



INTRODUCTION:

Further to my TTXGP 'General Thoughts' and TTXGP 'Electrical Risk Assessment' (E.R.A.) postings, I respond to a few issues raised subsequent to the E.R.A. posting:

CLARIFICATION/SUBSTANTIATION OF 'HAZARDOUS VOLTAGE'

I have received many comments, (supporting and querying), the following item in the E.R.A., in part quote: To summarise, in my opinion voltages in excess of 50V AC or DC and current in excess of 60mA with 'skin in place' and 1mA with 'no skin barrier' are hazardous.

I stand by 'my opinion' absolutely, a simple equation and much more importantly a brief Google search of Reputable Sources substantiates and in some cases quotes even lesser voltage/current levels as hazardous, examples:

OHMS LAW: Given that many consider the 'average' human body to have a nominal resistance of 50,000 Ohms and if 1mA (one thousandth of an Ampere) is the 'equation test current' then the voltage, (the potential difference) required for said current to flow is 50 volts, ($E=I \text{ (current)} \times R$ resistance), admittedly a somewhat simplified equation/explanation, many other factors can and do impact on hazardous situations and the potential for electrocution.

IEC 60950: In part states that 'minimum hazardous voltages' are 42.4V AC (peak) and 60V DC. (Also quoted in CSA, Canadian Standards Association data).

HAVELLS PUBLISHED DATA: Human body known 'voltage' limits, Dry Skin: 50V, Damp conditions 25V. Impact on the Human body from various 'mA' current levels, 10mA: person stuck to contact point and cannot let go, 20~30mA: Muscle contraction and can cause respiratory paralysis, 70-100mA: Cardiac fibrillation.

USA OSHA DATA: Requirements state that all 'voltages' greater than 50V be identified as a baseline for Hazard Assessment, and Training of Employees on Safe Work Practices are required where said 'voltages', or greater, are present.

USA NATIONAL ELECTRICAL CODE (NEC): A hazardous voltage is a voltage greater than 50V.

At no time do I wish to appear alarmist or in condemnation of the TTXGP, I repeat my conviction that the TTXGP will be beneficial to the TT, however I continue to be concerned about Electrical Safety, particularly with regard to TT Riders and First Responders, (TT Marshall's and TT Medical) in the event of a crash (hopefully none), involving a TTXGP Battery Powered Motorcycle. Another clarification, when I state 'crash' I mean a catastrophic crash, 'worst case scenario', end for end Motorcycle into a wall type crash, hopefully all realise and are aware of the crash energy involved and the lack of run off areas at the TT.

ELECTRICAL TERMINOLOGY:

I accept some may not understand some of the Electrical terminology used here, hopefully the following assists all to read the posting.

V=Volt or 'Potential Difference' between two points.

A= Ampere, the measurement of electrical current.

mA= milliAmpere, one thousandth of one ampere.

DC= Direct Current, generally as sourced from a Battery or Rectified AC.

AC= Alternating Current, generally as sourced from the Electrical Grid or Inverted from a DC supply.

E= In a mathematical equation the letter representing voltage, in volts.

I= In a mathematical equation the letter representing current, in amperes.

R= In a mathematical equation the letter representing resistance, in ohms.

OHM= Measurement of resistance, in ohms.

INVERTOR=A device to invert DC current to AC

CONVERTOR= A device to convert AC to DC

MSDS= Material Safety Data Sheet