EMC TECHNICAL MANUAL

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1.0 INTRODUCTION

All electrical and electronic products supplied by Taylor Lifts have been tested to the necessary EN standards to give compliance with the European Directive 2004/108/CE

As Taylor Lifts supplies sub-assemblies to the lift industry there is no mandatory requirement to comply with the EMC Directive. Such component parts are outside of the directives scope as they constitute items that have no intrinsic function themselves; it is only when they are combined with other components to form a system that the EMC Directive is invoked.

Taylor Lifts have ensured the products they supply comply with the EMC Directive for two reasons

a) Customers are requesting evidence of compliance.
b) It is not possible to fully test the EMC compliance of a lift in-situ. Therefore for the lift company to demonstrate compliance of the complete lift installation, they may self certificate the lift system. The basis of the rationale is that if all the individual components have been tested and comply with the EMC Directive and if they are all installed to the correct specification then compliance will be achieved.

Taylor Lifts approach for showing conformity is via the self certification route using the EMC standards for lifts EN12015 and EN12016, with due consideration being given to the generic standards EN50081-1/2 and EN50082-1/2.

In order to maintain this compliance it is recommended that certain precautions are taken during the installation of the control system. This installation manual has therefore been produced in order to assist the installer, in obtaining EMC conformity of the lift installation.

This information is given as a guide and represents Taylor Lifts understanding of the EMC regulations in the UK at present. Although every care has been taken in the preparation of this document, Taylor Lifts cannot accept any responsibility for any omissions, errors or misunderstandings made in the lift companies individual applications.

2.0 EMC AWARENESS

2.1 Good EMC practice promotes: -

a) Lower emissions levels
b) Higher immunity levels
c) More reliable products
d) Better appreciation of products and their constraints
e) Improved electromagnetic environment

2.2 Installation

Trunking and conduit used within the machine room should be metal, preferably galvanised steel and securely bonded throughout its length. Flexible conduit should be manufactured from galvanised strip with a PVC sheath.

EMC emissions will be generated throughout the length of the cable run. These radiated emissions will escape from any gap within the trunking / conduit system. Screened copper motor and mains cables will offer good attention.

Any signal wires should be separated from mains and motor wiring by a gap of at least 25mm. Please note do not run control, signal or digital cables in the same trunking as the motor cables. This can be achieved either by using separate trunking / conduit runs or via metal partitions within the trunking. Cables of differing voltages, e.g. control, signal or digital cables, should be as far as practical kept separate.

Identify types of earth bonding cables which exhibit low impedance at high frequencies. Select the best performance screened cable and suitable 360 degree earth bonding.

2.3 Cable runs

Conducted Emissions

Interference generated by electrical or electronic equipment or its power supply can then be coupled directly onto mains cables. Interference may also be coupled either inductively or capacitively from another cable onto the power cable. In variable speed inverter applications the primary emission source comes from the electronic inverter system which will conduct the switching currents of the transistors directly into mains cables. The secondary emission sources come from currents flowing in microprocessor clock signals or other oscillator driven equipment.

Radiated Emissions

Site wiring and controller wiring can be very efficient at coupling radio frequency energy in and out of the system, at the lower end of the VHF spectrum (30MHz to 100MHz). The coupling mechanism is enhanced at the resonant frequency of the cable, which depends on the length of the cable and equipment attached to it. In most variable speed inverter applications the primary radiated emissions come from currents flowing in the hoist motor cables and switch mode power supply cables. The secondary emission sources are from currents flowing in circuits (CPU clocks, data bus drivers and oscillators) that are mounted on PCB's. The amount of secondary emissions from PCB's will depend on the coupling mechanism, long PCB tracks or ribbon cables will enhance this mechanism.

Conducted/Radiated Immunity

Immunity is built into the design of the control systems according to the EMC Standards. The level of immunity does not change with site conditions, but the system needs to be correctly installed to achieve these levels of immunity.

2.4 Summary

a) As good practice always avoid running safety circuits in succession, try to space them out throughout the trailer.
b) Avoid parallel runs of signal (low voltage) and supply or power cables (high voltage). Cables of differing voltages should as far as practical be kept separate.
c) Trunking and conduit should be metal, preferably galvanised steel and securely earth bonded throughout its length. Flexible conduit should be galvanised steel with a PVC sheath.
d) Ensure motor and mains cable is always run in screened copper cable, for greater confidence this should also be run in metal trunking.
e) Any signal wiring must be separated from motor cables by a gap of at least 25mm. (Note; do not run control, signal or digital cables in the same trunking as the motor cables).
f) Ensure all serial communication and encoder cables are in screened cable. CAN bus serial communication equipment should be run in twisted pair cable.
g) Ensure all screened cables are terminated correctly as explained in section 5.3.
h) Ensure all earth connections are terminated correctly in the control panel as explained in section 5.0
i) It is essential that the building has a suitable low impedance earth that is run to the lift motor room. **Without this EMC is not effective.**

3.0 FUNDAMENTALS OF GOOD EARTHING

A well designed layout and earthing system can offer both improved immunity and lower emissions, whilst a poorly designed one may be a source of emissions and poor susceptibility.

Consider the earth cable as a path for current flow, both of interference into the system and conducted from it. It is important to minimise the earth impedance by utilising cable which promotes low impedance at high frequencies.

Please refer to **BS IEC 61000-5-2:1997** EMC Installation and mitigation guidelines, Earthing and cabling, for more in depth guidelines.

Following good earthing practice will:

a) Guarantee personal safety.
b) Make the interference levels low compared to the desired signal.
c) Give a low impedance path return for currents to return to their source.

4.0 WHAT IS A GOOD EARTHING SCHEME

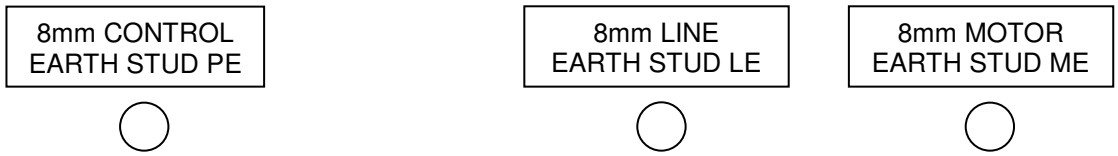
4.1 Earthing schemes

A good earth connection back to the main incoming supply is essential to ensure sound EMC compliance. Make sure there is continuity with metal to metal contact (all paint is scrapped away when necessary) and also that all connections aresecure through all points.

4.2 Earthing to the control panel

Do not attach earth cables to the studs on the cabinet frame or door, these are for the earth straps to provide protection. All earth wires should return to the studs provided on the backplane.

Earth Studs found in the control systems:-



All control panels have various earth studs located near the various terminals, there is a dedicated stud for the line and motor earths. All earths to the external equipment should go to the control earth stud below the terminal rail.

4.3 Earthing screened cables

Screened cables, particularly those used by variable frequency inverters need special attention. The overriding requirements for terminating a screened cable is a connection direct to the metal chassis or controller earth points on the backplane which ever exhibits the lowest possible impedance to earth.

The best termination for screened cables is one where the screen shield extends up to and makes a solid 360 degree connection to the ground plane. Where the screened cable is longer than 30 metres, re-earth using a suitable 360 degree connection at 15 metre intervals.

With power cables the screen should always be terminated at both ends. With signal cables it depends on the length of cable for short runs screen one end but for longer runs screen both ends.

As stated earlier a 360 degree earth bonding is best, but when a pigtail screen connection is used the pigtail needs to be kept to a minimum, no more than 50mm.