

Polymers 2022-02

Technical Bulletin

Introduction to EMI/RFI Applications for Orion Conductive Carbon Blacks

The overall global market for EMI/RFI shielding materials is estimated at about \$6 billion with a CARG of about 5 percent to 2026 (reference 2021- marketsandmarkets.com). This includes EMI shielding tapes and laminates, conductive coatings paints, metal shielding, and conductive polymers. For the Polymers segment in NA – compounders, master-batch makers, and polymer producers are potential targets for applications or product development.

The application requirements include shielding over a broad range of EMI/RFI frequencies and for polymers **mechanical property retention**. Some further definition within this segment follow:

- EMI shielding stands for electromagnetic interference. EMI is defined as an electrical or electronic disturbance. This can be a naturally occurring phenomenon or something man-made. This disturbance is going to cause undesirable effects such as interruption or degradation of service.
- RFI is short for radio frequency interference. The specific difference has a lot to do with the frequency at which electrical distortions fall between. So, all RFI is EMI, but not all EMI is RFI. RFI can be found at any frequency shared by radio transmission ranges—typically more than 1kHz to 10 GHz. Conducted RFI is usually going to be at the lower end of the spectrum, or, less than 30.

Although the EMI/RFI segment is extends across transportation, electronics, aerospace, and many other applications, work in polymers will have carry over in coatings, sealants, and other end uses. Currently these applications are served with conductive metal parts and metal fillers dispersed in liquid or polymeric media. Within Orion Specialty NA, we have completed XE2 compounding work in PC. The focus on PRINTEX® XE2 is derived from the need to impart low resistivity at relatively low black dosages (to maintain mechanical properties). Applications data follow:

Figure 1
Printex XE2 Resistivity in PC [ohmxcM]

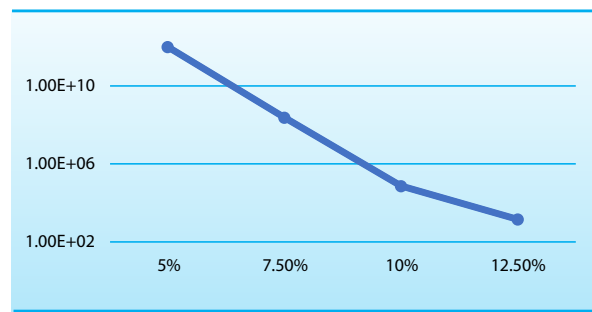
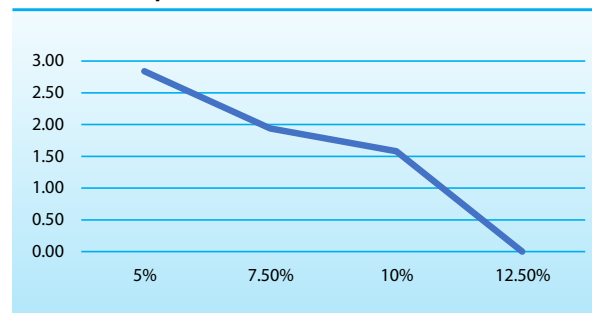


Figure 2
Printex XE2 Impact in PC (kJ/m2)



The data suggest that Printex XE2 at 10 percent in polycarbonate might be a good start note that lower resistivity correlates with better compound shielding efficacy.



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OEC-TB 2022-2-09/2022