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# Comply with Critical Lead-Free Water System Regulations

Understand calculations and specifications.

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**An engineer at a contracting firm is designing an upgrade for a new public water system. The engineer is aware there are regulations governing the use of lead-free components in potable water applications but is confused by the law's complex calculations and the number of pumps, valves and components with lead-free designations.**

This predicament plays out across North America as manufacturers, contractors and operators grapple with lead content requirements for potable water systems.

In the U.S. and Canada, these regulations have seen changes as safety restrictions tighten. In effect since January 2014, the laws in these countries dictate much lower lead content for certain systems and components than in the past.

Manufacturers of potable water equipment and systems—including reverse osmosis (RO) systems, water purification plants, and public and industrial water systems—as well as equipment maintenance contractors are affected. There is continued uncertainty regarding how it will impact the purchasing and implementation of water system components.

This article outlines relevant sections of the law. It then focuses on choices facing specifiers and purchasers who need to select products for these systems to comply. It considers the calculations that must be made to determine average lead content. Finally, it discusses suggestions for evaluating lead-free products. Following these guidelines

will help OEMs, contractors and end users to ensure equipment remains efficient, safe and compliant.

## The Law

The U.S. Federal Reduction of Lead in Drinking Water Act was established on Jan. 4, 2011, to amend Section 1417 of the Safe Drinking Water Act (SDWA). It took effect on Jan. 4, 2014.

The Office of Water of the U.S. Environmental Protection Agency (EPA) summarized the amendment in a December 2013 report:

Effective Jan. 4, 2014, lead-free means:

- not containing more than 0.2 percent lead when used with respect to solder and flux
- not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings and fixtures

Canadian law reflects the intent of the SDWA, regulations for low-lead policies relating to lead content in plumbing products. Regulators, legislators and Health Canada approached the lead-free issue through the national system of plumbing codes adopted and enforced

provincially or territorially through the recognized network of plumbing and health inspections.

## The Calculation

For purposes of the SDWA, the weighted average lead content of a pipe, pipe fitting, plumbing fitting, fixture or system is calculated using the following statutory formula:

- For each wetted component, the percentage of lead in the component is multiplied by the ratio of the wetted surface area of that component to the total wetted surface area of the entire product to arrive at the weighted percentage of lead of the component.
- The weighted percentage of lead in each wetted component is added together, and the sum of these weighted percentages is used to calculate the weighted average lead content of the product or system. The lead content of the material used to produce wetted components is used to determine compliance.
- For lead content of materials that are provided as a range, the maximum content of the range must be used.

## Doing the Math

A critical part of the law states that lead content must constitute no more than a weighted average of 0.25 percent—when used with respect to the wetted surfaces of pipes and pipe fittings, plumbing fittings and fixtures—for a product to be considered lead-free. The previous more permissive standard, in part, called for pipe and pipe fittings containing 8 percent lead or less. This applies to all relevant equipment sold in U.S. and Canada (except water distribution main gate valves 2 inches or more in diameter).

Under the new law, lead-free is a cumulative concept. Not every part of a system must meet that average. In practical terms, some parts can be over that number, some at it and some under it. Specifiers and buyers add up the lead content of all wetted components to get

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an average product percentage that must be less than or equal to 0.25 percent lead content. This total wetted surface area calculation governs the route to compliance.

How does it work in an application? Suppose that a manufacturer makes water treatment systems. The manufacturing engineer would have to perform the above lead content calculation, averaging all of the system's relevant components: pumps, valves, piping, etc.

OEMs must query the manufacturers of their valves, pumps and other components to ascertain the precise internal wetted areas of parts and the lead content of each part. However, this data can be difficult to obtain due to complex component geometries, making the calculation difficult or impossible.

Instead, a reputable manufacturer would likely simplify the task by installing lead-free components, foregoing the complex calculation. For example, one supplier's lead-free brass valves are an exact replacement for its conventional brass valves and can be applied without changing the system's design. Also, end users may desire as many lead-free components in their products as possible.

### **The Problem with Brass**

Brass is the conventional material choice for many industrial plumbing and water system products. However, brass components often contain lead content of 2.5 percent or greater. Using just one brass valve in a potable water system would require the OEM to perform the wetted surface area calculation and can

tip the balance of total lead content for a given product.

Incorporating older, traditional brass valves could result in noncompliance with the new law.

### **Lead-Free Brass**

The introduction of lead-free brass valves and other components has added another option for OEMs and water systems seeking SDWA compliance. For example, lead-free brass constructions are available on some suppliers' most popular lines of general service solenoid valves. These valves incorporate the same proven performance, reliability and quick availability as their brass solenoid valve counterparts.

To avoid calculation errors, manufacturers and contractors working with brass valves should use lead-free brass instead of performing the wetted surface area lead content calculation.

If a brass solenoid valve in the system must be replaced, the use of a corresponding lead-free brass valve will ensure SDWA compliance.

### **Making Sure Lead-Free Is Lead-Free**

The characterization of a component as "lead-free" can be a subjective issue. The law only requires manufacturers to self-certify their products. To ensure successful purchase of a lead-free component, look for a manufacturer that:

- inspects and analyzes forgings and materials to ensure they are lead-free before entering the production system
- uses dedicated forging tools for lead-free production to avoid manufacturing conventional brass and lead-free brass products on the same equipment
- forges a highly visible lead-free mark on the product's lead-free brass components to provide an additional degree of certainty for the user that the product is genuinely lead-free

Following these guidelines will ensure the purchase of a truly lead-free product. Plus, system maintenance will become

easier since the LF marking will ensure a replacement valve is lead-free.

### **Is It Available?**

Water system OEMs and contractors with demanding assembly or replacement schedules may weigh ordering, shipping and delivery times during equipment selection. No one likes to hold up an entire project or keep a system shut down waiting for parts.

### **Conclusion**

The discovery of lead in drinking water supplies has focused the public's attention on this important health issue. The contamination in these systems was generated by old pipes and components that contained high quantities of lead.

The new laws, plus public and environmental pressures, are driving the overhaul and upgrade of many public, industrial and commercial potable water systems.

The lead-free content laws are straightforward but can be complex if the SDWA's wetted surface area lead content calculation must be performed. Today, there are lead-free equipment options available that will meet the regulations and eliminate the need to calculate lead content. OEMs, contractors and operators now have choices to ensure their water systems and equipment meets all requirements for full compliance. ■

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