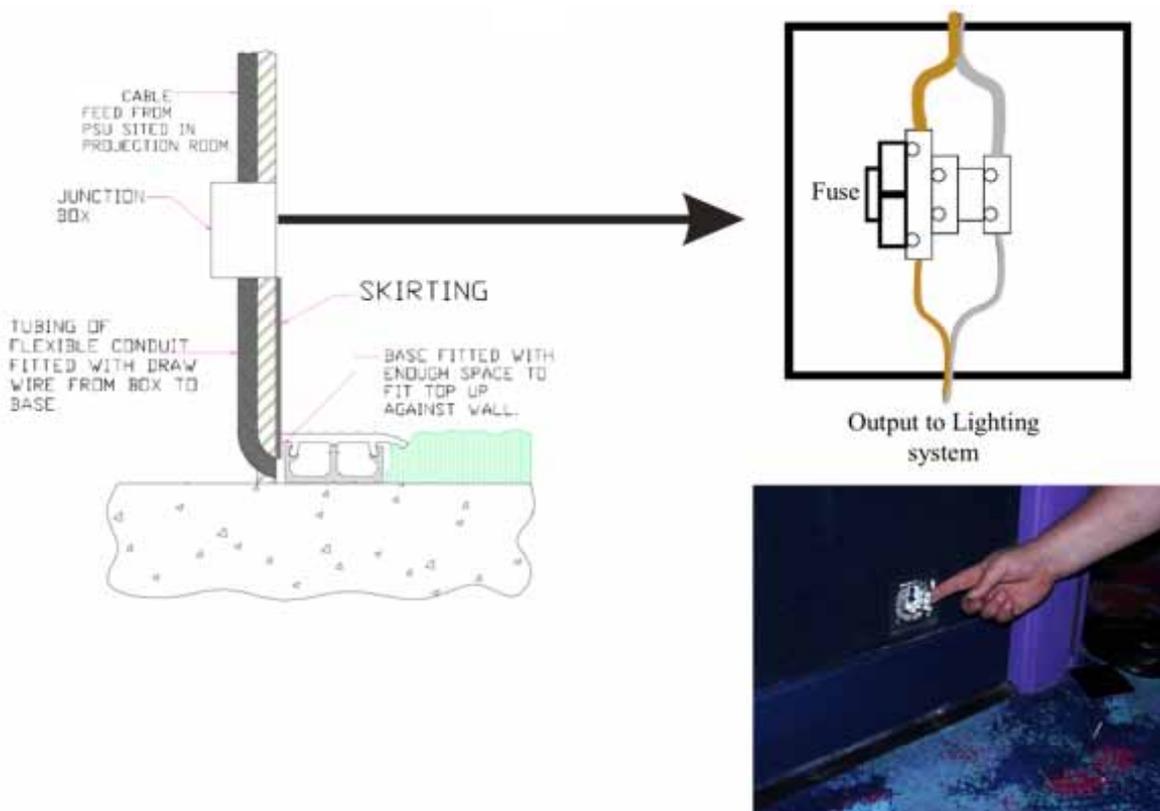


- A - PSU information, page 7
- B - Feed point information, page 7
- C - Step edge & cable management information, pages 8 - 14
- D - Floor trim information, page 15
- E - Wall light information, page 16

