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Understanding Protective Guard Rail

Be sure yours can take the hit

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Executive summary

What do people think when they hear the term guard rail? Is it something on an elevated platform that prevents people from falling? Is it that low-profile metal strip that runs along the freeway? Or maybe nothing significant comes to mind? Unfortunately, the latter is often the case, especially when talking about guard rail in an industrial setting. Guard rail is one of those components in a

facility that typically is not top of mind with companies, until it's too late. Soft federal guidelines for guard rail use have helped contribute to its low awareness within facilities, and have placed the onus for use on individual companies to implement. When used properly, guard rail can effectively protect equipment, assets and personnel in and around a facility. The key is to identify areas in need of guard rail, correctly specify it for the application, and take action.



Why guard rail?

While industrial guard rail protects machinery and provides a safe and efficient work environment, it's most important role is protecting people. Forklifts, tigger AGVs and other material handling vehicles are commonplace in manufacturing facilities, and often operate in close proximity to employees. Sometimes their paths do cross...with deadly results. According to the Occupational Safety and Health Administration (OSHA), there are about 85 fatal forklift accidents per year in the United States; 34,900 accidents that result in serious injury, and about 61,800 accidents that are classified as non-serious. Additionally, slightly less than half of the estimated 85 annual fatal forklift accidents occur in manufacturing facilities; of that about 10 percent involve people getting struck or run over by a forklift.

How do forklift accidents happen? OSHA says that most accidents could have been prevented with better operator training. Still, it's easy to see how an accident can occur. Many manufacturing facilities have tight lanes for forklifts to drive. If a turn isn't executed properly, the wheels or forks could sway into a designated *safe area* occupied by employees or equipment. Place an inexperienced driver behind a forklift and the risks increase. Well positioned guard rail can help reduce the chance of accidents by preventing forklifts and other vehicles from straying into dangerous or off-limits areas.

While there are OSHA guidelines regulating the use of hand rail and other guarding devices in facilities for structures such as stairs, mezzanines, temporary manhole covers etc.; there is no direct guidance for the use of guard rail around machinery or designated vehicle travel paths. As such, many facilities simply mark the floor for off limit areas, travel paths and pedestrian walkways with yellow-striped tape – which provides absolutely no protection against vehicle impact. What happens if the forklift driver experiences a medical issue, such as a heart attack, or is inattentive to his surroundings due to texting on his cell phone? A yellow piece of tape will certainly not stop an out-of-control forklift.

Differences in guard rail

Although it may look similar in appearance, not all guard rail is made the same. Many manufacturers build guard rail to have an impact rating of 10,000 pounds at 4 mph. An average forklift with a load generally weighs between 8,000 – 10,000 pounds. Guard rail with a 10,000 pound impact rating means it should prevent a forklift from driving through the guard rail at a speed of 4 mph or less. The goal of industrial guard rail is to maintain its integrity and deflect an

impact. In contrast, highway guard rail is designed to absorb and disperse an impact, which is why at an accident scene that type of guard rail is typically crumpled up.

But not all industrial guard rail comes with only a 10,000 pound impact rating. Some manufacturers build guard rail to a stronger 13,000 pound impact rating. The added value that a higher-rated guard rail brings to a facility is an increased level of safety and peace of mind. Clearly, a higher-rated guard rail will withstand a more severe impact. Furthermore, 13,000 pound impact rated guard rail has a lower deflection rate than 10,000 pound impact rated guard rail. For example, when a forklift truck traveling at 4 mph strikes a 10,000 pound impact rated guard rail, it can deflect, or push back, up to 12-15 inches. When that same forklift strikes 13,000 pound impact rated guard rail, it typically deflects only 10 inches, or less. A few inches may not seem that great, but in facilities and distribution centers where space is often a premium, those few inches mean that equipment and fixtures will be protected and additional manufacturing or storage space can be obtained.

It's important to check the impact rating on any guard rail purchased. That's because some manufacturers don't list an impact rating for their guard rail at all. The likely reason is that it was never tested or it failed an impact test, and they didn't want to spend the time, money or resources to redesign it. So they go to market with a product that isn't rated. These are guard rails to avoid because their impact rating isn't known and, as a result, your facility safety may be at risk.

