

Fire Shelter Training Update and Reminders—2022

Since the last fire shelter training guidance from 2003, it has become evident (through learning from actual fire shelter deployments as well as comments and questions from firefighters) that certain topics need additional context, clarification, and reemphasis. The training video and booklet is being revised and should be available in 2023. Refer to the NWCG Fire Shelter and Personal Protective Equipment Subcommittee (FSPPE) website at <https://www.nwcg.gov/committees/fire-shelter-and-personal-protective-equipment-subcommittee> for more fire shelter information.

Pre-2006 Fire Shelters

Deployments on the Dolan Fire (CA) and the Bridger Foothills Fire (MT) during the 2020 fire season caught the attention of fire shelter experts at the National Technology and Development Program (NTDP). NTDP fire shelter experts noticed a difference in delamination of materials between the shelters made from 2003 – 2005 and those made after 2006. An evaluation was undertaken in 2021 to review the delamination differences noticed on these two deployments.

NTDP tested and compared the material strength and the laminate bond strength of eight fire shelters manufactured between 2003-2005 to eight fire shelters manufactured from 2006-2008. Test results demonstrated greater laminate bond adhesion and stronger material strength in the fire shelters manufactured from 2006-2008. Fire shelters manufactured prior to 2006 have single stitched seams and a four-piece floor design. These fire shelters used a silica cloth that was not treated with silane. The silane treatment increases the bond strength between the aluminum foil and the silica fabric. Conversely, fire shelters produced from 2006 to present are manufactured with silane treated silica cloth, have double stitched seams, a one-piece floor design, and shake handle inserts. NTDP determined the differences in material strength and laminate bond strength, and the double stitched seams contributed to the differences in fire shelter degradation during the two 2020 fire shelter deployments.

The differences between pre- and post-2006 fire shelters only apply to REGULAR fire shelters, they do not apply to LARGE shelters.

While pre-2006 shelters still function as intended, shelters made after 2006 show a greater resistance to degradation. Firefighters should check and follow their Agency's replacement recommendation on pre-2006 fire shelters. The best way to tell if your shelter is pre-2006 is to see if it has a white or pink insert label inside the polyvinyl chloride (PVC) bag. If it does, the shelter was manufactured before 2006. Follow your Agency's direction on replacing the shelter. For additional information see the Equipment Advisory [ETC-EA-2022-03: Performance Differences Between Pre-and Post-2006 Fire Shelters](#).

Keep shelters from 2003-2005, clearly label them with permanent marker on the PVC bag OUT OF SERVICE FOR PRACTICE ONLY and use them for practice deployments during the annual fire shelter training.

Fire Shelter PVC Bag Retrofit 2021

The fire shelter PVC Bag design for new production was recently updated to ensure a more reliable opening. To update the existing shelters at your local unit, follow the [Retrofit Directions](#). Non-retrofitted fire shelters are still serviceable, but the FSPPE Subcommittee recommends the retrofit.

Cleaning and Disinfecting Practice Shelters

Disinfecting is not required unless someone with symptoms or known illness used the practice fire shelter within the past 24 hours.

The Stigma

Many firefighters who have deployed fire shelters mentioned a feeling of apprehension when it came to the decision to deploy their shelters. Firefighter quotes after shelter deployment include:

- “Somebody screwed up!”
- “It’s not a real deployment.”
- “Here comes the investigation!”
- “Am I in trouble?”
- “They’re going to fire me!”

This apprehension often relates to the stigma that comes with fire shelters. Firefighters have suffered burn injuries and severe smoke inhalation because of delays in deploying fire shelters. Deploying a shelter does not need to be an unquestionable, last-second lifesaving event. If you feel your situation is uncertain and can be improved by deploying a shelter, use it. The Wildland Fire Lessons Learned Center’s [“Two More Chains, Fall 2011 Edition”](#) addresses this issue.

Training

Shelter deployment training—As a firefighter, you practice entrapment avoidance to stay out of situations where you may need to deploy a fire shelter, but you can still find yourself in a situation where you’re entrapped by fire and need to deploy a shelter. Feeling like you are following the 10 Standard Fire Orders and LCES perfectly, does not guarantee your safety. You must take shelter training seriously. “It” can happen to [ANYONE!](#)

The fire shelter cannot provide sufficient protection in all fire situations, firefighter fatalities prove that fact. However, many firefighters have survived fatal conditions by deploying their shelter. View the statistics of the M2002 fire shelter [here](#). To enhance training, NTDP recently produced a collection of videos, [“Fire Shelter Deployments: Stories and Common Insights.”](#) You can view these videos on the Wildland Fire Lessons Learned Center’s [YouTube channel](#). You can also request DVDs of these videos from NTDP at 406–329–3900.