## PSU General Schematic



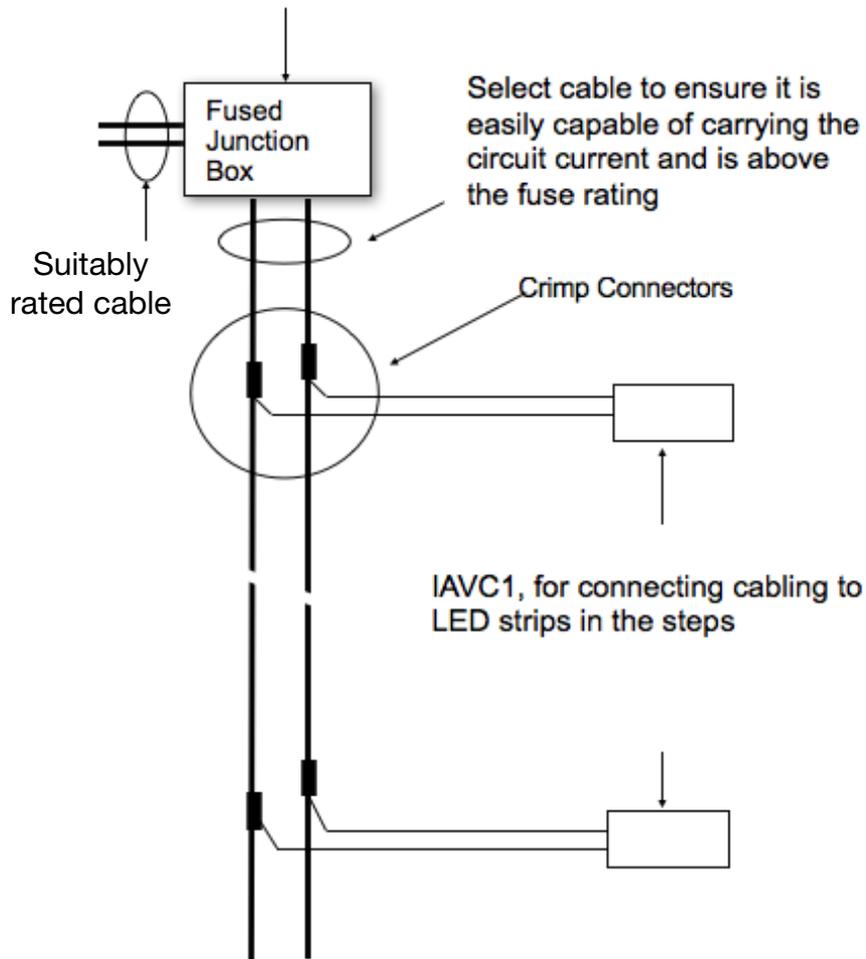
## Feed Point Wiring



## Basic Wiring - Interlok Advance

Stair loom and distribution

**The fuse should not be fitted or wiring connected until the system is tested and the circuit current is Measured.**



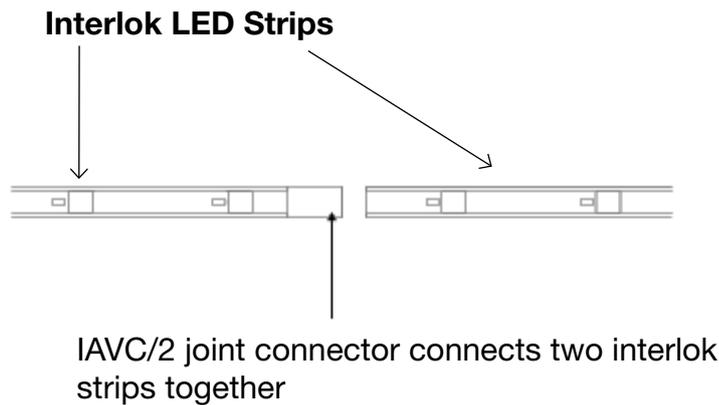
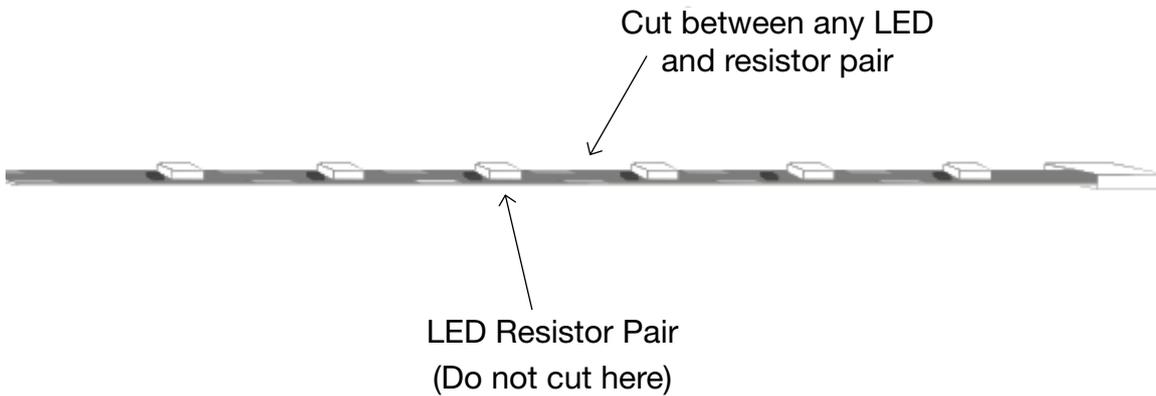
For long cable runs it is recommended that power is fed to both ends of the wiring

This will reduce voltage drop and associated problems.

