The use of IEC connectors at elevated ambient temperatures

Connectors that are approved in accordance with IEC 60320 are suitable for use at ambient temperatures of up to +40 °C. The average temperature over a period of 24 hours should not exceed +35 °C with a lower limit of -5 °C for the ambient air temperature. But can it go higher?

The appliance inlet classification is based on the maximum permissible pin temperature (cold = 70°C, warm = 120°C or hot = 155°C). This pin temperature is measured at the base of the pin. In addition to the ambient temperature, the temperature of the pin is also influenced by the temperature reached when in the appliance is in use.

However, the temperature of the pin is by no means always the limiting factor. The limiting element is almost always the insulating material of the housing of the connector.

The insulating material used in SCHURTER connectors is specified in the list attached along with the respective certified Relative Temperature Index for electrical stress (RTI_{elec}), in accordance with the respective UL Yellow Card. This value indicates the aging temperature that a material can withstand over a period of 100,000 hours and while still retaining at least half of its original material properties (in this case its dielectric strength).

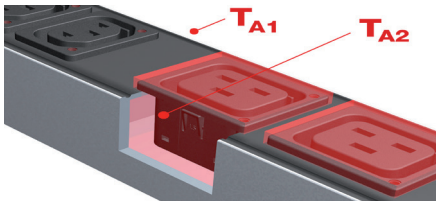

Fig. 1: The virtual volume is to be taken as the area around the installation socket in question with an ambient temperature of T_{A2}.

The RTI_{elec} reduced by the rise in temperature ΔT provides the upper limit for the ambient temperature T_{A2} in which a safe operation is ensured.
$RTI_{elec} - \Delta T = T_{A2}$

The rise in temperature ΔT is calculated by the maximum temperature measured at the hottest point T_b within the appliance coupler - depending on the current flow - minus by the ambient temperature T_{A2}.

$T_b - T_{A2} = \Delta T$

This means: Depending on the maximum occurring ambient temperature and the period in which the appliance coupler is subjected to elevated temperatures, use can also be regarded as uncritical at operating temperatures that exceed the specification listed in the appliance inlet standard.

The following derating curves for specific SCHURTER connectors show the maximum recommended ambient temperature T_{A2} with respect to the current applied.

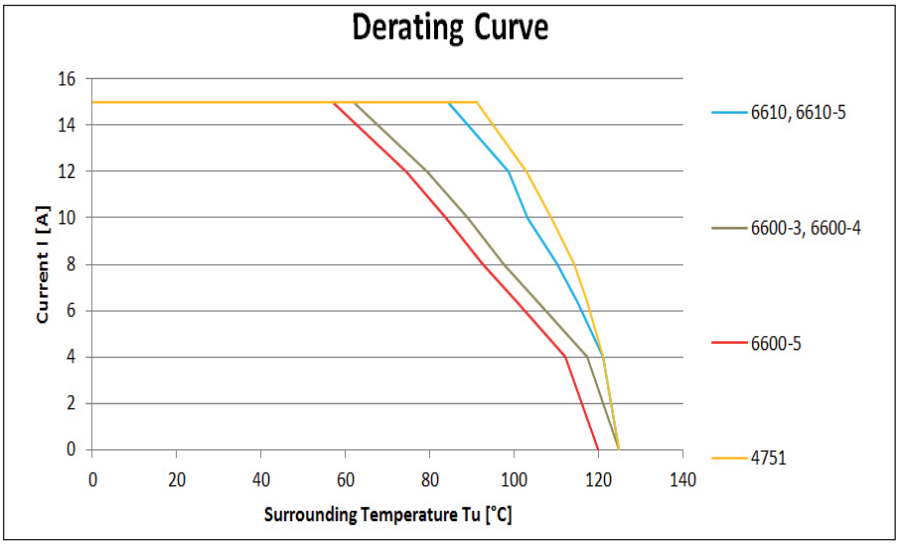

Fig. 2: Derating curves for selected SCHURTER outlets Type F (IEC 10 A / UL 15 A)

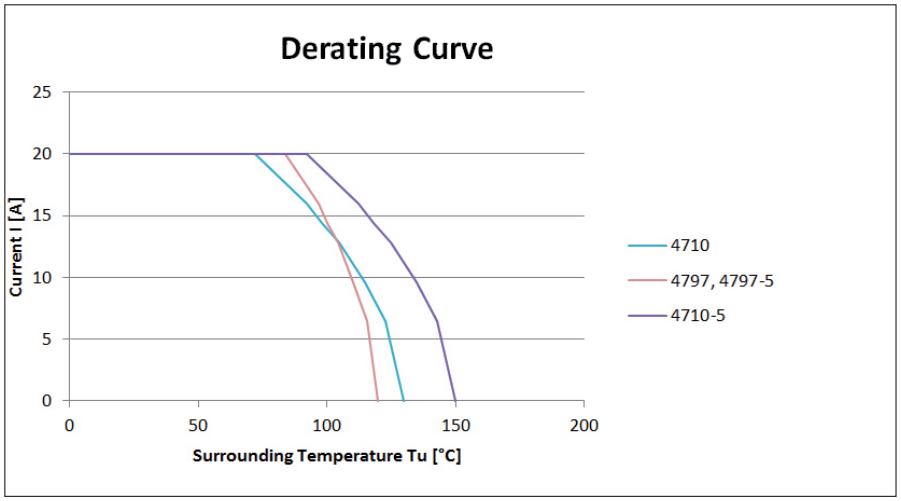

Fig 3: Derating curves for selected SCHURTER outlets Type J (IEC 16 A / UL 20 A)

Note: If connectors are operated at temperatures that are higher than those listed in the respective component standard, SCHURTER assumes no responsibility for any defects and consequential damage.
There is also the risk that when a device is subjected to the approval process according to the corresponding device standard, the testing body may object to the use of a component outside its component standard. It is important to distinguish in these cases.

Related Links:

-White Paper Mating Connectors
-White Paper Heissgerätestecker
-White Paper Haushaltgerätenorm IEC 60335-1
-FAQ: Gerätestecker

About SCHURTER
SCHURTER continues to be a progressive innovator and manufacturer of electronic and electrical components worldwide. Our products ensure safe and clean supply of power, while making equipment easy to use. We offer a broad range of standard products including circuit protection, connectors, EMC products, switches and input systems, as well as electronic manufacturing services. Moreover, SCHURTER is ready to work with our customers to meet their application specific requirements, not covered in our standard range. You can rely on SCHURTER's global network of companies and partners to guarantee a high level of local service and product delivery.

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