

# Fire, Safety and Health Tech Tips

United States Department of Agriculture  
Forest Service



Technology &  
Development Program

November 2002

5100/6700

0267-2331-MTDC

## Your Hardhat: Inspection and Maintenance

*Chuck Whitlock, Project Leader*

The hardhat is one of the most important pieces of personal protective safety equipment. It has prevented many serious injuries. Nearly every project activity requires workers to wear an approved hardhat to protect them from the impact of falling objects and from penetration injuries.

Hardhats can also provide additional safety protection, including protection from rain and ultraviolet light. Some wildland firefighters use different colors of hardhats for identification.

### Components

The hardhat has three parts: the shell, suspension system, and chinstrap. Each component requires periodic inspection and maintenance. Hardhats that meet the ANSI Z89.1–1997 class E or G are only approved for general use. Hardhats must meet the NFPA 1977 (1998 edition) standard for protective clothing and equipment for wildland firefighting. **The Bullard model 502 fiberglass hardhat does not meet the NFPA 1977 standard.**

The shell (the rigid outer portion of the hardhat) comes in two different styles: full brim (figure 1) and cap (figures 2 and 3). The shell is commonly made from a thermoplastic, such as polycarbonate. The shell's main function is to protect the head from penetration and impact injuries. It offers protection from short-duration exposure to lower levels of radiant heat, but it will not protect the wearer from high levels of radiant heat or direct flame. The shell will not retain its original shape when exposed to temperatures above 350 degrees Fahrenheit.



Figure 1—This full-brim hardhat (model FH911 H, manufactured by Bullard) is now compliant with the NFPA 1977 (1998 edition) standard.



Figure 2—Cap-style hardhat manufactured by MSA.



Figure 3—Cap-style hardhat manufactured by Bullard.

The suspension system fastens to the inside of the shell at either four or six points, depending on the manufacturer's design. Both systems meet the ANSI Z89.1–1997 standard and the NFPA 1977 standard (1998 edition). The suspension system is designed to help absorb the impact of a blow to the wearer's head (figure 4). Some newer hardhats have a ratchet-type suspension system which allows the wearer to easily adjust the headband to their head size.



Figure 4—Suspension system in a Bullard hardhat.

The chinstrap is designed to keep the hardhat in place during helicopter operations or in windy situations, when working on steep slopes, or in other conditions that may cause the hardhat to fall off.

## General Information

A conventional hardhat provides limited protection by reducing the force of falling objects striking the top of the shell. It is not designed to protect workers from impacts to the front, side, or rear.

Because hardhats can be damaged, they should not be abused. They should be kept free of abrasions, scrapes, and nicks. They should not be dropped or used as supports. Do not sit on your hardhat. Never drill holes in a hardhat.

Hardhats should not be carried on the rear window shelf of an automobile or stored in direct sunlight.

Never use hardhats with metal parts or clips. Such hardhats will not meet the electrical conductivity requirements of the ANSI Z89.1–1997 standard for class G hardhats or the NFPA 1977 (1998 edition) standard.

Neither the hardhat shell nor the suspension system shall be altered or modified. The use of decals or lettering on hardhats should be kept to a minimum so cracks and defects can be easily seen.

With the exception of face and neck shrouds, workers should never carry or wear anything inside their hardhats. Clearance must be maintained between the shell and head for the suspension system to work properly.

The general service life of a hardhat can range from 2 to 5 years. All hardhats are susceptible to damage from ultraviolet light, extreme temperatures, and chemicals. Employees who are frequently exposed to sunlight, heat, cold, or chemicals should replace their hardhats more often.

When the hardhat is put into service, the date should be written in the hardhat with a permanent marking pen. Subsequent inspections by employees and supervisors can ensure that the hardhat is within its service life and still meets standards.

## Inspection

Both the hardhat's shell and suspension system must be inspected frequently for signs of wear and degradation. Field personnel who wear hardhats should check them at least monthly, if not more frequently.

The shell should be inspected routinely for dents, cracks, nicks, gouges, and any damage that might reduce protection. Any hardhat that shows signs of worn or damaged parts should be removed from service immediately.

