White Paper

Safety Testing of Electrically Powered Height Adjustable Beds

Class I or Class II?

Height adjustable beds or couches, often called hi/lo beds, are found in many medical centres and physiotherapy practices. They are used for patient treatment, examination and even minor surgical procedures. There are several brands and models in current usage and most are usually powered by a linear actuator.

A common misunderstanding is that modern hi/lo beds are almost exclusively Class II electrical appliances. This in fact is not always the case and we need to be wary of testing beds as double insulated where in fact they are not. So what are the criteria for deciding which electrical class a bed has been built to?

The first determining factor is the labelling of the bed. If the manufacturer has affixed a double insulated symbol like this

then the bed can safely be considered Class II. Sometimes, but not often, the words 'Class II' or 'Double Insulated' will be used, with or without the symbol. But what if none of these are present?

In the absence of a Class II or double insulated marking an appliance must be considered to be Class I (unless it is battery powered). This means it must have an earth connection. Usually this will be evident by the green/yellow earth wire seen in the 3-pin plug; however moulded plugs are often used and it may not be possible to see the internal mains cord wires. The presence of a factory-fitted 2-pin mains plug usually means the appliance was built as Class II but the markings are missing. Some investigation may be required to confirm this and the missing marking replaced. Assuming a 3-pin plug is used, the next step is usually to check earth continuity with a resistance meter.

Now here is the trap. A Class I appliance can have metal components that are unearthed. This is quite acceptable and is in fact the case with many, but not all, Class I hi/lo beds. The bed frame and lifting mechanism is not earthed. You might think it should be, given the risk of the mains cord becoming entangled in the working parts, but that's a separate issue. Finding that the bed frame is not earthed **does not make the bed double insulated!** And remember the absence of makings means it must be treated as a Class I appliance.

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The important point here is to establish whether or not the bed frame or other metal was intended to be earthed by the manufacturer. A visual inspection should confirm whether earth bonding wires are present or if there is an insulating barrier between the mains powered actuator and the rest of the bed. If it is apparent that exposed metal is intended to be earthed, then the earth resistance must test to within the appropriate limit. In fact any measurable resistance between the earth pin on the mains plug and metal parts of the bed indicates an intended earth connection. If it is established that the bed was not intended to be earthed then of course any metal must be fully insulated.

The standard Class I tests (earth continuity, insulation resistance, earth leakage and touch current) should all be performed and must be within the expected limits. A low earth leakage current, while being a good thing, does not make the bed double insulated. It is still a Class I appliance with low leakage.

Where there is no exposed earthed metal to check earth bonding this needs to be noted. In this case it can be considered that the earth is present not as a protective earth, but usually for shielding purposes. Many linear actuators contain an inbuilt transformer, with the motor and control circuitry running on extra low voltage (usually 24 volts). The isolation provided by the transformer may perhaps be the justification for not needing to earth the bed frame and other metal parts.