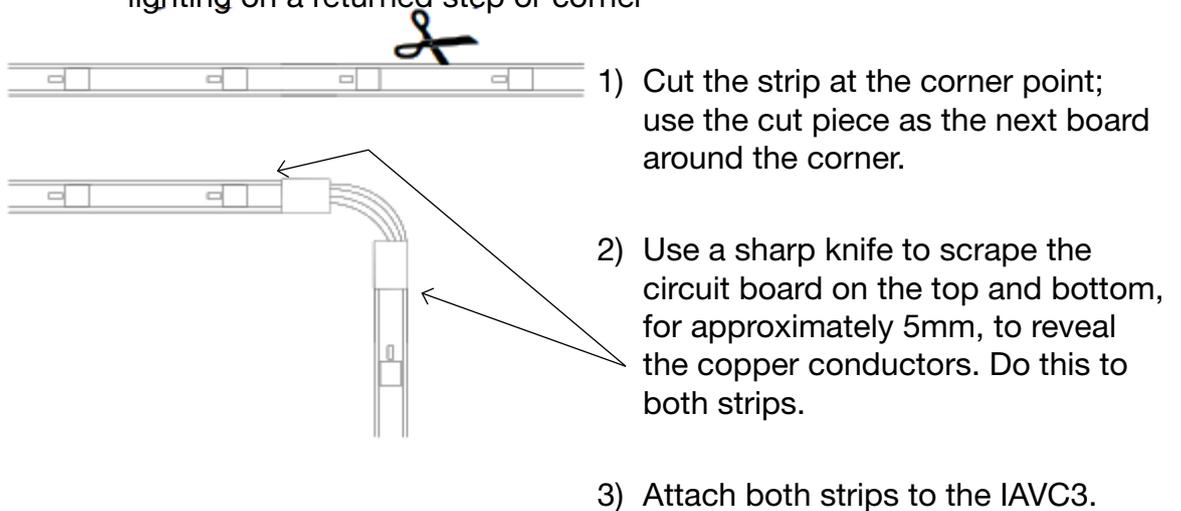
# Fitting Details for Interlok Advance

## Interlok Advance Strip

The Interlok Advance LED Strips may be connected together and/or cut to required length for your stair nosings



Use IAVC3 flexible connector to continue lighting on a returned step or corner



## Fitting Details For Continuity Lighting

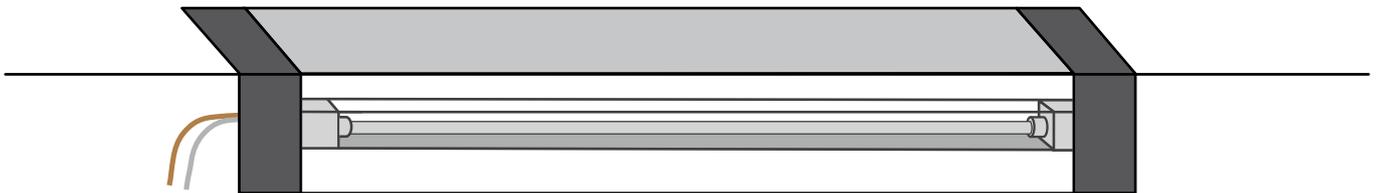
1. Fit LEDASSY and LEDASSY blank into each end of nosing. LEDASSY should be fitted so cables can easily be connected to supply cables
2. Cut the LR1238 tube to fit between LEDASSY and LEDASSY blank. LEDASSY and LEDASSY lugs fit into the tube



3. Cut ACP6/FR continuity rod 15mm larger than tube



4. Fit ACP6/FR continuity rod into LEDASSY. Fit tube over rod and LEDASSY lug, then fit LEDASSY blank onto end of rod and tube

