Amphenol-Air LB

Guidelines to select a plug connector as per DIN EN 61984 (VDE 0627)

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The EN 61984 standard replaces the former VDE 0627. This applies to plug connectors for rated voltages from 50 to 1000 V and rated currents to 500A for each contact, for which there is neither no construction type specification, or this specification refers to this standard. Industrial plug connectors can be found in a great variety on the market, but everyone does not meet the requirements of the EN 61984 standard in all its points. In too many cases, the responsibility is on the user, when choosing a plug connector, assumes that every plug which is offered on the market offers the highest safety. But this is not the case.

The DIN EN 61984 standard differentiates between plug connectors with and without switching capacity. The plug connectors without switching capacity and materials which should not be plugged or unplugged under load or when conducting current. Plug connectors with switching capacity, on the other hand, can be plugged or unplugged under current. A significant difference is that plug connectors with switching capacity, the protective ground connection must first be advanced when plugging in and lagged when unplugged (EN 61984, 6.5.1).

The following information is important for a safe selection of a plug connector: Should one unplug under load, one must ensure that the existing breaking capacity is sufficient, or has an enabling device (such as pilot contacts in connection with a load switch). In this case, the plug connector must have an advanced ground contact. This is connected with a metal plug device with the housing. It should be noted that the voltage must be present in a separated state wherever the socket contacts are mounted. In addition to these important instructions, the following information is needed:

Electrical

- Rated current
- Operating voltage
- Type of voltage production

Mechanical

- Number of contacts
- Wire cross-section
- Contact connection type
- (Solder, crimp, PCB, etc.)
- Needed number of plugging cycles
- Outside cable diameter
- Type of protection as per VDE 0470 or EN 60529

Environmental influences

- Contamination in the plug environment
- Environmental temperature
- Environmental aggressiveness
- Requirements as per EMVG or EU Directive 89/336 (replaced by 2004/108)

Rated current

The continuous supplied current is always measured in accordance with ambient temperature. This maximum allowed current can rapidly drop if the environmental temperature rises. The upper deployment temperature given for the plug connector is the approved rated current equal to zero, as otherwise, the upper deployment temperature will be exceeded due to self-heating. The maximum rated current determined in the derating curve can be read for the respective ambient temperatures. In most cases, the derating curve is given per contact; this does not mean, however, that with a multiple or high-pole plug connector that each contact may conduct this current.

Rated voltage

Rated voltage is only given for a certain level of contamination. The level of contamination is defined in DIN EN 60664-1 (VDE 0110) as follows:

- Contamination level 1

There is no, or only dry, non-conductive contamination. The contamination has no influence.

- Contamination level 2

Only non-conductive contamination is present. Occasionally, however, one can count on temporary conductivity due to thawing.

- Contamination level 3

Conductive contamination on or dry, non-conductive contamination which is conductive because one can expect thawing.

- Contamination level 4

Constant conductivity occurs, caused by conductive dust, rain or wetness. The rated current depends upon various criteria for the user.

User-specific:
The protection type of the plug connector and the contamination level of the connector environment as per EN 60664-1 (VDE 0110)

Manufacturer-specific:
Depends upon the voltage strength of the material from which the insulated bodies are manufactured (see EN 60664-1, Comparative Tracking Index (CTI) as well as air and creepage paths). The user has no influence on manufacturer-specific criteria, but user-specific criteria influence rated voltage.

Plugging cycles

The minimum or maximum plugging cycles are given by the manufacturer. These depend upon contact quality and contact surfaces. After the number of given plugging cycles, it is possible that contact resistance no longer provides the value required by the standard.

Backshell selection

In selecting a backshell, it is important to know the outside cable diameter; this is for two reasons:

- Each backshell guarantees the cable pull forces set forth in DIN EN 61984 6.17 only within a specified terminal area
- The seal and thus the protection type (as per DIN EN 60529) of the plug connector is only ensured with regards to the cable diameter range as provided by the manufacturer

Note: The information that the plug connector meets IP67 protection type does not assume that it also meets IP66 protection type. Protection type IP67 is examined with penetration from temporary dunking in water; protection type IP66 is for protection against strong water streams.

A metallic backshell can only be deployed as per EN 61984 6.17 if:

- the plug connector has a ground connected to the housing, or
- only safety extra low voltage (SELV as per IEC 60364-4-41) is used, or
- touching with a test finger as per IEC 60529 is excluded.

In all other cases, the backshell must, if made of metal, have a fully insulating covering.

EMI protection Connecting to a shield

Devices may only be placed on the market which fulfill the requirements of the EMVG [electromagnetic compatibility of devices] and have the CE mark in accordance with the EMVG law.
Thus EMC requirements are derived for a plug connector to a great extent, although there are no statutory EMC requirements for the plug connector itself. In selecting a plug connector with a shield connection, it is important to know the attenuation values of a plug connector with a shield connection. This attenuation is for the most part frequency-depended, and is derived from the characteristics provided by the plug connector manufacturer.