Building 13,000 pound impact rated guard rail

The way some suppliers achieve a 13,000 pound impact rating is found in their manufacturing process. The best material to use is corrugated 11 gauge steel for the rail. In the manufacturing process, strength is gained in part by hemming the top and bottom portion of the rail sections. This step not only provides added strength, but smoothes out any rough edges to enhance employee safety. Many manufacturers do not hem the rails and simply add a plastic strip to cover up rough edges, and that strip may fall off over time. Strength is also added by using heavy-duty columns and base plates. Avoid guard rail with weaker columns measuring only 4" x 4", or base plates that measure only 10" x 10" with a thickness of only 1/2". Lighter materials may reduce the manufacturer's cost, but it may also lower your level of protection. When assembled, rails should be bolted to the inside of the column, not to the front. Some manufacturers have designed their guard rails to bolt to the front of each column, exposing sharp jagged edges.

The testing process

The purpose behind certified testing of protective guard rail is to demonstrate and prove that it is actually able to handle and deflect the specified amount of weight that it was designed to withstand. Reputable manufacturers will enlist the services of a registered Professional Engineer or seek an independent, outside firm to oversee the testing process.

In testing 13,000 pound impact rated guard rail, two 10 ft. guard rail assemblies were bolted to heavy-duty columns, and base plates were properly secured to a concrete floor using four 1/2" diameter x 4-3/4" long Rawl/Power-Stud bolt anchors. A nominal 13,000 pound load, consisting of a Class IV forklift truck with a 200 pound driver was driven at 4 mph into a marked midpoint on the guard rail.

The resulting impact showed that the guard rail did its job and successfully stopped the forklift's forward progress. The guard rail was permanently deflected at both the lower and upper rails and the measured permanent deflection was only 5-3/4" on the bottom rail and 4-3/4" on the upper rail. This deflection was well within the 10 inch deflection rating specified by this manufacturer. The anchors on the columns remained in place, and there was no damage to the columns in the area of the holes. While both rails were damaged and would have to be replaced, both maintained their structural integrity and protected everything beyond the deflection of the rails. The PE Certified Test demonstrated that the 13,000 pound impact rated guard rail was clearly superior and worthy of consideration to enhance safety in warehouses, distribution centers, or manufacturing facilities.

Changing perceptions

A manufacturer can design and build the best guard rail in the world, but what good does it serve if it's not being used. And often that's the case. Guard rail is mistakenly viewed as a commodity item that people historically don't think much about for their facility. They've never had equipment damaged or personnel injured as a result of a vehicle accident, and as such, guard rail isn't given too much thought. Of course once an accident occurs, facility managers quickly see the value that protective guard rail can provide. But the importance of installing guard rail to protect people and equipment *prior* to an accident seems to be resonating with companies. Despite the slow economic recovery, sales of protective guard rail have increased. One rationale is that since companies don't have the resources to purchase new equipment, they're looking to protect what they have, and guard rail is a relatively inexpensive way to provide that protection.

A reputable supplier can not only provide quality, tested guard rail, but can perform an audit of either a new or existing facility, and recommend solutions on how and where to best use guard rail to protect personnel and equipment. In a facility with equipment that can sometimes be valued at more than a million dollars, properly protecting it with a tested guard rail system that may cost just a few thousand dollars is a smart way to protect that investment. Think of guard rail as insurance for your facility and equipment and the products it produces. How much money will it cost your company if production stops for a day or more due to damage inflicted by a forklift accident? And what is the cost to cover workman's compensation or a lawsuit in the event of an injury or death? Installing a relatively inexpensive, quality guard rail system can prevent those types of accidents and provide peace of mind knowing that equipment and personnel are protected from harm every day. Understanding that is certainly worth a call to your safety or material handling dealer.

This educational white paper has been provided as a service to the industry by Wildeck, Inc., a premier U.S. manufacturer of space enhancement, material handling, and safety guarding products. Based in Waukesha, Wis., Wildeck is a 100% employee-owned company and the largest manufacturer of safety guarding products, industrial steel work platforms (mezzanines), vertical reciprocating conveyors (VRCs), dock safety gates, stair systems and ladder equipment. For more information on 13,000 pound impact tested guard rail, please visit www.wildeck.com, email info@wildeck.com or call 800-325-6939.

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