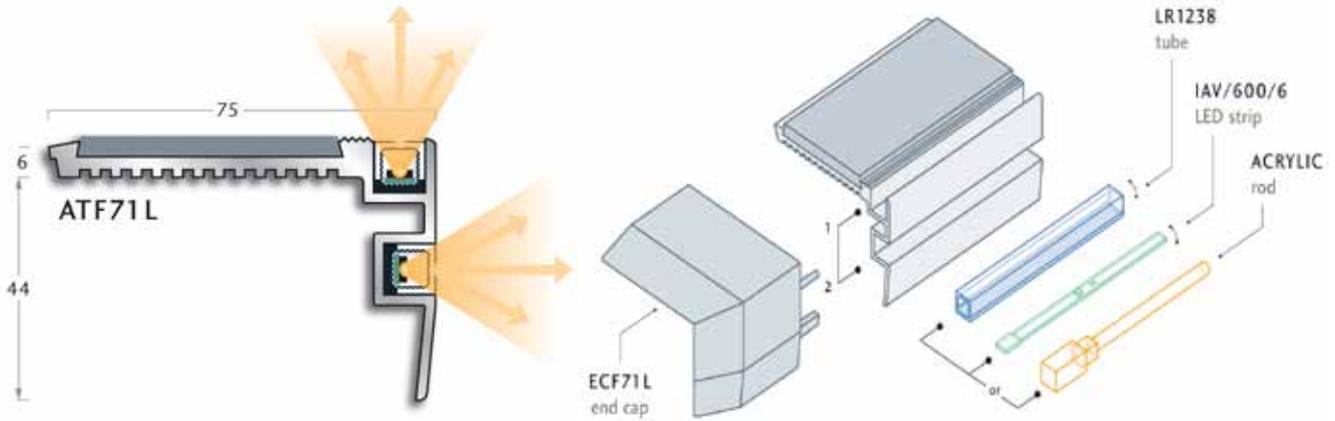


5. Install the complete lighting tube into the lit nosing recess, using a small amount of silicone to secure the tube

## Fitting Details for various profiles

### Aluminium profiles

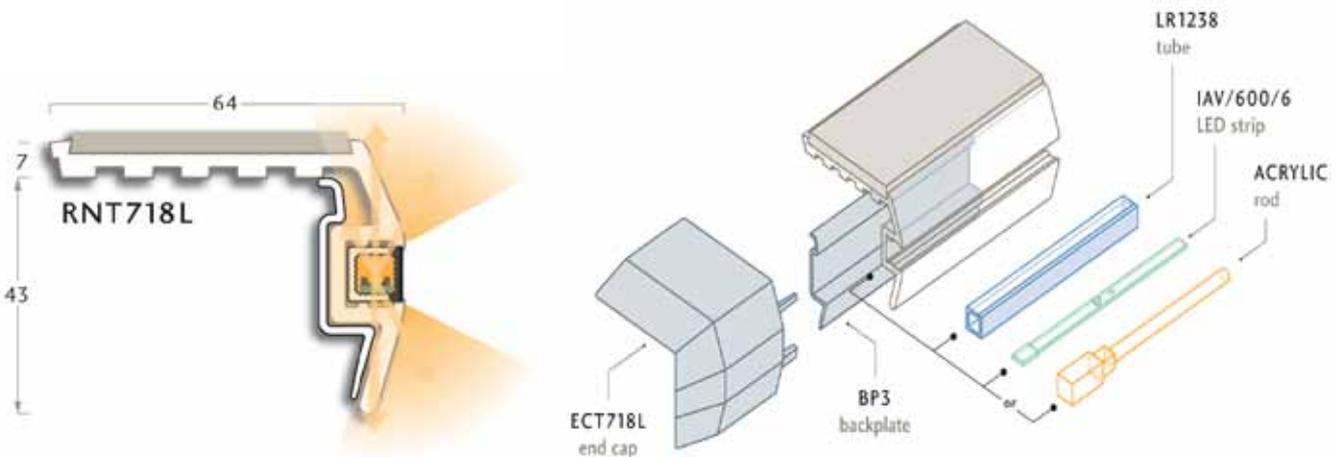
Light can only escape in one direction from aluminium profiles, so ensure the LED's are pointing away from the profile, and the black stripe on the LR1238 tube is not blocking the light.



**LR1238** should be fitted with black stripe at the back and clear at the front / top **Interlock Advance** – Fit the IAV/600/6 strip with LED's facing towards the front / top **Continuity** – Fit the rod with the white stripe at the back.

### PVC profiles

Light will pass through the clear parts of the PVC profile. Light can be blocked from travelling forward by rotating the LR1238 tube so that the black stripe is at the front.



**LR1238** can be fitted with black stripe blocking light, or with black stripe at back.  
**Interlock Advance** – Fit the IAV/600/6 strip with LED's facing in the desired direction.  
**Continuity** – Fit the rod with the white stripe opposite to the desired light direction.  
**BP2 or 3** – Fit behind the front of the step edging to cover the riser.

## Installation

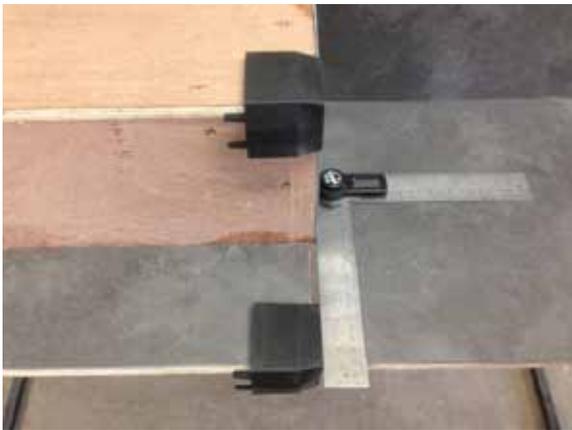
### Preparation for nosing and cable management installation

In all cases, the surface to be fixed to must be free from grease, moisture, dust, and debris. Track and nosings to be fixed using gap filling adhesive and mechanical fastenings.

Step edges should be manufactured as square as possible at all times.

All cuts should be made using a suitable tool to ensure square edges, and care should be taken to achieve perfect mitre joints in the cable management.

