Response to: Consultation Questionnaire Exemption Request No. 2020-1 (pack 19)

Exemption 12 for „ *Lead and cadmium in metallic bonds creating superconducting magnetic circuits in MRI, SQUID, NMR (Nuclear Magnetic Resonance) or FTMS (Fourier Transform Mass Spectrometer) detectors* " to be added to Annex IV

Based on the application for exemption issued by JASTEC and the consultation questionnaire from the Öko-Institut, Megin hereby respectfully provides the following input.

Megin is the global leader for Magnetoencephalography (MEG) technology, a non-invasive, functional brain mapping solution which utilises SQUID (Superconducting Quantum Interference Devices) detectors. Megin has submitted a separate exemption renewal request which includes SQUID detectors and where evidence can be provided for the consultation questionnaire this has been outlined below. Megin cannot comment on MRI, NMR or FTMS applications.

Q.1 The applicant has requested the renewal of exemption 12 in RoHS Annex IV based on the current wording but with limited scope:
"*Lead in metallic bonds creating superconducting circuits in MRI (Magnetic Resonance Imaging) or NMR (Nuclear Magnetic Resonance)*"

The exemption request should include SQUID detectors as it is critical for the function of Megin's devices. Megin have submitted a separate exemption renewal request which describes the use of lead in SQUID detectors. Lead-free solutions are not available for SQUID detectors where lead is used in superconducting bonds in the superconducting loops which are immersed in liquid helium at 4.2K.

The exemption wording should include SQUID detectors, such as in the original wording:

Lead and cadmium in metallic bonds creating superconducting magnetic circuits in MRI, SQUID, NMR (Nuclear Magnetic Resonance) or FTMS (Fourier Transform Mass Spectrometer) detectors

Q.2 Please provide information concerning possible substitutes or elimination possibilities at present or in the future so that exemption 12 could be restricted or revoked

a. JASTEC states that only lead-containing solders so far have been found to provide the properties required to create reliable bonds in magnetic circuits of MRIs or NMRs. Do you share this argument?

Megin cannot comment on MRI or NMR applications

b. If lead-free solutions are available for SQUID and FTMS detectors, could they be used for MRI as well?

Lead-free alternatives are not available for SQUID detectors. Lead-free solutions are either not superconducting at the temperatures required or have very reduced reliability either due to the inadequately robust bond formation or potentially due to the formation of tin pest. This is explained in Megin's exemption renewal request. Megin cannot comment on FTMS applications.

c. JASTEC is not the only manufacturer of MRI devices. Do you know of other manufacturers of such devices who have a lead-free solution for the use of lead in the scope of the requested exemption?

Megin cannot comment on MRI applications