The shell material may be degrading if the shell becomes stiff, brittle, faded, or appears dull or chalky. With further degradation, the shell's surface may flake or delaminate. A hardhat should be replaced at the first sign of any of these conditions.

Here is a simple hardhat inspection for field employees, supervisors, and cache personnel.

- Compress the shell from both sides about 1 inch with your hands and release the pressure without dropping the shell. The shell should return to its original shape quickly, exhibiting elasticity. Compare the elasticity with that of a new shell. If the shell being tested does not have as much elasticity as the new shell, or if the shell cracks, it should be replaced immediately.
- Inspect the suspension system closely for cracks, cut or frayed shell straps, torn headband or size adjustment slots, loss of pliability, or other signs of wear. Remove and replace any suspension that is damaged.

## Maintenance

Exposure to temperature extremes, sunlight, or chemicals (such as fire retardant, or tree-marking paint) shorten the useful life of a hardhat. Follow these practices to protect your hardhat and extend its service life:

- Never store a hardhat in direct sunlight.
- Remove dirt and stains from the shell and suspension system by scrubbing them with a mild detergent.
- Rinse the shell thoroughly with warm (not hot) water.
- Wipe the shell dry and carefully inspect the shell and the suspension systems for signs of wear and damage.

## Sources

The following hardhats meet Forest Service and OSHA standards (NFPA 1977–1998 version and ANSI–Z89.1–1977) for wildland fire use:

- MSA Wildland T Firefighter helmet, available in yellow from General Services Administration (GSA). Web site: <http://www.gsa.gov>
- Bullard “Wildfire” cap-style helmet, model FH911C. Web site: <http://www.bullard.com/products/fire>
- Bullard cap-style helmet with flat front panel, model FH5100P. Web site: <http://www.bullard.com/products/fire>

## About the Author

**Chuck Whitlock** is the safety and health specialist at the Missoula Technology and Development Center. He has worked on the Cleveland, Plumas, Fremont, and

Wallowa-Whitman National Forests. Before coming to MTDC in 1998, Chuck was a zone fire management officer on the Wallowa-Whitman National Forest.

## Library Card

Whitlock, Chuck. 2002. Your hardhat: inspection and maintenance. Tech Tip 0267–2331–MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 4 p.

Describes how to inspect and maintain a hardhat, one of the most important pieces of personal protective safety equipment. The hardhat has three parts: the shell, suspension system, and chinstrap. The shell, commonly made from a thermoplastic (such as polycarbonate), protects the wearer's head from penetration and impact injuries. The suspension system is designed to help

absorb the impact of a blow to the wearer's head. The chinstrap is designed to keep the hardhat in place when it might otherwise shift or fall off. A simple hardhat field inspection involves compressing the shell from both sides about 1 inch with your hands and releasing the pressure without dropping the shell. The shell should return to its original shape quickly, exhibiting elasticity. If the shell being tested does not have as much elasticity as a new shell, or if the shell cracks, it should be replaced immediately.

Keywords: personal protective equipment, safety at work

---

### Additional single copies of this document may be ordered from:

USDA Forest Service, MTDC  
5785 Hwy. 10 West  
Missoula, MT 59808–9361  
Phone: 406–329–3978  
Fax: 406–329–3719  
E-mail: wo\_mtdc\_pubs@fs.fed.us

### Electronic copies of MTDC'S documents are available on the Forest Service's FSWeb intranet at:

<http://fsweb.mtdc.wo.fs.fed.us>

### For further technical information, contact Chuck Whitlock at MTDC.

Phone: 406–329–3924  
Fax: 406–329–3719  
E-mail: cwhitlock@fs.fed.us

---

The Forest Service, United States Department of Agriculture (USDA), has developed this information for the guidance of its employees, its contractors, and its cooperating Federal and State agencies, and is not responsible for the interpretation or use of this information by anyone except its own employees. The use of trade, firm, or corporation names in this document is for the information and convenience of the reader, and does not constitute an endorsement by the Department of any product or service to the exclusion of others that may be suitable. The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national



origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410, or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.