### Installation of the Step System (RNT1218L)



1. Mark on the step the position of the endcap, the cable management and nosing sizes can now be determined.



2. Mark below and the back of end caps to determine length of cable Management.



3. Cut Mitres (Cable Management).



4. Mark where straight cuts are required.

## Installation of the Step System (RNT1218L) continued



5. Apply gap filling adhesive (Substrate must be in good condition).



6. Position correctly.



7. Cut nosing to required length.



8. Cut backing plate to same length as nosing.



9. Apply adhesive (keeping clear of screw hole & 50mm away from each end).

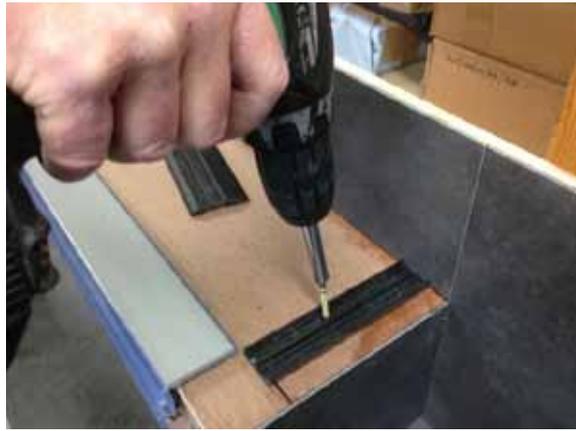


10. Screw nosings (concrete steps require sealant for adhesive to adhere to).

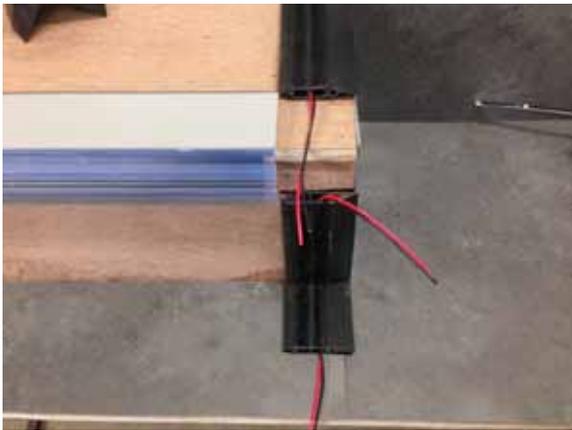
## Installation of the Step System (RNT1218L) continued



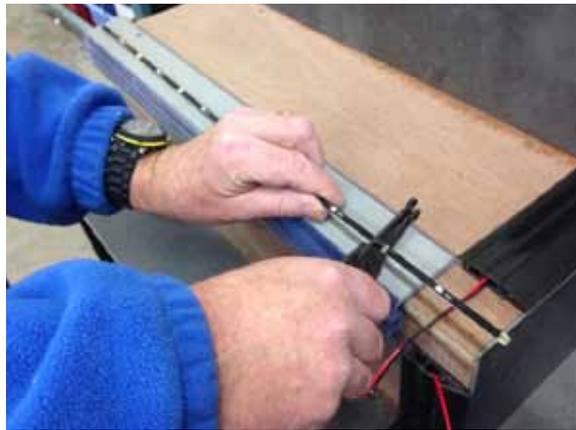
11. Insert Pip to cover.



12. Once gap filling adhesive has cured, remove clip-top cover to insert securing screw.



13. Wiring should be placed into appropriate channel in relation to channel in the end cap.



14. Cut circuit board to required length.



15. Insert circuit board into IAVC1 (Input).



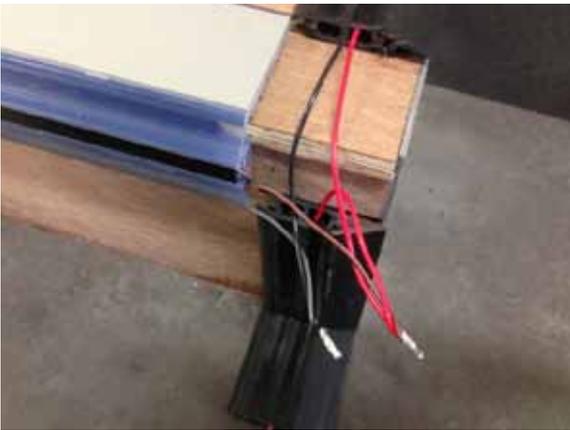
16. Cut PVC tube to required length.



