Understanding the new lead-free water system regulations –

and choosing valves to comply

by Rob Lindquist, P.E.
Product Marketing Manager, ASCO

Anne-Sophie Kedad-Chambareau
Director of Marketing, Process, ASCO

A Technical Brief From ASCO

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Introduction

In the U.S., regulations governing lead content of the components of potable water systems have seen considerable changes as safety restrictions tighten. The federal law in effect since January 2014 dictates much lower lead content for certain systems and components than in the past.

Manufacturers of potable water equipment and systems — including drinking water fountains, reverse osmosis (RO) systems, coffee machines, and commercial kitchen equipment — as well as equipment maintenance contractors are affected. Many remain uncertain how the new regulations will impact their manufacturing and purchasing.

This report outlines relevant sections of the law. It then focuses on the choices facing specifiers and purchasers who need to select important components of these systems — two-way solenoid valves — to comply. It considers the calculations that must be made to determine average lead content. Finally, it discusses the pros and cons of common valve materials (brass, lead-free brass, composite/plastic, and stainless steel), as well as other selection advantages.

Original equipment manufacturers (OEMs) and contractors will get useful information to ensure their equipment remains efficient, safe, and compliant.

Looking at the law

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

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

Effective January 4, 2014, lead free means:

(A) not containing more than 0.2 percent lead when used with respect to solder and flux; and

(B) 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.

Calculation

For purposes of the Act, the weighted average lead content of a pipe, pipe fitting, plumbing fitting, or fixture is calculated by 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 of each wetted component is added together, and the sum of these weighted percentages constitutes the weighted average lead content of the product. 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: 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, had called for "pipe and pipe fittings containing not more than 8.0 percent lead.")

This applies to all relevant equipment sold in U.S. (except water distribution main gate valves 2 inches or more in diameter).

Thus, under the new law, "lead-free" is a cumulative concept. It's not that every single part of a system must meet that average. In practical terms, some parts can be over that number, some right at it, and some under it. Specifiers and buyers add up the lead content of all wetted components to get 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 practical terms? Suppose that a manufacturer makes dishwashers. The manufacturing engineer would have to perform the above lead content calculation, averaging all of a given model's relevant components: stainless steel wash tank, copper piping, brass solenoid valves, and so on.

OEMs must query the manufacturers of their valves 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, making the calculation difficult or impossible.

Instead, a reputable manufacturer would most likely simplify the task by installing lead-free valves and components, foregoing the complex calculation. For example, ASCO's lead-free valves are an exact replacement for its brass valves, and can be applied without changing the dishwasher's design. In addition, end-use customers desire as many lead-free components in their products as possible.

Aside from the compliance issue, it's also important to select valves with the ratings required by the application — for pipe size, pressure, flow, and so on — as well as with appropriate agency approvals.

Selecting brass

The traditional choice of solenoid valve material for many OEMs and contractors, brass possesses well-known characteristics. However, brass components often contain about 2.5% lead content. Using just one brass valve in a potable water system can require the OEM to perform the wetted surface area calculation, and can tip the balance of total lead content for a given product. If so, incorporating brass valves will result in non-compliance with the new law.

Selecting lead-free brass

The introduction of lead-free brass valves has added another option for OEMs seeking SDWA compliance for their products.

For example, ASCO's lead-free brass constructions are available on the company's 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.

Manufacturers and contractors working with brass valves should use lead-free brass instead of performing the wetted surface area lead content calculation. If you have a brass solenoid valve in your system that must be replaced, a corresponding lead-free brass valve will ensure SDWA compliance.

Selecting composite/plastic

Solenoid valves constructed of composites or plastics start with the advantage of 100% lead-free construction.

They're also available in numerous pipe sizes and configurations, including those common to drinking water equipment. These valves are now perhaps the industry's most popular choice for residential/commercial drinking water service. Their completely lead-free construction may help an entire product qualify as compliant under a total wetted surface area calculation.

Composite valves exhibit various maximum pressures that can go up to 150 pounds. As with any new valve selection, it's important to make sure they perform with the necessary reliability and carry the proper ratings and characteristics for the application.

While composites may be slightly more expensive than brass valves, you get the additional benefits of NSF approvals. For example, ASCO 212 Series composite valves are tested and proven for performance and reliability equaling that of brass valves. All models in this series are approved to NSF 372. Many are also approved to NSF 61 Annex G, which combines the NSF 372 and NSF 61 requirements. Choosing these valves will make it easier to achieve overall NSF approval for an OEM's product.

Selecting stainless steel

Another choice that's totally lead-free, stainless steel offers compliance in a robust metal body. Valves made in this material offer the industry's broadest choice of characteristics in categories such as pipe size, pressure or temperature ratings, and flow coefficient (Cv).

These models are usually easily interchangeable with legacy brass valves. And figuring in their lead-free content may help qualify an entire product.

However, stainless steel is typically the most expensive material of construction used in water system solenoid valves.

Some NSF choices in stainless steel are available for certain pipe sizes. For instance, ASCO 8256 and 8356 stainless steel valves are NSF approved in 1⁄8-inch and 1⁄4-inch line sizes.

These stainless steel body valves are also available in higher temperature and pressure ratings.

Other selection advantages

Besides materials of construction, a few other selection factors are often important for specifiers and purchasers of water system solenoid valves.

Certification

Third-party certification by a standards entity such as NSF International is desirable or mandated for components of many water systems. Going beyond a manufacturer's mere statement of compliance, it offers independent, accredited validation from a trusted source.

In particular, NSF-approved valves are almost always the choice of manufacturers whose systems or assemblies as a whole carry NSF approvals. For example, local codes often demand that RO systems bear this certification. Using NSF-approved valves exclusively will make it less costly and time consuming to achieve certification for the entire system.

