Head Protection

Training Guide

Why Head Protection is Important?
Your head is a very delicate part of your body. In and around your head are:

- Your eyes, with which you see
- Your ears, with which you hear
- Your nose, with which you smell
- Your mouth, with which you eat and speak
- Your brain, with which you think

Injuries to the head are very serious so use your Head and wear your hard hat. It might just save your life today...

Protecting employees from potential head injuries is a key element of any safety program. A head injury can impair an employee for life or it can be fatal. Wearing a safety helmet or hard hat is one of the easiest ways to protect an employee's head from injury. Hard hats can protect employees from impact and penetration hazards as well as from electrical shock and burn hazards.

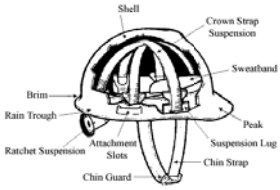
Employers must ensure that their employees wear head protection if any of the following apply:

- Objects might fall from above and strike them on the head
- They might bump their heads against fixed objects, such as exposed pipes or beams
- There is a possibility of accidental head contact with electrical hazards

Hard hats require a hard outer shell and a shock-absorbing lining. The lining should incorporate a head band and straps that suspend the shell from 1 to 1 1/4 inches (2.54 cm to 3.18 cm) away from the user's head. This design provides shock absorption during impact and ventilation during wear.

SHELL MATERIALS
ABS: (Acrylonitrile Butadiene Styrene) It is a copolymer made by polymerizing styrene and acrylonitrile in the presence of polybutadiene. The proportions can vary from 15 to 35% acrylonitrile, 5 to 30% butadiene and 40 to 60% styrene. The most important mechanical properties of ABS are impact resistance and toughness. Generally ABS would have useful characteristics within a temperature range from -40 to 100°C
HDPE: (Hi-Density Polyethylene) A thermoplastic HDPE has stronger intermolecular forces and tensile strength than lower-density polyethylene. It is also harder and more opaque and can withstand somewhat higher temperatures 120°C (248°F) for short periods, 110°C (230°F) continuously.
PC: (Polycarbonate**)** A particular group of thermoplastic polymers, temperature resistance, impact resistance and optical properties**.** Although polycarbonate has impact-resistance, it has low scratch-resistance. Maintains its properties over a wide range of temperatures, from -40 °F to 240 °F and up to 275 °F for short term application, the melting point being at 310 °F
PP: (Polypropylene) A thermoplastic polymer, normally tough, flexible and has good resistance to fatigue and has a melting point of ~160°C (320°F)
Fiberglass: (fiberglass and phenolic-impregnated textiles) Thermoset is material made from extremely fine fibers of glass. Properly known as fiber-reinforced polymer (FRP) or glass-reinforced plastic (GRP) It has no true melting point but softens at 2,000 °C (3,630 °F)
Aluminium: A class C helmet, not approved for work around electrical hazards.






SUSPENSIONS

6-point suspension: Offers a combination of advanced features for a comfortable and secure fit.
Ratchet suspension: Quick and easy adjustments, allows the wearer to modify the fit while wearing helmets.
4-point suspension or pin lock suspension is an economical style in suspension standard.

SWEATBAND

Front suspension sweatband is padded for comfort and perforated to allow air to circulate for a cooling effect, wicks away annoying, perspiration, keeps distracting sweat from dripping down face and provides a cushiony soft padding that enhances secure fit without creating uncomfortable forehead pressure.

CHINSTRAPS

Chin strap with chin guard provides extra comfort and control in windy job sites situation.

ANSI Z89.1-1997

Beginning with the ANSI Z89.1-1997 standard, ANSI updated the classification system for protective helmets. Prior revisions used type classifications to distinguish between caps and full brimmed hats. Beginning in 1997, Type I designated helmets designed to reduce the force of impact resulting from a blow only to the top of the head, while Type II designated helmets designed to reduce the force of impact resulting from a blow to the top or sides of the head. To improve comprehension and usefulness, the 1997 revision also re-designated the electrical-protective classifications for helmets.

ANSI Z89.1-2003

The most significant changes from the 1997 version were made to harmonize with other national standards that test and evaluate equipment performance. In addition, many physical hard hat requirements that did not provide added user value, or that limited design or performance, were removed.

ANSI Z89.1-2009

ANSI published a revision in January of 2009. The significant changes from the 2003 version included three non-mandatory tests: Reverse donning, Lower temperature and High visibility.

ANSI Z89.1-2014

Issued on May 15, 2014 Industrial head protective helmets meeting the requirements of this standard are classified as Type I for top protection or Type II for lateral impact protection. Both types are tested for impact attenuation and penetration resistance. Type II helmet performance requirements include criteria for impact energy attenuation from impacts from the front, back and sides as well as the top; off-center penetration resistance, and chin strap retention.

Helmet Types

Type I - Conventional hard hats that are designed to reduce the force of impact to the top of the head, neck and spine.
Type II - New designs that offer additional impact protection to the front, sides and back, as well as the top of the head.