17. Insert lighting circuit (making sure black out strip is in the correct position).



18. Insert tube into stair nosing.



19. Cut and strip wires (correct polarity required).



20. Crimp wires using correct size crimps.



21. Insert crimps into cable management system.



22. Install end cap inserting legs into appropriate retainers.

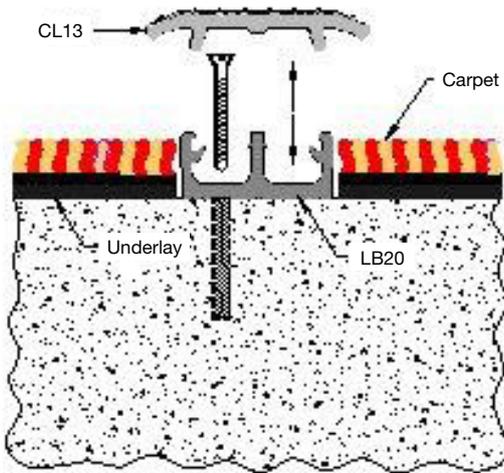


23. Secure end cap with screw.



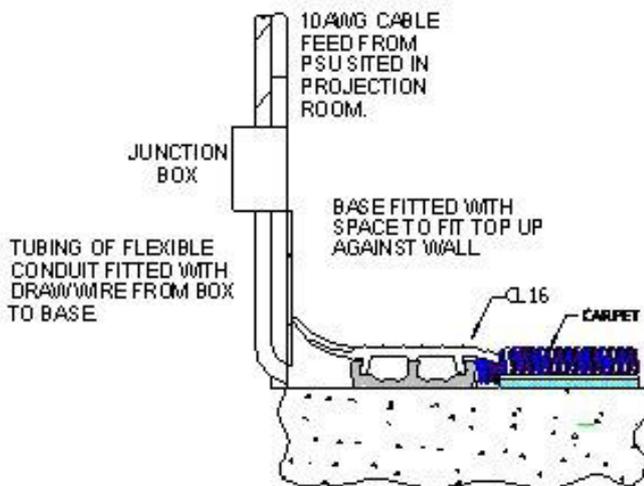
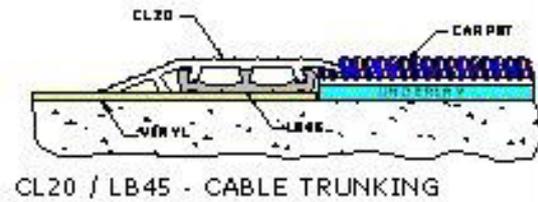
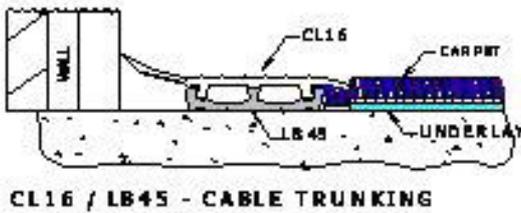
24. Insert Pip to cover.

## Installation of Aisle System



1. Find the correct positioning for the base by fitting some top to it, then placing in desired location.
2. Mark base position and remove cover.
3. Apply adhesive and stick base in position.
4. Drill through base into concrete using masonry drill bit.
5. Insert mechanical fixing and secure as diagram.

## Typical Installed Aisle Trims



The aisle \LED loom is supplied on a 50M reel.

One end of the loom is connected to a fused junction box supply.

A conduit from the junction box carries the wire to the floor level.

Normally the LB45 base is screwed to the floor in one channel, and the lighting is placed in the other.

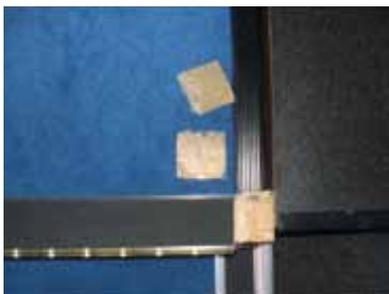
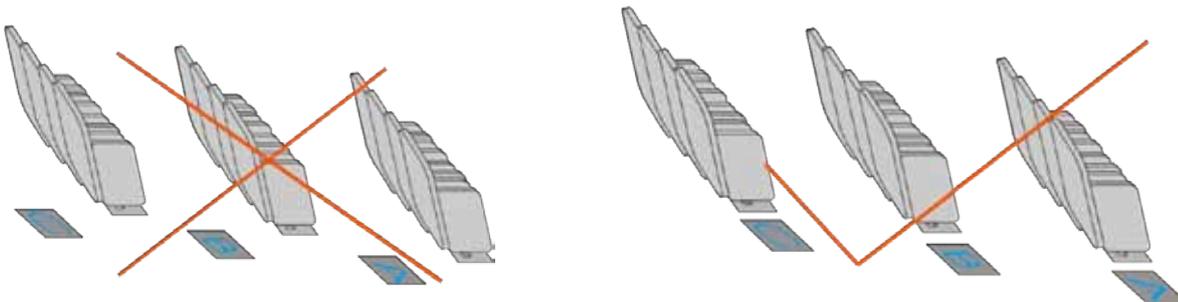
The capping is then clipped onto the base.

## Row Indicator Fitting Instructions

### Fitting Details;

The row indicators are designed to be fitted into carpet; usually they are fitted in the corner of the step edging and the cable management system, next to the seat, each side of the step.