Training should include practicing shelter deployments while wearing personal protective equipment (PPE)—especially gloves—in a high-stress environment, with time constraints, and in different positions, such as standing, kneeling, and lying down. Examples of ways to add stress to training include using blindfolds, producing loud noise, or making firefighters share a shelter. Adding high-ventilation fans to simulate wind and using outdoor conditions also helps to create more realistic practice situations.

Shelter inspection—Ensure that you are carrying a serviceable fire shelter. Use shelter inspection criteria to inspect shelters at the start of every fire season and periodically throughout the season. Review the [“Fire Shelter Inspection Guide and Rebag Direction”](#) tech tip. Take shelters that don’t pass inspection out of service and use them for practice deployments.

Practice shelters—Firefighters who have deployed real shelters have indicated that practice shelters deploy differently. Whenever possible, use real but out-of-service shelters (like pre-2006 shelters) to provide more realistic training. The stiffer, heavier material of real shelters does not shake open as easily. Also, the Velcro tear strip of the practice shelter PVC bags and the real shelter bag tear open differently. The short video, [“Opening Shelters,”](#) demonstrates some differences.

Repacking practice shelters can be quite cumbersome. The short video, [“Practice Shelter Repack,”](#) provides directions on how to easily refold and repack a practice shelter.

Shelter PVC bags—Firefighters who have deployed real shelters indicated that training PVC bags open with much less effort than real shelter PVC bags. Expect to open the bag with a quick, strong pull down of the red tear strip. In addition, a high-temperature environment can soften the shelter’s PVC bag, making it more difficult to tear open. Make sure to deploy your shelter before dangerous high temperatures arrive at the deployment site.

Shake handles—The purpose of shake handles is to assist in a speedy deployment. You should find that the real shelter shakes out easier if you spread your arms out wide and use short, jerking shakes. Shake handles derived from an evaluation involving practice deployments of the previous shelter design, which many firefighters struggled getting the shelter fully open. Firefighters would shake the shelter from an end repeatedly, which sometimes only partially opened the shelter. Shaking the shelter from its side where the handles are located enables you to unfurl the shelter more quickly and completely with only a couple of shakes. The shelter opens quicker even if you grab the wrong handles or only shake one handle than if you shake it from an end.

Large Size Fire Shelters—For those firefighters 6’1” and taller, a large-sized fire shelter has been produced. This shelter is 10 inches longer, 4 inches taller and 2 inches wider than the regular size shelter. [Find out more information here.](#)

Entrapment and Fire Shelter Deployment

Safety zones—Even though safety zones have guideline criteria for judgement, firefighters cannot determine the true effectiveness of a safety zone until after the fire passes. If you commit to a safety zone and become uncertain about its viability, be prepared to deploy your shelter.

Entrapment— When entrapment is imminent, do not wait until the heat drives you to deploy your shelter. Deploy your shelter well before the fire arrives. Waiting too long to deploy your shelter can leave you exposed to dangerous levels of heat.

Decision to deploy—Many firefighters have reported apprehension when making their decision to deploy shelters – expect self-doubt. In group deployments it has often been less experienced firefighters that initiate the shelter deployment discussion. Quite often entrapped firefighters are performing many

“active” tasks to improve their situation. Deploying a fire shelter is a “passive” last-action that can feel like being “defeated.”

Deployment site selection—Pick a site that has the sparsest fuels and where it is least likely that flames and convective heat will contact the shelter. Avoid chimneys, saddles, and draws. On a few occasions, firefighters have attempted to burn out a deployment site or safety zone as a fire front approaches – “Wag Dodge it.” It has rarely succeeded. Is it worth a try? It depends on the individual situation but refrain from relying on it as a last-minute plan.

Vehicles—Firefighters have both survived and perished while taking refuge inside vehicles and deploying a fire shelter. Past situations have shown that vehicles can catch fire rather easily, cab windows can shatter, and cabs can quickly fill with toxic smoke. This can force firefighters to hastily exit into nonsurvivable conditions. If entrapped inside a vehicle, unfold the fire shelter to reflect heat, but be prepared to exit quickly and deploy the shelter.

Moving—Firefighters have moved from one location to another while in a shelter and have used the shelter as a shield to move. However, using a shelter in this manner may expose your airway to nonsurvivable air temperatures.

