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Turning Risk Into Reward

With the right in-house precautions and some help from outside experts, recyclers can avoid the risks of sealed containers in their facilities and still recover the scrap metal for recycling.

By Marc Hequet and Kent Kiser

"We're scared to death of anything in a sealed tank," says Greg Dixon, general manager of Baker Iron & Metal Co. (Lexington, Ky.). "There are too many things that can go wrong."

Many scrap recyclers share Dixon's perspective, and for good reason. Sealed containers pose very real safety and environmental risks to scrap processing operations. A metal cylinder pressurized to 2,000 psi contains energy equivalent to nearly 1.5 pounds of TNT, according to the Web site of Integrated Environmental Services (Atlanta), a remediation company. If processed or mishandled, sealed containers can explode, start fires, or leak potentially hazardous gases or fluids. Such incidents could cause significant downtime in your operations, damage equipment, hurt your reputation with your neighbors, and—most important—injure or kill someone. "We know of operations that have had flammable gas cylinders blow up in their shredder and shut them down for days," says Adam Leisten, technical field services sales manager for Pollution Control Industries (East Chicago, Ind.), a specialized waste management firm. "We've heard of scrapyards employees who were de-valving cylinders, and the container took off like a rocket across the yard. We've also heard of valves flying off as uncontrolled projectiles during de-valving operations and killing employees."

Given those and other risks, it's no wonder that most recyclers don't willingly accept sealed containers in their yards. That said, the metal from such containers represents a promising source of scrap. The challenge for recyclers is how to avoid the risks but reap the scrap rewards.

Tanks, But No Tanks

Most scrap operations have a cut-and-dried approach to sealed containers: No tanks, period. "We tell all of our suppliers we do not accept cylinders of any kind," says John Hayworth, vice president of safety, health, environment, and community for Sims Metal Management (Jersey City, N.J.). "We decided many years ago we don't want to accept tanks or cylinders. It's just not a business we want to be in because of the hazardous nature of such products."

If your company adopts a no-tanks policy, the main challenge is informing your suppliers and getting them to abide by it. A good first step is adding sealed containers to the list of items prohibited from entering your facility. Many scrapyards post a large sign at their entrance or scale that lists such taboo materials. Such a policy can have its repercussions, however. "When you impose a policy prohibiting sealed containers, suppliers may start hiding them from you, and then you can't always find them," says Bill Rouse, risk and environmental manager for PK Metals (Coram, N.Y.).

The best—though not foolproof—way to address that problem is to conduct a visual inspection of each supplier's load as it crosses the scale. If you find a sealed container in the load, inform the supplier about your prohibition. Explain the safety hazards such containers pose to your facility, employees, and community, says Manny Bodner, president of Bodner Metal & Iron Corp. (Houston). Suppliers simply may not understand the risks because they don't know that such containers could be highly pressurized and could contain hazardous constituents, posing serious dangers should the vessels be crushed, shredded, or otherwise breached.

If the safety rationale is not sufficient to discourage suppliers from sending you tanks, try the economic one. Tell your suppliers that the presence of cylinders in their scrap will slow down both your business and theirs. "Our suppliers understand our system and protocol, including what it takes to get in and out [of the yard] without having any issues," says Josh Carter, vice president of Integrity Metals (Connersville, Ind.). If they have to wait for inspectors to pick out unwelcome material, "they're not making money," he notes. Yard staff can aid the education process by conducting a second visual inspection of suppliers' loads in front of them, clarifying what you do and don't accept and why.

If a supplier does bring a sealed container to your facility—inadvertently or intentionally—make sure you and your yard staff are unequivocal in rejecting the material. "Tell the customer, 'It's yours. Do something with it,'" advises John Gilstrap, ISRI's director of safety.

Not a DIY Task

A no-tanks policy is all well and good, but the reality is that some sealed containers still may end up in your scrap pile. "We're very careful," Bodner says, "but there's always a chance that something will slip in." Tanks may arrive hidden in the trunk or back seat of a scrap vehicle, for example. One recycler recalls receiving a discarded refrigerator filled with gas cylinders. Many scrap operators have piles of sealed containers they've pulled out of their scrap and set aside over weeks, months, or years. "We've seen more than 3,500 cylinders at one site," Leisten says.