**Take care to avoid placing the row indicator in the middle of a row where it will cause confusion and sustain more damage.**



1. Cut a 67mm square hole in the carpet and underlay



2. Draw the IAV led strip from the endcap areas, under the carpet to the hole



3. Use an adhesive suitable for the substrate



4. Pull the IAV led strip through the nearest cut out on the corner of the row indicator base



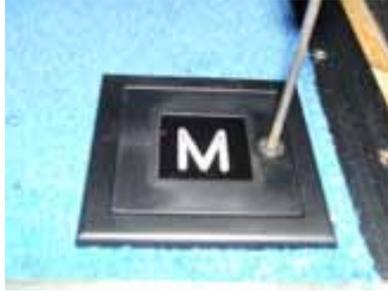
5. Screw base to the floor.  
NB, **ensure the base is correctly orientated, the embossed letter A indicates how the finished row indicator will appear**



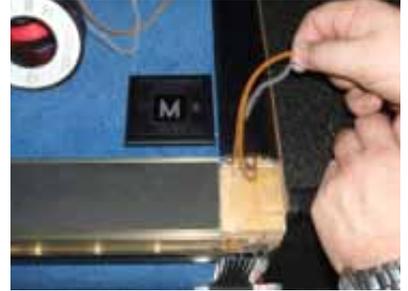
6. Place the IAV LED strip in the locating lugs as shown, with the LED's facing towards the embossed letter A



7. Fit the tile flat side down, with the letter turned the correct way



8. Slot the frame into the cutout in the base, then tighten the hex screw



9. Connect the IAV led wires into the supply, red joined into the red and black into the black cables



10. The crimped connectors should be inserted into the cable management, and the endcap fixed into the step edging

## Installation of the Wall Lighting System



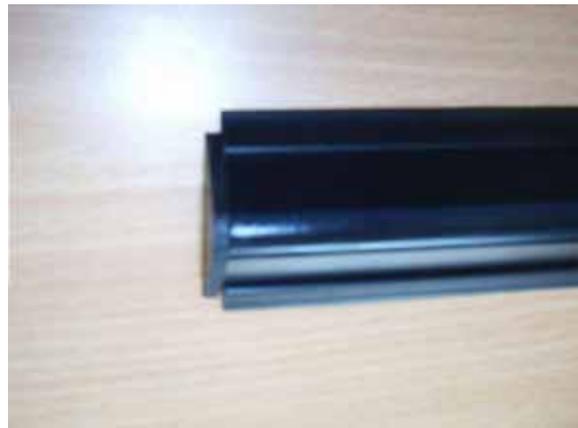
1. Mark the wall in the position where the Wall light housing is to be mounted, drill suitable holes and insert wall plugs. We recommend 3 fixings per metre.



2. Insert the Interlock Advance lighting into the channel in the Wall Lighting housing. Due to the tolerances in the plastics, it may be necessary to use small sticky pads or silicone to hold the lighting in place in the channel. On corners, use the IAVC3 connector as shown on page 9.



3. The Wall light cover can now be fitted to the base. This simply clips into the base, ensure the clear lens part is on the bottom, allowing the lighting to shine to the floor.



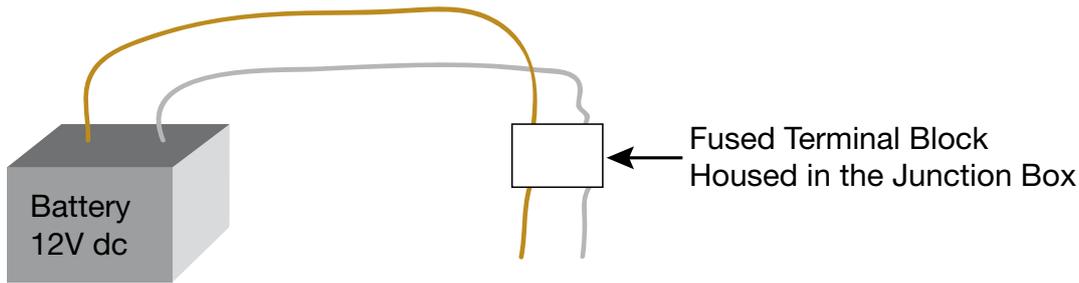
4. Apply some superglue to the endcap piece, and then hold the endcap firmly against the end of the wall profile for a few seconds.

## Testing & Basic Fault Finding

### Testing

It is recommended that individual parts of the circuit are tested before they are connected to the corresponding Junction box.

This can be done by using a 12V DC battery pack.



If the light system does not illuminate first Check Polarity of the connection then refer to the basic fault finding section.

Once all the light system has been checked connect the wiring up to the terminal block (with fuse removed).

Switch on the power supply check that 12V dc is present across the input to the terminal block

Insert Fuse Check 12V dc is present, if it is present but circuit not illuminated check the polarity of the wiring.

If the circuit is still not illuminated, refer to the basic Fault finding section

If illuminated the system is functioning.



