February 2017

To: Essex Group, Inc. Magnet Wire / Winding Wire Customers

From: Essex Group, Inc. Regulatory Compliance

Re: Request for Certification of Compliance with Initiatives for Substance Restriction, such as EU-RoHS, WEEE, REACH, GADSL, JIG-101, CEPA, CSCL, etc

Essex Group, Inc. is in receipt of inquiries involving 'initiatives for substance restriction' vs Essex finished magnet wire. These inquiries have included the following:

- Restrictions on Hazardous Substances (EU-RoHS);
- Waste Electrical and Electronic Equipment (WEEE);
- Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH);
- Global Automotive Declarable Substance List (GADSL);
- Joint Industrial Guide-101 – Material Composition Declaration for Electrotechnical Products (JIG-101);
- Canadian Environmental Protection Act-1999 (CEPA) and Canada Chemicals Management Plan /Chemical Challenge;
- Japanese Chemical Substances Control Law (CSCL).

Nothing about Essex finished magnet wire (also referred to as 'winding wire') could be construed as contrary to these aforementioned initiatives.

Specific to RoHS: Based on our internal review of raw material inputs, Essex has determined that its finished magnet wire has no substantive content for lead, mercury, cadmium, hexavalent chromium, and polybrominated flame retardants. This compliance statement holds for RoHS-2 (Directive 2011/65/EU).

Specific to WEEE and ELV: Essex finished magnet wire will not interfere with the collection, treatment, recycling, and recovery of waste electrical and electronic equipment, nor will Essex magnet wire interfere with management of end-of-life vehicles (ELV). Essex magnet wire is based on copper or aluminum conductor, two metals of intrinsic value. Therefore, developed nations should already be well-equipped for managing the reclamation of scrap magnet wire.

Specific to REACH SVHCs and Annex XVII: Essex has reviewed the REACH lists of Substances of Very High Concern (SVHCs) against raw material input for Essex finished magnet wire, **up to and including the SVHC additions finalized in January 2017**.

Some formulations for raw magnet wire enamel coatings do indeed contain REACH-SVHCs 1-methyl-2-pyrrolidone (aka NMP, CAS # 872-50-4) and/or N,N-dimethylacetamide (aka DMAC, CAS #127-19-5). However, analytical data acquired by independent laboratories on behalf of

Essex found all samples of Essex finished magnet wire to have residual NMP at <0.1% after full curing. In addition, when considering physical properties of DMAC vs. NMP, Essex further has no expectation about issues with residual DMAC in Essex finished magnet wire.

Ultimately, Essex is aware of nothing contrary about Essex finished magnet wire vs SVHC lists under REACH.

In addition, Essex reviewed the provisions of REACH Annex XVII. To that end, Essex is aware of no quantifiable presence of carcinogens, mutagens, nor reproductive toxins in Essex finished magnet wire. There is some history of light use of azo colorants in some magnet wire enamels. However, Essex notes that interest in azo dyes in REACH Annex XVII is directed at textiles and like products, for which direct skin contact might be expected. This is not a typical use for magnet wire.

Specific to GADSL and JIG-101: Essex has reviewed the GADSL and JIG-101 lists of declarable and/or prohibited substances, and there have been some inquiries involving specific substances on the GADSL and JIG-101 lists. Based on Essex' internal review of raw material inputs vs. what would be expected to remain in the final magnet wire product, weighed against specific inquiries received to-date plus Essex' aforementioned statements about RoHS and REACH, Essex notes the following about GADSL and JIG-101:

- Essex copper magnet wire contains metallic copper, a GADSL declarable substance.
- Essex is aware of no substantive use of ozone depleting chemicals, whether CFCs or HCFCs, in the production of Essex magnet wire.
- Essex film-insulated finished magnet wire (cured enamel coating applied as a solution over copper or aluminum conductor) has no substantive halogen content. Note that halogens may indeed be present in some Essex fabric-wrapped magnet wire products (see text below re: polyfluorinated organics in specific polyimide tape).
- Essex film-insulated finished magnet wire (cured enamel applied as a solution over copper or aluminum conductor) contains no substantive perfluorooctane sulfonate (PFOS) nor its variations, and no perfluorooctanoic acid (PFOA). One fabric-wrapped Essex magnet wire product (a specific polyimide) contains polyfluorinated organics in its tape wrapping, and a tape supplier acknowledges that there may be unquantifiable traces of PFOA among these polyfluorinated organics.

Specific to Canadian Initiatives: Essex has reviewed Canadian expectations about Priority Substances List, Toxic Substances List, and Virtual Elimination List under CEPA as well as Chemical Challenge substances. A few chemical substances from these aforementioned Canadian initiatives may be found in raw magnet wire inputs, but ultimately Essex is aware of no substantive free content (ie, >0.1%) for these substances in finished Essex magnet wire. As for Domestic Substances under CEPA, note that Essex finished magnet wire would be considered an article, not a chemical substance, while also noting that there is no substantive free content for phthalates in Essex magnet wire. As for NPRI reporting, consider that Essex magnet wire is based on copper or aluminum conductor.

Specific to CSCL (Japan): Essex reviewed this Japanese regulation re: chemicals management, and it's apparent that CSCL addresses manufacture and importation of chemical substances, whereas magnet wire is an article. As a courtesy to its customers, Essex will advise to being unaware of any substantive content for Priority Assessment Chemicals (PACs) in Essex finished magnet wire. A few PACs may be found in raw magnet wire enamels, but ultimately Essex is aware of no substantive free content for these PAC substances in finished Essex magnet wire.

Specific to Packaging: Essex has reviewed European Union expectations about packaging vs current practices at Essex' magnet wire operations in North America. Based on this review, Essex considers itself compliant with EU expectations about packaging and packaging waste.

EU regulates packaging and packaging waste under Directive 94/62/EC. Goals include reducing quantity and hazard of packaging waste plus recovery and recycling of packaging. To that end, Essex magnet wire makes use of reusable plastic spools, reels, and buckets plus reusable wooden reels, boxes, and pallets. Standard terms & conditions for sale of Essex magnet wire demand that customers return this reusable packaging. As for contents of packaging, Essex' specification for plastic spools, reels, and buckets excludes noteworthy bad-actor chemicals such as heavy metals and halogens.

In addition, specific to wooden reels, boxes, and pallets, Essex specifies that such wooden packaging must comply with 'International Standard for Phytosanitary Measures', aka ISPM15, typically by heat treatment.

This concludes Essex Group, Inc.'s review of Essex magnet wire against the more commonly referenced initiatives for substance restriction.

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