Helmet Classes

The three classes indicate the helmets electrical insulation rating:

- **Class E** (electrical) are tested to withstand 20,000 volts
- **Class G** (general) are tested at 2200 volts
- **Class C** (conductive) provide no electrical protection

	Class E	Class G	Class C
Description	Utility service, high voltage protection	General service, limited voltage protection	General service, metallic no voltage protection
Insulation Resistance	20000v, 50Hz for 3 min. with 9mA maximum leakage	2000v, 50Hz for 1 min. with 3mA maximum leakage	N/A
Impact Resistance	850 lb average 1000 lb maximum	850 lb average 1000 lb maximum	850 lb average 1000 lb maximum
Penetration Resistance	3/8 in maximum	3/8 in maximum	7/16 in maximum
Flame Resistance	3 in/min. maximum	3 in/min. maximum	N/A

Reverse Donning: Helmets marked with "reverse donning arrow"  can be worn facing frontwards or backwards
Lower Temperature: The optional mark "LT" indicates that the helmet meets all testing requirements of the standard when preconditioned at a temperature of -30°C (-22°F), instead of the normal cold preconditioning done at -18°C (0°F)
Higher Temperature: An optional preconditioning at higher temperatures of 60°C ± 2°C (140°F ± 3.6°F) it will be marked with "HT"
High Visibility: The optional mark "HV" meets new requirements in the standard for high visibility colors

Bump Cap: Not intended for use where ANSI approved head protection is required. Protects the head of someone who walks into an obstruction or stands up in restricted headroom. The bump cap is unsuitable for protection against a falling or moving object.

Care Considerations

Some protective headgear allows for the use of various accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields and mounted lights. Optional brims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face. Protective headgear accessories must not compromise the safety elements of the equipment.
Periodic cleaning and inspection will extend the useful life of protective headgear. A daily inspection of the hard hat shell, suspension system and other accessories for holes, cracks, tears or other damage that might compromise the protective value of the hat is essential. Paints, paint thinners and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance. Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats. Never drill holes, paint or apply labels to protective headgear as this may reduce the integrity of the protection. Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and extreme heat can damage them.

Hard hats with any of the following defects should be removed from service and replaced:

- Perforation, cracking, or deformity of the brim or shell
- Indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking)

Although there is no set “expiration date” on a hard hat, the polymers that the hard hat is made up of can break down over time, especially with UV and/or high heat. OSHA recommends replacing a hard hat after five years.

Always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

It is recommended that helmets should be replaced automatically after 2 years of use.
It is recommended that suspensions be routinely replaced at least once a year under normal wear conditions.
It is recommended that if the helmet has sustained an impact from an object, it should be replaced even though no damage may be visible.

Dos

- Do inspect headwear before each use
- Do replace headwear that has been struck, even if no damage is visible
- Do clean the suspension and shell regularly according to the manufacturer’s instructions
- Do remove and destroy any headwear if its protective abilities are in doubt

Don’ts

- Don’t transport headwear in rear windows of vehicles
- Don’t paint the plastic shell, solvents can make the plastic brittle and more susceptible to cracks
- Don’t use winter liners that contain metal or electrically conductive material under Class G or E headwear
- Don’t put anything between the suspension and the shell

Plastic Recycling Code

CAN/CSA Z94.1-2005

National Standard for Canada; classes of headwear can include:

- Type 1 - protection from impact and penetration at the crown (top) and
- Type 2 - protection from impact, penetration at the crown (top) and laterally (sides)
- Each type is also available in the following classes:
    - Class E (20 000 V electrical rating) - non-conducting material (electrical trades)
    - Class G (2200 V electrical rating) - non-conducting material (general trades)
    - Class C (no electrical rating)

European Safety Headwear Standards and Markings

EN 397: 2012 certifies that safety helmets are designed to offer protection from lateral impact or top impact.
This European Standard specifies physical and performance requirements, methods of test, and marking requirements for industrial safety helmets. The mandatory requirements of BS EN 397 apply to helmets for general use in industry in the European Union as mandated by 89/686/EEC for personal protective equipment. Additional optional performance requirements are included to apply only where specifically claimed by the helmet manufacturer. Industrial safety helmets (also known as headgear) are intended primarily to provide protection to the wearer against falling objects to avoid brain injury and skull fracture. EN 397:2012 is written by Technical Committee CEN/TC 158 on "Head protection". Countries in Europe are expected to adopt it as a national standard, either by publication of an identical text or by endorsement.

Industrial Safety Helmets - Symbol Explanation

MM	Molten Metal
F	Flame Resistant
440V a.c.	Electrical Insulation
-30°C & -40°C	Low Temperature Performance

All helmets perform to +50°C and -10°C

EN 812: 2012 Industrial Bump Caps - Symbol Explanation

F	Flame Resistant
440V a.c.	Electrical Insulation
-20°C & -30°C	Low Temperature

Unlike industrial helmets, bump caps are intended only to protect the wearer from static objects.

References:

Occupational Safety and Health Administration https://www.osha.gov
American National Standards Institute https://www.ansi.org
The Safety Equipment Institute http://www.seinet.org
International Safety Equipment Association https://safetyequipment.org
Canadian Standards Association https://www.csa.ca
European Committee for Standardization https://www.cen.eu
The European Union https://europa.eu
The British Standards Institution https://www.bsigroup.com