RoHS Compliance and Lansing Instrument Corporation Products

Each Lansing Electronic Instrument Enclosure is composed of individual parts that fall into a limited set of categories useful for understanding RoHS compliance.

Each category of parts is itemized in one of two lists below. The first is a list for parts that are, without question, RoHS compliant. The second is for parts that may be at issue for RoHS compliance. Each part in this second list has been placed in one of four generic sub-categories. Each of those sub-categories is then discussed in the text that follows.

Category 1: Lansing parts that are RoHS compliant:

MicroPak Bezels (C, D and E styles)

MicroPak Panels (C, D and E styles) with anodize finish

MicroPak Tubes (D Style) with anodize finish

MicroPak Bases (E Style) with anodize finish

MicroPak Hardware (C, D and E Styles)

MicroPak Accessories

GrayBox parts (B, P and A Styles) except for vinyl-clad covers and special order Iridite finishes

GrayBox Accessories

Category 2: Lansing parts that may be at issue for RoHS compliance:

MicroPak Base (C Style) with an Iridite finish (Sub-category 1)

MicroPak Covers (C Style) made from vinyl-clad steel (Sub-category 3)
MicroPak Covers (C Style) made from vinyl-clad aluminum (Sub-category 2)

MicroPak Panels (C, D and E styles) with Iridite finish (Sub-category 1)

MicroPak Tubes (D Style) with powder coat paint finish (Sub-category 4)

MicroPak Bases (E Style) with powder coat paint finish (Sub-category 4)

GrayBox 6-hole Covers (B Style) made from vinyl-clad aluminum (Sub-category 2)
GrayBox Covers (P and A Styles) made from vinyl-clad steel (Sub-category 3)

GrayBox parts (B, P and A Styles) with special order Iridite finishes (Sub-category 1)

RoHS:

One of the substances that the European Union (EU) is proposing to ban is hexavalent chrome. This substance is present in the surface finishes of some Lansing parts. These parts can be placed in four sub-categories:

Sub-category 1: Aluminum parts (sheet and extrusion) with a clear Iridite finish:

Iridite is a very thin layer of hexavalent chrome. In the worst case, hexavalent chrome is present in the range of 26-62 parts per million (PPM) by weight. All PPM calculations are documented below.

Sub-category 2: Vinyl-clad aluminum parts:

The aluminum surfaces are prefinished with Iridite prior to cladding. Excluding vinyl, hexavalent chrome is present in the range of 26-62 PPM by weight.

Sub-category 3: Vinyl-clad steel parts:

The surfaces are treated with hexavalent chrome prior to vinyl-cladding (exterior surface) and painting (interior surface). Excluding the vinyl and paint, hexavalent chrome is present in the range of 14-33 PPM by weight.

Sub-category 4: Aluminum parts (sheet and extrusion) with powder coat paint finish:

The aluminum surfaces are prefinished with Iridite prior to powder coat painting. In the worst case, hexavalent chrome is present in the range of 26-62 PPM by weight (excluding powder coat paint).

The question as to whether or not these parts are RoHS compliant lies in the interpretation of what the European Union means by a "homogeneous material". In a homogeneous material, hexavalent chrome cannot exceed 0.1% by weight (1000 PPM by weight). As noted above, all Lansing parts in question fall well under this limit.

The term “homogeneous” does not appear in the original RoHS Directive. It first appears in December 2003 in a Commission stakeholder document. The purpose of this document was to propose maximum concentration values for RoHS restricted substances:

“A maximum concentration value of 0.1% by weight in homogeneous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and of 0.01% weight in homogeneous materials for cadmium shall be tolerated. Homogeneous material means a unit that can not be mechanically disjointed in single materials”.

Liberal interpretation: Under this guideline for homogeneous materials ("can't be mechanically disjointed"), these parts can be interpreted to be homogeneous and, hence, to be RoHS-compliant, since hexavalent chrome content is far less than 1000 PPM by weight. A Commission Amendment to the RoHS Directive, dated 18 Aug 2005, appears to support this interpretation. It states,

“... a maximum concentration value of 0,1 % by weight in homogeneous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and of 0,01 % by weight in homogeneous materials for cadmium shall be tolerated.”

This decision reiterates the percentage by weight concept and leaves open to interpretation the meaning of “homogeneous”. It is believed to be the result of lobbying efforts for "homogeneous" to be interpreted as "grind up the whole and analyze the resulting powder".

Conservative interpretation: The UK government has suggested (not decreed) that the term “homogeneous” be understood as being “of uniform composition throughout”. Under this interpretation, metals and their coatings would be considered to be of multiple homogeneous materials (e.g., aluminum and Iridite are two separate homogeneous materials) even though they cannot be "mechanically disjointed". Should the EU adopt this guideline, then these parts would be interpreted not to be RoHS-compliant.

This confusion is further aggravated by the lack of any standards against which materials are to be tested. In addition, persistent rumors have been floated that hexavalent chrome passivation coatings are going to be exempted from RoHS. Note further that the EU Commission has employed consultants to independently review outstanding exemption requests. At a February 15th meeting, those consultants recommended that hexavalent chrome passivation coatings be exempted, at least on a time-limited basis. As yet, the EU has not taken action, pro or con, on the recommendation.