What can you do with such unwanted containers? First and foremost, do not attempt to de-valve or otherwise manage the products yourself, according to ISRI's Gilstrap—who has a background in explosives—and other hazardous-material experts. "Unless you know exactly what you're doing, it's probably not a good idea," says Jeff Gold, president of Integrated Environmental Services. Though scrapyards tend to receive cylinders containing inert gases such as argon, nitrogen, oxygen, and carbon dioxide, a cylinder could have much more dangerous contents, including poisonous gases such as phosgene and chlorine, flammable gases such as propane, or radioactive gases. Even nontoxic gases such as nitrogen pose a significant hazard due to the high pressure under which they are stored, which can propel a cylinder like a rocket if the valve is accidentally sheared or broken off.

Though experts can draw helpful clues about the contents of a sealed vessel based on the container's shape and valve type, only sophisticated equipment can make a conclusive—and safe—determination. "There are often subtle differences in cylinders that contain dramatically different materials, and these differences are not always apparent on a cursory exam," Gold says. Even legible labels and markings may be misleading, he warns. Leisten agrees, noting that the

"scary thing about cylinders is that everything is not always as it seems." For one, people sometimes refill cylinders with different contents.

"We get propane cylinders that contain hydrochloric acid or ammonium hydroxide because somebody was using them to cook crystal meth," he says. In addition, tank owners may have stored cylinders on their side, which can make them unstable, or removed pressure-release valves and overpressurized them. Containers' valves may be blocked or damaged, making it difficult to determine if pressurized gas remains inside and dangerous to de-valve the containers without the right equipment.

Even de-valved tanks that appear to be empty can be dangerous because gas or residue may remain inside. Wasps have been known to pack mud into valve holes, sealing low-pressure gases such as butane and even propane inside, Gold notes.

Recyclers who attempt to process sealed containers expose their employees and their operations to a host of safety and environmental hazards. Some recyclers reportedly de-valve cylinders in a rolloff container full of water. That approach may eliminate some dangers related to the few types of gases that react with water, but it creates other hazards. If a chlorine cylinder is opened under water, for instance, a small portion of the chlorine bonds with the water to form hydrochloric acid while the majority escapes as pure chlorine gas. "If the EPA did an inspection and saw that," Leisten warns, "you'd face hundreds of thousands of dollars of fines"—not to mention the potential health, safety, and environmental repercussions.

For these and other reasons, recyclers should refrain from de-valving sealed containers themselves, leaving such work to experts, says ISRI's Gilstrap. "Separate the containers from the scrap, and put them in an isolated area," he advises. Leisten recommends storing sealed containers upright in a secure place where they won't get knocked over or damaged. Gold concurs. "Keep them out of harm's way," he says. "Don't let forklifts or trucks hit them. Also, keep them out of the sun. If they get too hot, they can start leaking or safety releases can give way." Do not pile them in a rolloff container, Leisten says, because valves could get damaged and containers could leak, creating a potentially flammable, explosive, or oxygen-deficient environment.

Calling in the Experts

If you aren't supposed to process sealed containers yourself, what precisely can you do with them? Cylinder manufacturers and specialized firms offer several handling options—some free, others fee-based.

Some manufacturers and sellers of sealed containers offer recycling outlets for their products or help customers render their products safe for recycling. Coleman Co. (Wichita, Kan.) introduced its Green Key tool in mid-2008 for its small, single-use propane cylinders—the type used in camping and outdoor activities. Users insert the plastic tool into an empty cylinder to release any remaining gases or vapors and depressurize the container. The key remains in the cylinder to mark it as safe for recycling or disposal. (Coleman used to include a Green Key with each new propane cylinder, but now it sells them through its Web site and dealer network in packages of six for about \$1. Call 800/835-3278 or visit www.coleman.com/coleman/recycle.) In a similar

vein, recyclers can encourage their suppliers to purchase specialized equipment such as the ProSolv system from Katec (Virginia Beach, Va.), which is designed to empty and tag small propane cylinders for recycling. (Visit www.aerosolv.com.)

