

Module 7: Firing Devices

Topic 1: Introduction

Firing devices module overview

It's time to turn up the heat. This topic introduces you to the tools you will use to fight fire with fire. Each firing device has its own advantages and hazards, but all of them are reliable when you need to *burn out* or *backfire* during wildland firefighting operations.

In this module, we'll discuss the following firing devices:

- Drip torches
- Fusees
- Items at hand

Firing devices are powerful tools with the potential to be powerfully dangerous, so we'll also run down the safety features and procedures of each device.

Narration script: Establishing a fire line can be time consuming and backbreaking. Your job is to assist in the fire's management, and though it may seem counter-intuitive, you will often need to start small fires to put out or contain the bigger one. Using a firing device can save valuable time and your back, but you must use special care with this method. We discuss it all in this module.

Topic 2: Firing Devices

Firing devices topic introduction

Firefighters often use firing operations to *control* wildland fires by *backfiring* or *burning out* to consume fuel between a *control line* and the main body of a fire. The many devices available to start these fires are classified as either primary or secondary firing devices.

Primary firing devices are the most basic devices and the one's you'll be using. When needed and authorized, the primary firing devices to be familiar with are:

- Drip torches
- Fusees
- Items at hand

In this topic, we'll cover drip torches and *fusee* preparation and describe steps for keeping you hazard-free in the process.

We'll cover each firing device in turn.

Warning

Firing operations are potentially very dangerous and should only be conducted or supervised by trained personnel. As a Firefighter Type 2 (FFT2), you are not qualified for *backfiring* operations. However, you will often be asked to participate in *burning out* operations. Make sure you know the difference!

Narration script: Up to this point in this course, we have only discussed using hand tools for suppressing a fire. But sometimes you need to fight fire with fire. You need to be familiar with the primary devices, such as drip torches, fusees, and items you have at hand to deprive a fire of needed fuel. Drip torches and fusees are the most common devices you will be using.

Drip torches

The drip torch is perhaps the most commonly used ignition device for burning out. When you're carrying the torch, it allows the burning fuel to drip onto the vegetation where you want to burn.

The fuel mixture you will use in the drip-torch tank is usually four parts diesel fuel to one part gasoline. When filling the drip torch, fill only to 1/4 inch (6 mm) from the top to allow for fuel expansion.

Narration script: The tank of the drip torch contains a fuel mixture that you ignite and spread onto the vegetation to be burned out.

The fuel flows through a tube and saturates the wick, which burns continuously. A loop in the tube prevents "flashback" into the fuel tank.

Placing drip torch into service

After putting on the proper protective gear, to place a drip torch into service:

- Remove drip torch from storage location and shake vigorously to mix fuel
- Remove lock ring in vegetation-free area
- Remove and secure flow plug
- Separate tube from fuel tank; inspect rubber gasket and fuel level
- Set tube upright and tighten lock ring
- Open air vent three-fourths of the way
- Wipe any spilled fuel from exterior of drip torch
- Carry drip torch in completely upright, vertical position to point of application
- Tilt torch to spread small amount of fuel on ground litter or paper at ignition point
- Ignite spilled fuel and light torch from ground fire
- Tilt torch downward to dispense fuel at each desired ignition point

Narration script: In case you have to use a drip torch, here's how to do it. First remove it from storage and shake it vigorously to mix the fuel. Once you are in a vegetation-free area, remove the lock ring and remove and secure the flow plug. Then separate the tube from the fuel tank and inspect the rubber gasket and the fuel level. While facing the opposite direction from the handle, set the tube upright on the torch in the opening and tighten the lock ring. Then open the air vent three-fourths of the way and wipe any spilled fuel from the exterior of the torch.

Be sure to carry the drip torch in a completely upright, vertical position until you reach the place you intend to use the torch. When you get to the ignition point, tilt the torch to spread a small amount of the fuel on some material, such as ground litter or paper and then use the flame from that material to light the torch. Then, when you reach each desired ignition point, just tilt the torch downward to dispense the fuel and start the fire.

Preparing drip torch for next use

When you no longer need the drip torch, prepare it for its next use by:

- Extinguishing the wick or letting it burn dry
- Allowing the entire unit to cool to ambient temperature
- Preparing the unit for road travel by removing the lock ring, placing the tube back inside the tank, and replacing the lock ring
- Replacing the flow plug
- Closing the tank vent

Drip torch hazards and safety precautions

Drip torches have many hazards, including flaming fuel, personal burns, improper fuel mix, flash back or explosion, and injuries from improper carrying and handling.

To overcome these hazards, there are several drip torch safety precautions to take.

Before Using Torch

The drip torch precautions to follow before use are to:

- Wear all personal protective equipment (PPE) properly, including sleeves down, gloves on, and eye protection in place
- Open or fill the can away from ignition sources, such as open flame, hot embers, sparks, or while smoking
- Follow proper maintenance steps for the torch
- Avoid breathing hazardous vapors
- Follow fuel-mix ratio to avoid an explosion upon ignition

While Using Torch

The drip torch precautions to follow while using the torch are to:

- Carry the torch by the handle only
- Carry the torch as you would any tool—on the downhill side of your body
- Keep the burning torch away from your body, clothes, and boots
- Burn from the top of a hill downward
- Have an escape route planned
- Keep fuel flowing so the wick does not burn out

After Using Torch

The drip torch precautions to follow after using the torch are to:

- Extinguish the torch when not in use
- Let torch cool before inserting the wick and spout into the can
- Wash exposed skin areas as soon as possible after fuel contact
- Change out of any fuel-contaminated clothes and wash them before wearing again

Narration script: You can imagine what the results would be from flaming fuel and personal burns—not a pretty sight. And, an improper fuel mix might cause an explosion. You should also try to carry the torch on the downhill side of your body. Obviously, stay alert when handling the drip torch and especially when placing fire on any sort of slope.

