

GENERAL CONSTRUCTION EQUIPMENT

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TOOLS FOR THE CONCRETE PRO

SAFETY WITH SAWS

Powerful tools require caution to operate

By Bill Palmer



Wacker Safety Issues

The blade on a saw is one of the most dangerous parts, although it's also the most essential because it does all the work. Proper procedures must be followed to ensure operator safety.

What may seem obvious to one person may be less so to another, so never take it for granted that anyone operating a saw will understand safe procedures. Every saw comes with a whole list of general power tool safety rules that must be followed, from making sure electrical tools are unplugged before changing blades to simply using the tool for its intended application instead of something else.

Blade Application Codes

The blade code has three letters: X-X-X

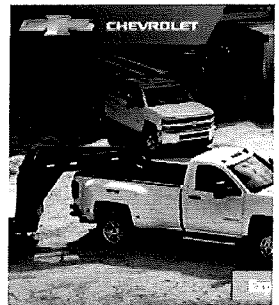
First position: indicates wet-use only (W) or wet or dry use (D).

Have you ever had to cut concrete without a saw? Perhaps in the old days there were craftsmen who could use a chisel and hammer and get a decent finished surface, but today most of us would leave a jagged mess. That's why a cutoff saw is an essential tool for every concrete contractor.

Today, you have lots of choices in saws: early entry saws for cutting flat-work, wall saws or wire saws for big cuts, handheld cutoff saws, and chain-saws. Saws come with electric motors (even cordless options), gas engines, or are powered by hydraulics or pneumatics. There are the typical cutoff saws with a disc blade, ring saws, and chain saws, abrasive blades or diamond. All of these, by their very nature, are dangerous tools if not used properly—anything meant to cut concrete will cut through flesh without even slowing down. Safety, therefore, is one of the most important issues you need to consider before picking up a saw.

Safety Issues

For saws, the most critical issues include making sure guards are well maintained and properly positioned, blades are straight and tight, and that the right blade is being used. For dry cutting concrete or masonry, silica dust becomes a paramount concern.



ABOUT THE AUTHOR



Bill Palmer

Bill Palmer is editor in chief and director of Hanley Commercial Construction Group, which includes

digital and print versions of *Concrete Construction*, *Concrete Surfaces*, *Top Producer*, *Public Works*, and *Masonry Construction*. Previously, he worked for the American Concrete Institute for 10 years as an engineering editor and director of several programs and was the executive director of the American Society of Concrete Contractors (ASCC) and of The Masonry Society. He was the editor in chief of *Concrete Construction* for 16 years. Bill is a Fellow of the American Concrete Institute and is a professional engineer in Michigan and Colorado. He lives in Lyons, Colorado. He can be reached at wpalmer@hanley.com. Follow on twitter @WmPalmer.

Second position: indicates the application, such as cured concrete (C), green concrete (G), or block/brick (B).

Third position: indicates the saw type, such as handheld saw (H), wall saw (W), or stationary saw (S).

For a free detailed listing of the codes, click here

Cutting concrete with an abrasive blade or a diamond blade generates dust, some of it silica dust that is fine enough that it can be drawn deeply into the lungs. Breathing in fine crystalline silica can lead to silicosis—an incurable lung disease that results in lung fibrosis. The National Institute for Occupational Safety and Health (NIOSH) estimates that nearly 300 construction workers die annually from silicosis. Workers who spend years in an environment where there is free silica dust in the air are more likely to end up with silicosis unless something is done to prevent them from breathing it. That's why the OSHA has established a Permissible Exposure Limit (PEL) for airborne crystalline silica.

The PEL defines how much silica a worker can be exposed to during a given shift. OSHA has a rather complicated formula for determining the PEL in units of million parts per cubic foot of air—a simpler limit is recommended by NIOSH of 0.05 mg/m³. There has been a move in California to reduce the PEL from its current 0.10 to 0.01 mg/m³. In practice, if you can see the dust in the air, then it's probably too much to be breathing.

