PRODUCTS

Effective shielding concepts

Application details for WE-LT conductive textile gaskets

Despite all extensively discussed and recommended design rules for the EMC-conform design of components, the interaction between different functional groups within an apparatus has often a sobering effect when tested in the EMC laboratory.
Although installed in a metal casing, the emitted interference radiation is above the threshold.

What has happened?

Most of the times, the casing itself is not part of the electronics development but is developed by the construction department. They make sure that the openings in the casing, e.g. for cable inlets and outlets, ventilation slots, operating buttons, speakers, transducers or displays cause a massive reduction of the shielding action.

But even if the desired openings in the casing were not existent, no complete overlap and hence no RF-density is attainable for contiguous metal surfaces.

*"**Why**"?* is the legitimate question.

If you look at an even metal surface microscopically, you will not see this ideal state. You will rather find that the material is uneven, with asperities on the surface and therefore there is no continuous connection between these two surfaces. Consequently, the shielding is disrupted by slots and if you look at the bonding from a RF-technical point of view, it is "highly impedant". The slots and "eyes", which were formed due to the asperities, are an open gate for shortwave radiation to uncouple and outcouple (see Figure 1).

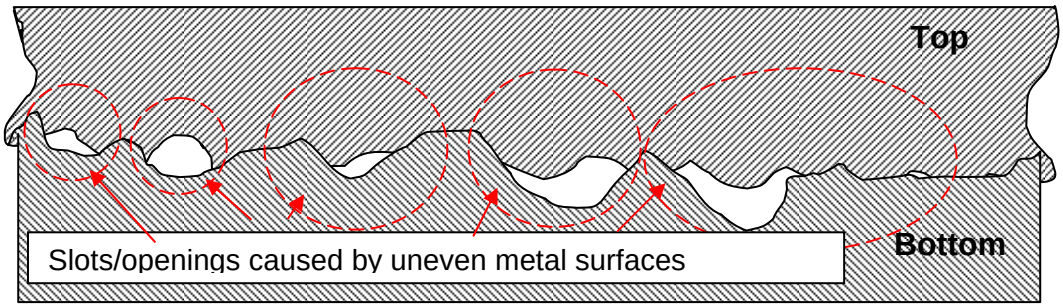

Figure 1: Reduced shielding effect of casings due to slot transducers

Suggestion to solve the problem:

The solution to the problem lies in the bridging and sealing of these asperities. For that purpose, our conductive textile gaskets WE-LT are very well suited (see Figure 2).

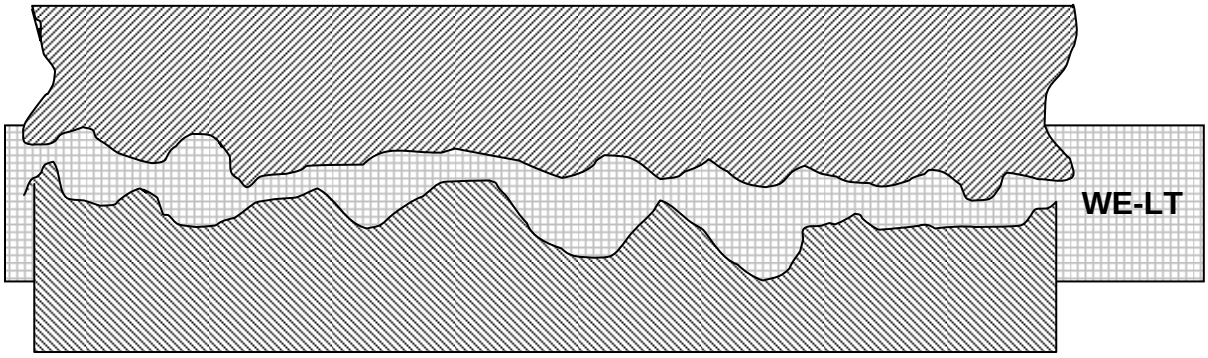

Abb. 2: Sealing of the slots and “eyes” using textile gaskets WE-LT

The textile gasket requirements are always very different and depend on the purpose for which it is used. From practical experience the following minimum standard has proven itself:

- UL94-V0 approved material combinations (always necessary if the end product is for the US market)
- Protection against rough environmental conditions (dust/humidity)
- Good surface conductivity to obtain a low-impedant connection
- Double-sided adhesive tape as fixation and mounting aid

For the application of textile gaskets a certain minimum compression is necessary in order to keep the transitional resistance steadily low. Long-term studies with different compressions have shown that the mounting compression of the gaskets influences the conductivity over time (see Figure 4). A steady compression for contact surfaces of at least 50% is necessary in order to keep the transitional resistance over a long period of time low and steady.