Fusees

You can use fusees for burning out. Some fusees designed specifically as firing torches are manufactured with a hollow sleeve in one end so a 6- to 8-inch (150 mm to 203 mm) handle or other fusee may be attached.

Fusees burn phosphorous contained within the body of the device. Phosphorous burns very hot (1,400° F or 760° C) and easily ignites grass, twigs, leaves, and other *light fuels*.

Fusees usually burn for 15 to 30 minutes.

Narration script: Some fusees are designed specifically as firing torches with a handle attached. When using this type of fusee, or one that a makeshift handle has been attached to, you won't have to stoop down. Besides saving your back, you'll be better able to see what is going on around you.

Lighting a fusee

To light a fusee:

- Slide fusee onto the tool handle
- Grip fusee in one hand and remove striker cap by tapered end
- Scrape striker end sharply against ignition end of fusee in downward motion, away from your face and body
- Hold fusee away from body with the lighted end down
- Keep the fusee on the burn side of the *fireline*
- Extinguish fusee by tapping burning end on noncombustible surface

Once you're done with a fusee, be sure to dispose of it properly.

Narration script: If you have to light a fusee, start by sliding the fusee onto a stick or tool handle if it doesn't already come with a handle. That way you don't have to bend over to light the fire. Next grip the fusee in one hand and remove the striker cap by the tapered end. Scrape the striker end sharply against the ignition end of the fusee in a downward motion, away from your body with your elbow locked. It may take quite a bit of pressure. Be sure you turn your head to the side when you strike it. All the while, hold the fusee downwind and don't breathe the fumes. If you hold the fusee away from your body with the lighted end down, then burning phosphorous won't drip onto your hand. Keep the fusee on the burn side of the fireline. When you're done, extinguish the fusee by tapping the burning end on a noncombustible surface and be sure to dispose of it properly. Don't leave fusees where livestock or other animals can eat them.

Fusee hazards and safety precautions

The two primary hazards of burning fusees are from the released particles and fumes. Fusees burn at 1,400° F (760° C) and can burn you severely. Also, when fusees burn, they give off toxic fumes. Avoid these fumes as well as contact with hot splattering phosphorous slag.

When using fusees:

- Wear all *PPE* properly, including sleeves down, gloves on, and eye protection in place
- Do not remove the fusee cap until you are ready to light it
- Turn your head to the side when striking
- Keep lit fusees away from your body, pointed down, and away from anything you do not want to burn
- Stand upwind of the fusee to avoid breathing smoke and vapors
- Do not stare at the bright burning flame from the fusee
- Do not point a burning fusee at anyone

Items at hand

Sometimes firefighters may have to burn out without a drip torch or fusee. In these cases, it is possible to use items at hand to light a fire.

Examples of such items include:

- Burning leaves or needles placed in unburned fuel with a shovel
- Burning branches
- Burning rag wrapped around a stick

- Matches or a cigarette lighter

The basic safety precautions and principles of burning out with these materials are the same as for using drip torches and fusees. Also, watch out for any materials that may roll or blow into fuels not intended for burn out.

Narration script: Maybe you're in a situation where you don't have either a drip torch or a fusee, but you still have to burn out. You know what that means—it's time to get creative like this firefighter who is using a makeshift torch.



Caption: A firefighter in full PPE standing in the black using a lit long-handled makeshift torch to light adjacent grasses

Knowledge check 1

Matching—select the match you choose from the pull down list.

Why don't you burn up this Knowledge Check with all you know about firing devices?

Match each firing device with the correct description.

Drip torch

Fusee

Matches

The correct matches for this question are: a drip torch is the most commonly used ignition device. A fusee contains phosphorous in the body of the device. Matches are considered an “item at hand” suitable for burning out.

Knowledge check 2

Why not try to hazard a guess about these common firing device hazards?

Match each firing device with its potential danger. You may use each device more than once.

Drip torch

Drip torch

Fusee

Fusee

The correct matches for this question are: a drip torch's potential danger is an explosion and ignition of fuel mix from improperly cooled component. The potential dangers from a fusee are contact with hot slag and eye damage from burning flame.

Topic summary

Firing devices are familiar tools in the wildland fire fighting arsenal. Properly using them when burning out or establishing a control line can save land, structures, and possibly lives. As a FFT2, you won't make the decision to burn out, but you will lend a hand when called upon.

You should now be familiar with these firing devices and their potential hazards:

- Drip torches
- Fusees
- Items at hand

If you're going through this course in order, the next module moves quickly from using fire to fight fire to water use.

Narration script: This topic has covered some of the hottest tools of the trade. As we stated many times before, your safety is the most important factor while fighting a wildland fire. Your knowledge of the available tools, their use, and their maintenance contribute to your overall safety. And by maintaining and storing your tools properly, you will always be able to respond when duty calls.