What that means to a saw operator is that measures must be taken to prevent silica from becoming airborne, workers must be kept out of dusty areas, or workers must use respirators. Preventing silica dust from getting into the air is accomplished by what are called "engineering controls," such as using wet saws or vacuum systems. "The vacuum systems around right now are difficult to work with," said Becky Gallert, Wacker's product manager for demolition products. "The main reason people use a cutoff saw is because it's easy to use and versatile, so to drag around a vacuum hose defeats the purpose." Water creates similar problems, especially indoors. We'll cover respirators in more detail later.

Blades

The blade on a saw is obviously one of the most dangerous parts, although it's also the most essential because it does all the work. Diamond blades almost always are used for concrete cutting today, since the price has come down and because they cut so much better than abrasive blades. For detailed information on diamond blade safety, the Masonry & Concrete Saw Manufacturers Institute (SMI, a bureau of the Association of Equipment Manufacturers) has developed an excellent brochure located at www.aem.org/CBC/ProdSpec/SMI/Pubs.asp.

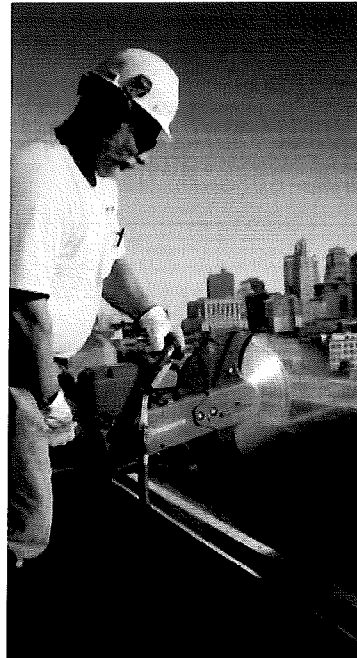
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- Diteq www.diteq.net
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problems and remedies to help your blades last longer and stay safer.

The most important place to start when looking into blades is to check that you are using the right blade for the application. SMI and the Concrete Sawing & Drilling Association (CSDA) have developed a blade application code that most diamond blade manufacturers will follow (see Blade Application Codes). Blades also will be marked with a maximum RPM and a direction of rotation—make sure the saw doesn't exceed that blade speed and that the blade is turning in the intended direction. Always make sure a wet blade (W) is used with cooling water; dry blades (D) can be used with or without water, although trying to use water on a saw intended to be dry can lead to electrocution with electric saws.

Before starting to cut with a blade, carefully look that it's not damaged. Damaged blades can break during cutting, ejecting hot steel pieces—never a good thing. Check that the blade isn't missing segments, that it isn't cracked, and that it doesn't appear to have been overheated. One way to tell if a blade is cracked is to bang it with a piece of wood to see if it rings. Inspect the blade regularly to guarantee it remains in good condition. The SMI brochure has a lengthy listing of blade



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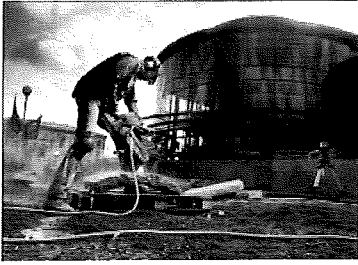
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Keeping non-construction personnel at least 100 feet away from sawing operations helps ensure a safe environment.

Proper mounting of the blade may seem simple, but can be critical to its safe operation. First, of course, before mounting a blade, completely turn off the power to the saw—make sure the cord is unplugged or the engine is off. Use the proper tools to tighten the arbor so the blade doesn't wobble. And never operate a saw without the blade guard in position. When using a new blade for the first time, spin it at top speed for a minute to make sure it doesn't come apart.

Kickback And Lock-In

The term kickback is used a bit differently by different saw manufacturers, but basically it refers to when the saw jumps back toward the operator. Lock-in is when the blade jams in the concrete and pulls the saw away from the operator. With proper use neither of these should happen.

Kickback can be caused by using the upper part of the cutting blade or when a cut is interrupted. It also can happen when putting the blade back into a cut that's already been started. If you must do that, make sure the blade is spinning at top speed before continuing the cut.

Lock-in is similar and often is caused by the workpiece shifting and pinching the blade. Make sure that it is supported and clamped so that this can't happen. Another cause of lock-in is trying to cut too deeply too quickly or trying to cut a radius. These can lock the blade or can cause a diamond segment to pop off. Sometimes a safe practice is to make a shallow guide cut then come back for a deeper cut.