**All Electrical Installation, connections and Testing must be carried out by Qualified Personnel.**

## Basic Fault Finding

The system has been designed so that the floor loom is generally made up of two separately fused circuits and each set of stairs is separately fused.

This has the double advantage of aiding fault finding and preventing a single fault from causing the entire auditorium step and aisle lighting to fail.

These fuses are located in the junction boxes normally located at the top of each stairway and just inside either side of the entrance doors. The fuses should never be greater than 5A quick blow, UL approved fuses.

Each Power supply unit (PSU) is also fused. The PSU's are fed from a distribution Panel via breaker or via a mains supply socket. The Distribution Panel is normally sited in the projection suite.

<b>Fault</b>	<b>Most Likely Cause</b>	<b>Action to Take</b>
All Lighting Out	Power Supply Unit	See section A
One Aisle Not Working	Feed point fuse blown due to short	See section B
One step not working	Connections or input failure	See section B 6-11
One section of a step not working	Circuit board, connection link or flexi corner failure	See section B 6-11

Any replacements made to Gradus products including fuses and circuit boards must be exact replacements unless advised otherwise by the Technical Department.

## Section A

### Power Supply Fault

(A competent electrician must carry out work on the mains side of the transformer.)

Ensure there is power to the power supply and a 12V – 15V DC output from the power supply.

#### 1) Blown output fuse

- a. Wire from P.S.U. to feed point(s) short, replace cable and fuse.
- b. Short on step circuits caused both feed point fuse and P.S.U. output fuse to blow – see B.

#### 2) Blown input fuse

- a. Transformer fault, replace entire P.S.U.

## Section B

The steps are generally wired in black and red cables, the red cable being the positive. In the feed point at the top of the steps, (usually a one gang wall box fitted at or just above skirting level), there will be a fuse.

The cables then run down the cable management system to the steps.

If all of the lighting on an aisle is out, then a fuse in the feed point may have gone due to a short or faulty component.

Isolate the fault using the following methods.

- 1) Identify the feed point for the circuit which is not working and check if the fuse has blown.
- 2) Insert a new fuse and observe the steps.
- 3) If the lighting only comes on for a few seconds, it should be possible to observe any steps that do not come on, or are much dimmer than the rest. If this is the case proceed to 6).

*If the fuse blows immediately, then the following steps should be taken.*

- 4) Locate crimped connectors for a step halfway down, and disconnect the bottom half of the lighting, both positive and negative cables.
- 5) Insert another fuse.  
If the top half of the steps comes on, repeat this procedure 3/4 of the way down the steps after reconnecting the halfway point. Repeat again until the fault is isolated.  
If the top half does not come on, repeat this procedure for the first quarter of the steps, and repeat again until the fault is isolated.

*If the short has occurred in a wire, replace or repair the wire.*

*If the fault has been isolated to a step;*

- 6) Remove the lighting from the step and examine the circuit board for any signs of damage.
- 7) Replace any damaged boards and ensure that the replacements are exactly the same as the boards removed.
- 8) Connect the supply to the boards again to ensure correct operation.

*If the fault still exists;*

- 9) Remove all boards from the input connector and supply power to the connector.
- 10) Add each component until the faulty component is added and the fuse blows.  
Replace faulty component.

### Note

Where applicable before removing the lid of the PSU make sure that electrical power is isolated. Ensure correctly rated fuses are used for replacement.

Investigate cause of failure before replacing blown fuse.



**Isolate the power supply before removing cover to the PSU, or carrying out any work between the Distribution Panel & the output of the power supply.**

**A qualified electrician must carry out all electrical work.**

## **Basic Maintenance**

The Step and Aisle lighting system will require the minimum of maintenance. Care should be taken to correct damage caused by vandalism, or fair wear and tear, as soon as it occurs to prevent further problems.

Clip top covers should be checked occasionally and tapped back into place using a rubber mallet if they have become dislodged.

The clip top cover and nosings should be periodically cleaned with a neutral soapless detergent and a soft cloth.

During cleaning care should be taken not to flood the floor looms with cleaning solution.

## **Recommended Procedure**

### **Monthly**

Recommended schedule for a visual inspection is every month

1. Check Aisle & Step system for physical damage (such as clip top or covers are still intact & the nosing & base unit are still secure to the floor)
2. Check for exposed LED strips or cables
3. Check lighting illumination in steps and aisle for faulty LED's (this is normally indicated by uneven spacing)

### **Annually**

A full system test should be conducted by a competent service engineer/electrician

**Note: A visual inspection may be carried out by responsible personnel but it is recommended that actual maintenance should be carried out by suitably qualified personnel (qualified electrician)**

## **Contacts**

The Technical Service Department at Gradus Ltd is available for help and advice during normal working hours  
Monday to Friday except Bank Holidays

When contacting the Technical services department we would ask you to ensure you have as much information to hand as possible

**Tel: (+44) (0) 1784 457345**

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