For gas-grill propane tanks, Blue Rhino (Winston-Salem, N.C.) collects unwanted and discarded tanks from companies, with a minimum pickup of 36 tanks. Under the Rhino Recycle program, launched in mid-2009, the firm refurbishes usable tanks by shot-blasting, repainting, and retrofitting outdated valves and components. For tanks that do not meet safety and quality standards, Blue Rhino reclaims any unused propane and recycles the steel. In most cases the service is free, though the company charges a small fee per tank in some circumstances, usually related to extra transportation costs. (Call 888/753-7159 or visit www.bluerhino.com.)

Another option—especially for dealing with more challenging sealed cylinders—is to contact companies that specialize in handling potentially hazardous products and materials, such as Pollution Control Industries, Integrated Environmental Services, SET Environmental, CEMCO (Auburn, N.Y.), and Cylinder Recycling (Rockport, Mass.). (To contact these firms, see "Expert Sources" on page 104.)

If you have no interest in the containers whatsoever, you can simply pay a qualified vendor to remove them from your property. More commonly, however, recyclers want to recover the metal value from the sealed containers because they paid for it when they bought the tank (perhaps unintentionally) within a load of scrap. In these cases, you have two options: Off-site or on-site processing. With off-site processing, you send the containers to be de-valved at the vendor's facility, then you buy back the metal or get it back under some type of tolling arrangement. One East Coast recycler says his firm pays about \$1.50 to have each tank de-valved, then it buys back the brass valves and steel containers. "We're basically paying twice for the metal," he says, "but the money we make off the scrap helps offset the costs, so we don't lose too badly."

On-site Processing is mandatory for some materials because U.S. Department of Transportation rules prohibit hauling them over the road. Whether it's by choice or necessity, for on-site processing the vendor will bring a mobile service truck to your plant and typically charge a day rate for the equipment and labor. The vendor likely will pressure-test each cylinder and use various methods to identify its contents. After extracting the contents and bringing the containers to atmospheric pressure, the vendor will remove the valve, purge the vessel with an inert gas such as nitrogen or carbon dioxide, punch a hole in the side, and mark it with fluorescent paint to identify it as safe. At the scrapyards that contained 3,500 cylinders, Pollution Control Industries was able to process 3,220 of them—92 percent—on site, leaving the metal for recycling, Leisten notes. The remaining 280 cylinders had to be shipped off site for disposal.

As in the above case, vendors sometimes must ship certain sealed containers—such as particularly dangerous or damaged ones—for processing, incineration, or disposal at their own facilities or other specialized sites. Integrated Environmental Services encounters some containers that pose such high risks that the company must operate some of its equipment from afar by remote control, Gold says. Other containers require specialized processing that only some very specialized vendors offer. Take acetylene tanks: Even when emptied of pressurized gas, they still contain a porous filler saturated with the hazardous solvent acetone, which helps

stabilize the acetylene gas, notes Erik Cannon, assistant marketing director of Cylinder Recyclers, which says it handles up to 10,000 acetylene cylinders a month. To complicate matters, acetylene tanks made in 1984 or earlier may contain asbestos, which requires special handling by trained disposal workers. For later versions of acetylene tanks, Cylinder Recyclers removes the valves, vents any remaining acetylene, and heats the cylinders in a vacuum to gasify and withdraw the acetone. When the acetone gas cools and liquefies, the company collects the material for reuse. Then it cuts open each steel cylinder and removes the lime silica core, leaving only clean scrap steel.

Talk with various vendors to discover the service options they offer and their fee structure. If you have questions about any sealed containers in your yard, hazardous-material experts encourage you to call them or even send photos for review and possible identification. By working with the pros, scrap recyclers can avoid the potential safety and environmental hazards of sealed containers but still reclaim the associated scrap—a win-win situation for all. •

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