chainflex cables with cleanroom rating: more reliability with IPA certificate

New particle-free Ethernet cables with a 36-month guarantee withstand 24 million stroke test

No abrasion, no particles - and durable. The path to the IPA cleanroom rating is not easy, products have to pass a multitude of tests before they receive the official certificate from the Fraunhofer Institute. This is the same for igus chainflex cables. They have to withstand different conditions in the in-house test laboratory over a longer period of time. igus has developed the CFBUS.LB.045 and CFBUS.LB.049 in order to provide users with cleanroom-compatible Ethernet cables. In the test, they successfully completed over 24 million strokes without failure with just 55mm bend radius.

An impressive 21,900 hits are returned when you search for bus problems on the internet. This is amazing, because actually bus technology embodies the progress in automation like no other. How can this be explained? As a rule, companies that use fieldbus cables today have a clear objective: to combine many sensor cables on field devices into one cable that can be easily and quickly routed to a centralised or decentralised control system. The advantage is that the total cost of ownership (TCO) can be reduced, since an integration of all communication functions into a single network already promises significant savings potential during assembly. For many controllers, however, that remains just a theory, over the entire lifecycle. This is often because they tried to save money in the wrong place, that is with connector and cable. Incidentally, this is not a phenomenon that is only found with classic bus cables: forum posts often reveal connectors and cables as the cause of connection problems for Ethernet cabling, network connections or fibre optic cables.

One solution is to buy preassembled cables. The user who selects these bus systems, keeps the installation costs of their manufacturing plant low and ensures long-term optimal transmission qualities. A positive side-effect when buying harnessed bus cables: the significantly leaner storage and spare parts inventory. However, the theory does not necessarily match the practice:

incorrect connectors and cables can delay commissioning or repair. Often all the measuring devices are then "on green", but nothing happens where something should be moving. The consequence is often the replacement of all systemically relevant components. Because, for many companies this is sometimes more efficient than troubleshooting - which the igus test laboratory undertakes. The objective was to develop products that precisely exclude these problems during installation and maintenance. In thousands of tests in the in-house laboratory, the engineers test cables in motion and in combination with a large number of plug-in connectors, contacts or core end ferrules for functionality and service life. The result: Several hundred harnessed cables, which are used, for example, in energy chains as the bus cable of the chainflex family.

Sits, fits, has no air - faultless contact

Whenever Profinet cables or Ethernet connections are exposed to highly dynamic loads, the link between connector and cable is decisive. Because, the biggest weaknesses are to be found in dynamic applications such as robotic production lines. In order to ensure maximum operational safety and error-free data transmission even after thousands of hours of moving operation, two decisive evaluation criteria are required: first, a cable that does not change its electrical behaviour, even after many millions of movements, which means the defined attenuation values and characteristic impedances must not shift too much; second, a faultless contact between connector and cable cores, an exact fixation of the connector to the system and a snug fit of the terminal brackets in the plug-in connector.

And this is exactly where the problems start in most cases: countless companies offer an almost infinite variety of bus cable and connector combinations. They all have to work together. And this is where theory and practice diverge, because statistically this is rather unlikely.

igus took up this challenge: it focused on the development of bus cables and their long service life in motion. In addition, the focus was placed on tests involving well-known connector manufacturers, who - in addition to the functional reliability of the electrical connection - also had an optimal coordination to each other's goal.

Relaxed bus pairs ensure safety

Numerous tests in the igus laboratory showed that the so-called Insulation Displacement Contact (IDC) brings everything that makes the perfect permanent fit of a conductor in a connector, if the selected conductors and insulation materials match it. Because, here the insulated conductor is first pressed into a gap. This tapers, whereby its flanks are designed as a cutting edge. If the conductor and clamp are brought together, the blades cut through the insulation and strike the conductor. As a result, a contact is formed, which, due to the long-term stable cold welding, is gas-tight and therefore does not age. Corrosion by the ingress of oxygen as well as chemical reactions are prevented, as they may occur in automated processes of petrochemistry.

Keyword automation: igus knows more than anyone else about global regulatory approval requirements. The many certified components and cables secure companies an uncomplicated entry into the digital world and Industry 4.0 anywhere in the world. The fact that stable systems and secure processes are extremely important for the establishment of Industry 4.0 can also be seen from the growing number of industrial robots in use worldwide. An estimated 2.6 million robots will already be in operation next year, many of them with certified chainflex cables. At the same time, these are also examples of a successful combination of cable and bus elements of the CF bus families for Ethernet and Profinet. In order to ensure data transmission over a long period of time and in adverse conditions, the elements were stranded with a particularly short pitch length. In addition, they are protected by a gusset-filling extruded TPE inner jacket. This relieves the bus pair mechanically and fixes the cores in a defined position. The combination of design details, IDC technology and precisely fitting (bus) cable altogether ensures stable data transmission in a manufacturing or industrial process. Here it does not matter whether it is the classic manufacturing process in the automotive industry, or use in the harsh environment of the petrochemical industry or safe handling under cleanroom conditions: the core requirements for a cable can be defined in detail by a multitude of configuration parameters. It starts with choosing the right connectors, their design or the manufacturer, then it goes on to details such as travels and ends up with the choice of specific requirements, which in many cases call for certification. Stable processes and compliance with regulatory

requirements not only keep the total cost of ownership transparent, but they also keep it within limits.

Caption:

Picture PM1819-1

Certified and tested: the new chainflex cables CFBUS.LB.045 (CAT5e) and CFBUS.LB.049 (CAT6) with cleanroom approval withstand over 24 million strokes. (Source: igus GmbH)

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ABOUT IGUS:

igus GmbH is a globally leading manufacturer of energy chain systems and polymer plain bearings. The Cologne-based family business has offices in 35 countries and employs around 4,150 people around the world. In 2018, igus generated a turnover of 748 million euros with motion plastics, plastic components for moving applications. igus operates the largest test laboratories and factories in its sector to offer customers quick turnaround times on innovative products and solutions tailored to their needs.