

January 2024

To: Customers of Essex Furukawa Magnet Wire

From: Regulatory Compliance at Essex Furukawa Magnet Wire

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

Essex Furukawa Magnet Wire (Essex Furukawa) is in receipt of inquiries involving 'initiatives for substance restriction' vs Essex Furukawa finished magnet wire and Essex Furukawa bare copper. 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), and Joint Industrial Guide-101 – Material Composition Declaration for Electrotechnical Products (JIG-101);
- Toxic Substances Control Act (TSCA) and Lautenberg Chemical Safety Act;
- Persistent Organic Pollutants (POPs);
- Canadian Environmental Protection Act-1999 (CEPA) and Canada Chemicals Management Plan /Chemical Challenge;
- Japanese Chemical Substances Control Law (CSCL).

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

Specific to RoHS: Based on our internal review of raw material inputs, Essex Furukawa has determined that its finished magnet wire and Essex Furukawa bare copper have no substantive content for lead, mercury, cadmium, hexavalent chromium, polybrominated flame retardants, nor free phthalates. This compliance statement holds for RoHS-2 (Directive 2011/65/EU) and RoHS-3 (EU 2015/863).

Specific to WEEE and ELV: Essex Furukawa finished magnet wire and Essex Furukawa bare copper will not interfere with the collection, treatment, recycling, and recovery of waste electrical and electronic equipment, nor will Essex Furukawa magnet wire and Essex Furukawa bare copper interfere with management of end-of-life vehicles (ELV). Essex Furukawa 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 and bare copper.

Specific to REACH SVHCs and Annex XVII: Essex Furukawa has reviewed the REACH lists of Substances of Very High Concern (SVHCs) against raw material input for Essex Furukawa finished magnet wire and Essex Furukawa bare copper, **up to and including the SVHC additions finalized in January 2024.**

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, such solvents are removed within the magnet wire oven during the curing process, and analytical data acquired by independent laboratories on behalf of Essex Furukawa found all samples of Essex Furukawa finished magnet wire to have residual NMP at <0.1% after full curing. In addition, when considering physical properties of DMAC vs. NMP, Essex Furukawa further has no expectation about issues with residual DMAC in Essex Furukawa finished magnet wire.

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

In addition, Essex Furukawa reviewed the provisions of REACH Annex XVII. To that end, Essex Furukawa is aware of no quantifiable presence of carcinogens, mutagens, nor reproductive toxins in Essex Furukawa finished magnet wire and Essex Furukawa bare copper. There is some history of light use of azo colorants in some magnet wire enamels. However, Essex Furukawa 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 at all a typical use for magnet wire.

Related to SCIP Database and Waste Framework Directive: Essex Furukawa magnet wire is considered compliant for SVHC content in EU-REACH, and thus EU-SCIP Database is not applicable to Essex Furukawa magnet wire. As for EU Waste Framework Directive, Essex Furukawa magnet wire is based on copper or aluminum conductor, two metals of intrinsic value, so economics inherently drives magnet wire toward reuse, recycling, and recovery.

Specific to Persistent Organic Pollutants (POPs): Essex Furukawa has reviewed persistent organic pollutants as defined by the European Chemicals Agency and by the United Nations Stockholm Convention, and Essex Furukawa is aware of no substantive content for persistent organic pollutants in Essex Furukawa finished magnet wire and Essex Furukawa bare copper.

Specific to GADSL and JIG-101: Essex Furukawa 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 Furukawa' internal review of raw material inputs vs. what would be expected to remain in the final magnet wire product and Essex Furukawa bare copper, weighed against specific inquiries received to-date plus Essex Furukawa' aforementioned statements about RoHS and REACH, Essex Furukawa notes the following about GADSL and JIG-101:

- Essex Furukawa copper magnet wire and Essex Furukawa bare copper contain metallic copper, a GADSL declarable substance.
- Essex Furukawa is aware of no substantive use of ozone depleting chemicals, whether CFCs or HCFCs, in the production of Essex Furukawa magnet wire and Essex Furukawa bare copper.
- Some formulations for raw magnet wire enamel coatings do indeed contain phenol (CAS # 108-95-2), used as a carrier solvent during production of film-insulated magnet wire. However, phenol is

removed during the curing process, and thus there is no substantive phenol content in Essex Furukawa finished magnet wire.