Fasteners

Solenoid valve fastener technology is often of particular interest to contractors installing or maintaining water systems. They prioritize features that save time, trouble, and cost on the jobsite.

Example: ASCO 212 Series composite valves are equipped with a unique FasN™ universal connection system configured for solvent bond. Easily adapted to PVC tubing, these connectors make valves much easier to maintain and to change in the field. The savings in installation and maintenance costs can be substantial — starting with a measured labor savings of 35 seconds per valve, plus material savings where an extra fitting or adapter might otherwise be required.

In one study where an OEM was producing 1000 RO units per year, with 3 valves per unit, comparing FasN connection to NPT-threaded valves on PVC piping showed cost reductions of $15,790 per year. Another study — with ASCO's FasN-equipped valves versus NPT-threaded valves on PEX tubing — proved annual savings of $40,930!

Availability

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

Certain valve manufacturers may present built-in delivery disadvantages for North American customers, because these suppliers make their valves in Europe.

Where this poses a potential problem, specifiers and purchasers should consider North American manufacturers with quick-shipment programs. Example: U.S.-based ASCO offers many popular water system valves via its proven, industry-leading ASCO Express program. So buyers are assured of faster, more reliable delivery, with less downtime and greater system availability.

Conclusion

The new water system 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 many lead-free solenoid valve options available that will meet the regulations and eliminate the need to calculate lead content. Each valve type has its own set of benefits from the standpoint of cost, form factor, connection systems, ratings, and approvals. OEMs and contractors now have plenty of choices to ensure their potable water systems meet all requirements for full compliance.

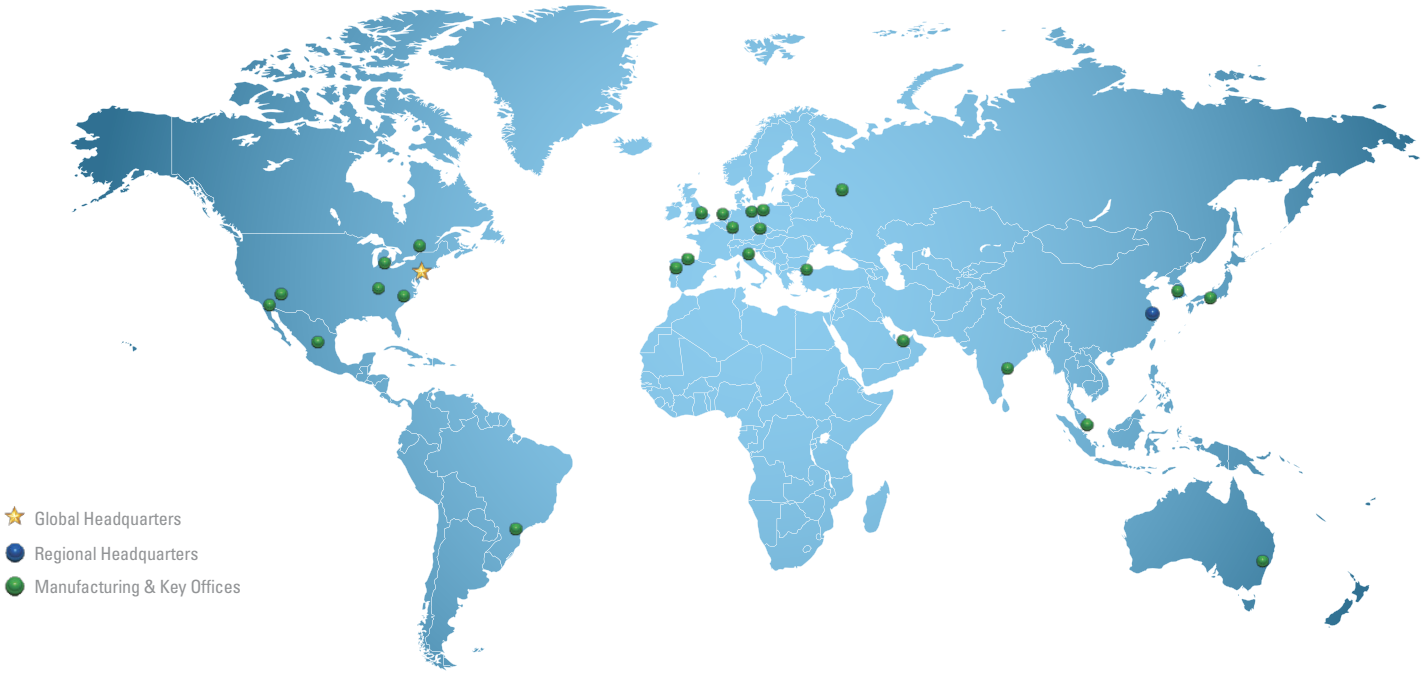
Takeaways

- U.S. federal lead-content standards have tightened for components in potable water systems
- A variety of lead-free solenoid valve options have made it easy to ensure compliance
- New lead-free brass valves enable drop-in replacement of their brass counterparts
- Other system makers may choose stainless steel or composite valves for their range of sizes, ratings, approvals, and connection systems

Global Contacts

www.asco.com

ASCO Headquarters (U.S.A.)
Tel: 800-972-ASCO (2726) or
+1 973-966-2000
info-valve@asco.com



Other Worldwide Locations

Australia	(61) 2-9-451-7077	**Italy**	(39) 02-356931
Brazil	(55) 11-4208-1700	**Japan**	(81) 798-65-6361
Canada	(1) 519-758-2700	**Mexico**	(52) 55-5809-5640
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