SUDDEN IMPACT

Know the limits of your safety helmet

Photo courtesy of ERB Safety

By VICKI SCOTT

Safety helmets are designed and manufactured for your protection, but wearers often make inappropriate modifications that can render their helmets ineffective. Furthermore, there is often a lack of understanding about what a particular helmet is designed to do. To get the appropriate level of protection, follow these common sense guidelines.

Unauthorized alterations

One of the most common areas for unauthorized consumer alterations is in the suspension and inner structure of the helmet. Typical examples involve removing the energy-absorbing foam liners for Type II helmets, cutting the ribbons that form the "cradle" or "web" of the suspension, or wearing the helmet in the reverse suspension orientation when the helmet is not approved for such configuration. In these situations, the wearer has negated almost all the protection provided by the helmet, and the energy from an impact could potentially be transmitted directly to the spine.

Another modification that has serious unintended consequences is drilling through the helmet's outer shell to allow for the attachment of gadgets. This is particularly true for Class E helmets which are designed to provide the greatest electrical resistance (and are tested for current leakage at 20,000 volts). A hole in the shell creates a path for high voltage to leak through, and the addition of unapproved metal fasteners makes it even easier for an electrical charge to find a conductive path to the wearer. Perforations added by the wearer for ventilation or other purposes could also decrease the level of protection offered by the helmet.

Other abuses include poor maintenance and storage, painting or applying unsuitable solvents to the helmet. Certain chemicals, including some detergents and paints, can cause plastic helmets to crack. Painting may also hide cracks from the wearers' view. Any degradation of the plastic shell can reduce its impact protection. To get the maximum life and protection from your helmet, keep it clean, use mild detergents, and be sure to rinse and dry the helmet afterward.

Know your helmet's limits

Even without mistreatment or unsuitable modifications, there are limits to what the best designed, constructed and fully functioning helmet can do.

In the U.S., the performance requirements for industrial head protection products are outlined in the ANSI/ISEA Z89.1-2009 standard. For crown impact protection (where objects may strike the top of a worker's head), the standard limits the amount of force that can be transmitted to the wearer's head and, thereby, to the cervical spine. The test impact uses an eight pound weight with a rounded face to strike the top of the helmet with a velocity of 17 feet per second (equivalent to a five-foot drop). There are also requirements in the standard for resistance to penetration by a 2.2 pound pointed missile.

For Type II helmets, in order to prevent brain injury the helmet must resist imparting excessive acceleration to the wearer's head when struck on the side by an object with a defined shape and force. While this is a substantial impact, the conditions of the test can be readily exceeded, particularly when objects fall from greater heights. The laws of physics say that if you double the weight of a falling object, you double the energy of the impact. However, if you double the speed of a falling object, the energy goes up by 2^2 or 4 times (tripling the speed means 3^2 or 9 times the energy, etc). Obviously, it doesn't take long for even a lightweight object to become a deadly missile.

I have been asked for advice regarding helmet selection where the expressed risk is a full 55-gallon drum (around 500 pounds) falling from a second story or higher onto someone's head. You don't really need a hard hat for this situation; what you need is an underground bunker or an army tank!

Even in impacts involving eight-pound objects falling at 17 feet per second, as in the ANSI test, there are other variables such as the exact location of impact on the shell, the angle of impact, and shape of the objects that can greatly effect how the helmet holds up to the blow. Similar types of variables can also effect how helmets resist penetration and lateral impacts.

Treat your helmet well

What can be taken away from all this? Wear a helmet where risk of impact to the head exists. Treat the helmet well; don't perform unauthorized modifications and don't subject it to conditions that are likely to shorten its life. Your safety depends on it. ISHN

Vicki Scott is product manager ERB Safety, a division of ERB Industries, Inc. in Woodstock, Ga. Vicki has over 16 years experience in head protection and other safety product development and manufacturing.

Aritcle written for the June 2010 edition of ISHN trade magazine | www.ishn.com