Amount of protection—Fire shelters provide their best protection in a radiant heat environment and less protection against convective heat and direct flame contact. Selecting the best available site to deploy your shelter is very important. Deploy the shelter at a site that will minimize exposure to convective heat and flame contact as much as possible. NTDP conducted fire shelter tests in both laboratory and wildland environments. The short video, [“Fire Shelter Comparison Test”](#) shows a test in a wildland fire environment. T&D specialists estimate that the current fire shelter has saved three firefighter lives, which would have been fatalities in the old-style fire shelter. Check out these Fire Shelter Deployment stories, [“Mudd Fire”](#) and [“Holloway Fire.”](#)

During development of the current shelter, NTDP specialists subjected fire shelters to a variety of lab tests including radiant and convective heat scenarios. In the radiant heat test, shelters were exposed to 40 kW/m² of heat flux for 5 minutes. The current shelter showed a non-injuring rise in temperature of 140 °F and a heat flux—the rate of heat energy transfer—of 1.5 kW/m². An exposure of 40 kW/m² would be fatal to an unsheltered human. In comparison, the sun has a rating of 1 kW/m² on the Earth’s surface. In the convective heat test, shelters were exposed to flames with 80 kW/m² of heat flux and a temperature of 1,300 °F for 20 seconds. The current shelter showed a non-injuring rise in temperature of 100 °F and a heat flux of 1.3 kW/m². Limitations of the test facility prevented testing longer duration exposure.

The current test protocol involves a more severe convective test that lasts much longer than the previous test. The current shelter has survivable conditions for an average time of 54 seconds. Watch the short video, [“Shelter Testing 2015—2018.”](#) It is not uncommon for wildland fires to reach more than 180 kW/m² of heat flux and temperatures exceeding 1,900 °F with turbulent winds. Flaming fronts usually burn through a site within 75 seconds. Depending on fuel loading, conditions do not become survivable for several minutes afterwards.

High winds—Deploying a shelter in windy conditions is difficult. Lie on the ground to unfold and deploy the shelter. The short video, [“Fire Shelter Deployment in 50 mph Wind,”](#) shows a firefighter deploying fire shelters in 50 mph winds created by the Forest Service’s DC-3 airplane.

Gloves—Wildland firefighting gloves are designed to provide appropriate protection from heat and physical hazards. However, the gloves limit dexterity when using fine motor skills. Wear gloves while working in a fire area, except when you need to use fine motor skills. Review the tech tip, [“Firefighters’ Leather Gloves Redesigned To Be More Comfortable.”](#)

Water—Only take your water bottle with you into the shelter if it is convenient and time permits.

Radio—Only take your radio with you into the shelter if it is convenient and time permits. Fire shelters can inhibit the ability of a radio to transmit and receive. You can slide the radio antenna out from under the shelter for better reception, but only attempt to do this when you feel it will not allow dangerous levels of heat to enter the shelter. Review the tech tip, [“Fire Shelters Weaken Transmissions From Hand-Held Radios.”](#) Many firefighters have mentioned the calming effect of being able to communicate, but it is rare when outside entities, aviation or otherwise, are able to rescue firefighters inside shelters.

If you have an external radio microphone cord woven through your fireline pack webbing, practice detaching the microphone cord from the radio under a mock high-stress, time-constrained situation.

Risk management—Risk homeostasis, in short, is a theory that predicts a person is willing to take more risk if he or she perceives more protection. Even though the current M-2002 shelter offers significantly more protection than the old-style shelter, fire shelter deployment numbers have decreased. From 1996 to 2009, the average number of shelters deployed per year was 28. From 2010, the year firefighters were required to carry the M-2002 shelter, until 2019, the average number of shelters deployed per year is seven.

In 2021, one firefighter deployed their shelter to protect from radiant and convective heat during their escape from the fire after their vehicle broke down. Deploying your shelter as a heat shield is a perfectly acceptable use, and it may help to prevent against burn injuries. Deploying your shelter does not need to be treated as a last second, lifesaving event. If your situation is uncertain, and you feel deploying your shelter can improve the situation, do so.

Remember—Weigh the risks of your assignment. Fires occur in a dynamic environment where drastic changes can arise very quickly. Never take added risks because you are carrying a fire shelter. Maintain a healthy distrust that the fire shelter will save your life in every fire situation. Be sure to communicate with your subordinates, supervisors, friends, and family that fire shelters have protective limitations.

Comments or questions?—Contact David Maclay-Schulte, fire shelter project leader, U.S. Forest Service, National Technology and Development Program, at david.j.maclay-schulte@usda.gov; phone: 406–329–3965.