- As noted previously in this document, there is some history of light use of azo colorants in some magnet wire enamels, but Essex Furukawa notes that interest in azo dyes in REACH Annex XVII (the basis for inclusion in GADSL) is directed at textiles and like products, for which direct skin contact might be expected. This is not a typical use for magnet wire.
- Essex Furukawa film-insulated finished magnet wire (cured enamel coating applied as a solution over copper or aluminum conductor) and Essex Furukawa bare copper have no substantive halogen content. Note that halogens may indeed be present in some Essex Furukawa fabric-wrapped magnet wire products; see text below re: polyfluorinated organics in specific polyimide tape.
- Essex Furukawa film-insulated finished magnet wire (cured enamel applied as a solution over copper or aluminum conductor) and Essex Furukawa bare copper contain no substantive perfluorooctane sulfonate (PFOS) and no substantive perfluorooctanoic acid (PFOA). One fabric-wrapped Essex Furukawa magnet wire product, a specific polyimide, contains polyfluorinated organics in its tape wrapping, but suppliers of that tape wrapping deny any declarable PFOA or PFOS among these polyfluorinated organics.

Specific to TSCA (USA): As for Toxic Substances Control Act (TSCA) and related Lautenberg Chemical Safety Act, Essex Furukawa is aware of no use of Persistent, Bioaccumulative, and Toxic chemicals (PBTs) in production of Essex Furukawa magnet wire and bare copper rod. Some solvents used in production of Essex Furukawa magnet wire are listed as TSCA High-Priority chemicals (ex: NMP, xylenes), but Essex Furukawa bare copper rod and fully cured Essex Furukawa magnet wire would have no substantive content for TSCA High-Priority chemicals.

There's ongoing news in the United States at both Federal and State levels about regulatory activity involving PFAS, or per- and polyfluoroalkyl substances. Polytetrafluoroethylene (PTFE) is more commonly known by the brand name Teflon, and PTFE is reportedly a PFAS chemical. Essex Furukawa offers a magnet wire product with polyimide tape wrapping with PTFE film. Ultimately, PFAS is applicable to only those Essex Furukawa magnet wire products with reference to Apical or Kapton film in polyimide tape wrapping.

Specific to Canadian Initiatives: Essex Furukawa 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 Furukawa is aware of no substantive free content (ie, >0.1%) for these substances in finished Essex Furukawa magnet wire and Essex Furukawa bare copper. As for Domestic Substances under CEPA, note that Essex Furukawa finished magnet wire would be considered a manufactured article, not a chemical substance, while also noting that there is no substantive free content for phthalates in Essex Furukawa magnet wire and Essex Furukawa bare copper. As for NPRI reporting, consider that Essex Furukawa magnet wire is based on copper or aluminum conductor.

Specific to CSCL (Japan): Essex Furukawa reviewed this Japanese regulation re: chemicals management, and it's apparent that CSCL addresses manufacture and importation of chemical substances, whereas magnet wire is a manufactured article. As a courtesy to its customers, Essex Furukawa will advise to being unaware of any substantive content for Priority Assessment Chemicals (PACs) in Essex Furukawa finished magnet wire and Essex Furukawa bare copper. A few PACs may be found in raw magnet wire enamels, but ultimately Essex Furukawa is

aware of no substantive free content for these PAC substances in finished Essex Furukawa magnet wire and Essex Furukawa bare copper.

Specific to Packaging: Essex Furukawa has reviewed European Union expectations about packaging vs current practices at Essex Furukawa magnet wire operations in North America. Based on this review, Essex Furukawa 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 Furukawa 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 Furukawa magnet wire demand that customers return this reusable packaging. As for contents of packaging, Essex Furukawa 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 Furukawa specifies that such wooden packaging must comply with 'International Standard for Phytosanitary Measures', aka ISPM15, typically by heat treatment.

This concludes this review of Essex Furukawa magnet wire against the more commonly referenced initiatives for substance restriction.

et