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## MOOPs and MOPP's



Medical



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## Background – MOP, MOOP and MOPP

- Electrical medical devices, Healthcare and Dental products must comply with specific country or industry safety standards that are based on IEC60601-1
- The 3<sup>rd</sup> Edition of the medical standard IEC60601 was published in 2005 and introduced the concept of Means of Protection (MOP). This allowed a clear differentiation between healthy operators of medical equipment (nurse, doctor, surgeon or technician) and patients dependent on medical equipment.

There are 2 sub-classifications within MOP:

- Means of Operator Protection (MOOP)
  - 1 x MOOP is equivalent to basic insulation under IEC62368-1
  - 2 x MOOPs is equivalent to reinforced insulation for operator, the same as in IEC62368-1
- Means of Patient Protection (MOPP)
  - 1 x MOPP is equivalent to basic insulation for a patient under IEC60601-1
  - 2 x MOPPs is equivalent to reinforced insulation for a patient under IEC60601-1

## Additional – MOP, MOOP and MOPP

Dependent on the MOOP or MOPP classification IEC60601-1 defines different levels of Isolation, insulation, creepage and leakage current<sup>1</sup>. Table 1.

Classification	Withstand Voltage	Creepage	Insulation
1 MOOP	1,500VAC	2.5 mm	Basic
2 MOOP	3,000VAC	5.0 mm	Double/Reinforced
1 MOPP	1,500VAC	4.0 mm	Basic
2 MOPP	4,000VAC	8.0 mm	Double/Reinforced

Table 1. based on a working voltage of 240VAC

- Creepage is defined as the shortest distance along the surface of the insulating material between two conductive parts.
- Clearance is the shortest distance through air between two conductive parts

<sup>1</sup> Leakage currents are the subject of another medical quick guide from TDK-lambda

## Power supply MOOPs and MOPPs

- Ideally a medical power supply is designed with the following MOPP classifications for patient protection, this can help reduce cost and simplify the medical equipment design later.
  - 1 x MOPP primary input to PE (protective earth)
  - 2 x MOPP primary input to secondary output
  - 1 x MOPP secondary output to PE (protective earth)
  - 1 x MOPP secondary output to PE can be a big benefit to the system designer
  - Can simplify their design and reduce risk