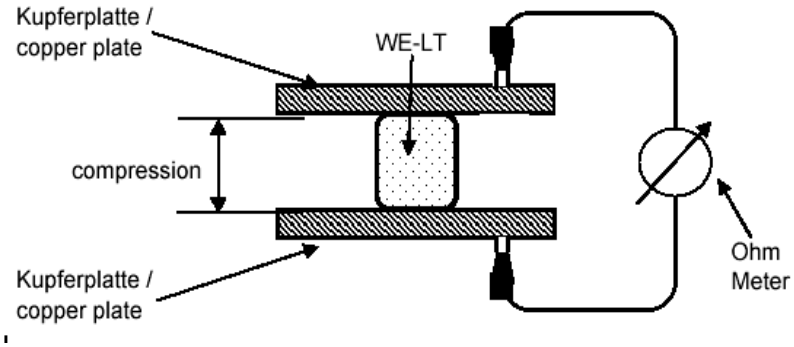

Figure 3: Test setup surface resistance WE-LT vs. compression

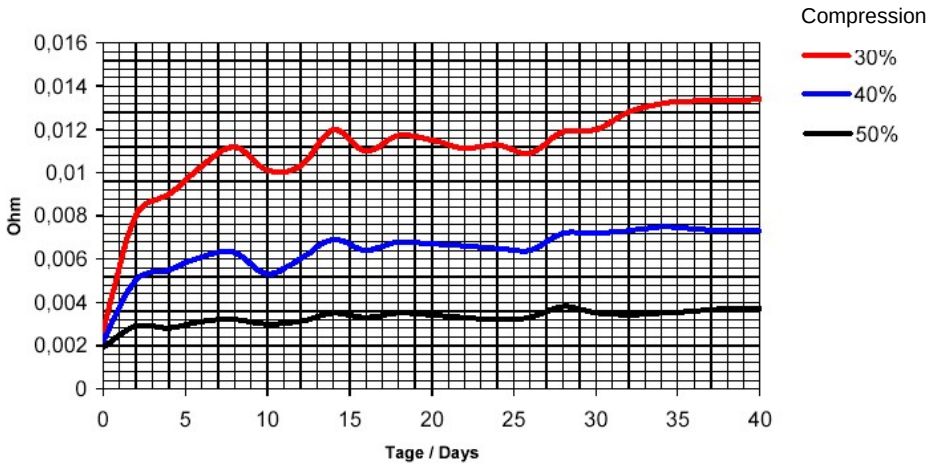

Figure 4: Long-term run surface resistance vs. compression

The typical surface resistance of the series WE-LT is far below **8mOhm.** The reachable shielding effect is approx. 80 dB at 100 MHz and approx. 75 dB at 1 GHz (according to MIL 285 standard).

Positive side effect: At the same time the gaskets fulfil protection class IP54 for dust- and water protection:
IP= International Protection

1.) Key numbers for protection against solid objects	
IP5X	Protected against dust-limited ingress (no harmful deposit)
2.) Key numbers for protection against liquids	
IPX4	Protected against water sprayed from all directions – limited ingress permitted

When you put in contact different materials, a galvanic process takes place, which leads to the corrosion of the contact surfaces. As a result the oxide layer, which has developed, isolates the two surfaces against each other instead of providing for a very good electric connection.

For practical applications the following table should be considered in order to prove the suitability of the material und hence guarantee long durability.

Table 1

Suitability of the material matching for WE-LT:			
+	Aluminium (Al)	++	Chrome / Silver stainless steel 13% Chrome (passive)
+	Iron (Fe)	++	Chromatized Steel 18%, Brass (La)
+	Rhodium (Rh)	++	Stainless steel 13% Chrome (aktiv)
++	Silver (Ag)	++	Stainless steel 18% Chrome 8% Nickel (passive)
-	Steel galvanized	--	Magnesium alleys
++	Titanium (Ti)	++	Monel, Nickel (Ni), Copper (Cu)
-	Zinc (Zn)	+	Platinum (Pl), Gold (Au), Carbon (C)
++	Stannous (Sn)	+	Platinum (Pl), Gold (Au), Carbon (C)

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