Other General Saw Safety

All reputable saw manufacturers have extensive safety sections in their owner's manual. "Our safety committee looks carefully at each product," said Gallert, "and we make sure that the operator's manual is very clear."

"The biggest trend in saw safety I'm seeing," said Bosch's Jason Feldner, "is education—training people to use the saw properly. Most of the time, they know what they should be doing, so we have to convince them to not pin back the guard and to keep both hands on the saw."

Maintaining a safe environment is another important safety factor. Keep nonconstruction people at least 100 feet away and make sure other workers who are closer have proper personal protective equipment (PPEs). Saws are dangerous and maintaining control of the situation and focus on the work goes a long ways toward safe operation.

Another good source for safety information on cutting is the CSDA. They have developed online courses in saw safety and toolbox talks. For information visit www.csda.org.

Personal Protective Equipment

OSHA standard 1926 has detailed requirements for personal protective equipment for construction available on the Web (www.osha.gov/SLTC/constructionppe/standards.html). For concrete sawing, the most important PPEs include safety glasses, respirators, and hearing protection. Of course, proper clothing, footwear, and hard hats also are necessary and sensible for most construction sites. If you employ workers, it is your responsibility to provide proper PPEs and to ensure your workers use them properly. For an excellent article on PPEs for saw operators, go to the list of safety articles on the CSDA Web site.

Safety glasses or goggles are a must during cutting. The glasses must meet OSHA standard 1926.102 and be stamped as ANSI approved under Z-87.1. Glasses must be comfortable enough that your workers will keep them on and you should require that they be worn at all times. For workers doing a lot of cutting, a full-face respirator would be a good option.

If a worker is dry-cutting concrete without any kind of dust control system, a respirator is a must. There are several types of respirators on the market, ranging from dust masks to full-body supplied-air respirators. MSA has an excellent guide to selecting the proper respirator and also a guide to setting up a respiratory protection system, which is a required part of your safety program. Visit www.msanet.com for more information.



MSA

The ideal safety PPEs for a worker using a cutoff saw includes face shield, respirator, and gloves.

For silica exposure, the first step must be to try to control the silica dust with engineering controls. If that's not enough, then go to respirators. The respirator needed depends on how much dust is in the air (for details, go to the OSHA Web site and look up crystalline silica). The minimum respirator is a half-mask model with a P-100 filter; face masks are not enough protection against silica.

"Silica requires a P-100 filter, that's the NIOSH designation," said MSA's John Hierbaum. "Those used to be called HEPA filters but NIOSH discontinued that terminology. P-100 means that it's 100% efficient against particulates—actually 99.7%. You also have to do a fit test of the respirator by exposing the wearer to banana oil or another material that the respirator would filter out so if the person can smell it you know you've got a leak."

proper way to insert earplugs—pulling up on the top of the ear during insertion helps them to fit better and to more effectively reduce noise.

Hearing protection is another important consideration while cutting. Ear plugs or ear muffs should be provided to workers. There are many very good low-cost earplugs on the market today that are effective at reducing noise levels. Muffs also can be effective but are less so when glasses or respirators affect the fit over the ears. Employers should provide training in the

Keeping yourself or your workers safe when cutting is really good sense. Take safety seriously and your company will prosper.

— William D. Palmer Jr. is the former editor in chief of Concrete Construction magazine. He now runs his own company, Complete Construction Consultants in Lyons, Colo. He can be contacted at atupalmer@greenspeedisp.net.

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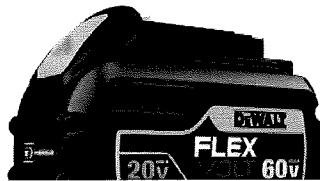
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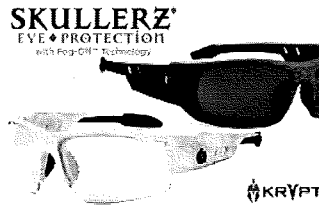
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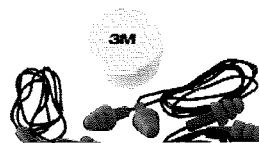
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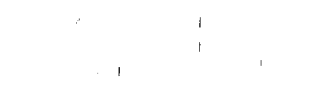
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