At this point, we simply do not know with any certainty whether or not parts with Iridited surface finishes comply. Hence, Lansing cannot issue Certificates of Compliance for parts within these groups until the EU has established clear definitions and the appropriate standards against which products are going to be tested. In the interim, we will freely share any relevant information with regard to materials, finishes, etc.

Alternatives to hexavalent chrome:

There are a variety of new trivalent chrome finishes that can be substituted for hexavalent chrome finishes. All are inferior with regard to corrosion resistance, conductivity, paint adhesion, vinyl adhesion, yield and cost. No one of them appears to be the best alternative for all applications. To further complicate the issue, preliminary analysis indicates that trivalent chrome may be more hazardous to the environment than hexavalent chrome.

Lansing can offer the following alternatives for the elimination of hexavalent chrome on a group by group basis:

Sub-category 1: Alternatives for aluminum parts (sheet and extrusion) with a clear Iridite finish.

Note that Iridite is often used in applications where it is important for surfaces to be conductive.

Option 1: If conductivity is not important, substitute clear anodize for clear Iridite. Appearance is the same. Parts are not conductive. In parts where it applies, installation of thread-forming screws is considerably more difficult. Corrosion resistance is excellent. Price for the part increases approximately 3-5%.

Option 2: Substitute "Iridite NCP" (http://www.macdermid.com/industrial/pdf/IrIditeNCP.pdf) for clear Iridite. Appearance is largely the same (can have a slight mottled appearance). Conductivity and corrosion resistance are acceptable, at least for office and laboratory environments. Price increases approximately 10%.

Sub-category 2: Alternatives for vinyl-clad aluminum parts.

As of this writing, the manufacturers of vinyl-clad metals have not found a satisfactory substitute for hexavalent chrome. All efforts to date have yielded inadequate bonds between vinyl and metal.

Note that vinyl-clad aluminum is generally used in applications where it is important for the non-vinyl surface to be conductive.

Option 1: If conductivity is not important, substitute clear or black anodize for vinyl cladding. Color will be very similar, but texture and sheen will differ. Price will be approximately the same for clear anodize and increase for black anodize depending on size of part.

Option 2: Paint exterior surface of aluminum that has been prefinished with "Iridite NCP". Appearance will be virtually identical. Cost per part will be approximately double that of vinyl-clad aluminum.

Sub-category 3: Alternatives for vinyl-clad steel parts.

As with vinyl-clad aluminum above, the manufacturers of vinyl-clad metals have not found a satisfactory substitute for hexavalent chrome. All efforts to date have yielded inadequate bonds between vinyl and metal.

At present, the only viable alternative is to substitute aluminum for steel, prefinish with “Iridite NCP” and paint. Appearance will be identical. Part will be significantly lighter in weight. Cost per part will approximately double that of vinyl-clad steel.

Sub-category 4. Alternatives for aluminum parts with a powder coat paint finish:

Substitute “Iridite NCP” for clear Iridite. The difference is indistinguishable. Price increases approximately 5-7%.

Our RoHS Compliance response:

For the present, Lansing Instrument is handling each request for RoHS compliance on an individual basis. As indicated, we can produce parts that are free of hexavalent chrome and are happy to quote to your needs. At such time that it is clearly understood what the RoHS standards really are, Lansing will act accordingly to make its entire product line compliant.

It appears that the manufacturing world is dividing into two camps, those that accept the liberal interpretation, at least until the EU directs otherwise, and those that accept the conservative interpretation. There are some very large companies in both camps. The problem is that those adopting the liberal interpretation will have a significant financial advantage.

I hope this sheds some light on a very difficult topic. We are shooting at an ill-defined target.

If you have further questions or wish to have any parts quoted with an alternate finish, please don't hesitate to contact me or, in my absence, Rich Kippola (rkippola@lansing-enclosures.com)

Fred Widding
VP, Engineering
Lansing Instrument Corporation

800-847-3535 phone
607-277-1953 fax
fwidding@lansing-enclosures.com

Appendix I: Parts per Million calculations for aluminum parts with Iridite finish (hexavalent chrome):

Chemical / manufacturer:	Alodine 1500 / Henkel Corporation
Mass of coating spec:	5-12 milligrams per square foot
Density of aluminum:	0.098 pounds per cubic inch

Two forms of aluminum (sheet and extrusion) are used in Lansing products. For parts made from sheet, the most prevalent thickness is 0.060". For parts made from extrusion, the thinnest wall sections are 0.060". To calculate the maximum parts per million of hexavalent chrome present in Lansing aluminum parts with an Iridite finish, assume a one-foot square of 0.060" aluminum:

Mass of hexavalent chrome (2 surfaces):	10-24 milligrams per square foot
Mass of aluminum (12" x 12" x 0.060"):	384,400 milligrams per square foot
Parts per million (hexavalent chrome):	26-62 PPM

In general, Lansing parts should be at the smaller end of the PPM spectrum based on our specification for minimal time in the Iridite bath.

Appendix II: Parts per Million calculations for vinyl-clad steel parts with hexavalent chrome pretreatment:

Density of steel:	0.31 pounds per cubic inch

All vinyl-clad steel in Lansing products has a thickness of 0.036" To calculate the maximum parts per million of hexavalent chrome, assume a one-foot square of 0.036 steel:

Mass of hexavalent chrome (2 surfaces):	10-24 milligrams per square foot
Mass of steel (12" x 12" x 0.036"):	730,000 milligrams per square foot
Parts per million (hexavalent chrome):	14-33 PPM