

Prerequisite Training

Learners must have received basic instruction in the use of personal protective equipment, hose, and nozzles.

Learning Outcomes

1. Identify the following nozzle characteristics:
 - a. Kind of nozzle (i.e., solid stream, combination)
 - b. Type of nozzle (i.e., fixed flow, variable flow, automatic)
 - c. Flow Rate(s) or Range
 - d. Flow control mechanism (tip size, flow control ring, nozzle shutoff)
 - e. Range of patterns (combination nozzle only)
 - f. Shutoff mechanism (i.e., ball valve or slide valve)
 - g. Operating pressure (at the nozzle)
2. Demonstrate the following nozzle techniques while operating from a fixed position:
 - a. Gas Cooling (Short and Long Pulses)
 - b. Surface Cooling/Direct Attack (Painting and Penciling)

Reference

Grimwood, P., Hartin, E., McDonough, J., & Raffel, S. (2005). 3D Firefighting: Training, Techniques, & Tactics. Stillwater, OK: Fire Protection Publications.

Resource Requirements

This drill requires a pumping apparatus and sufficient hose and nozzles to provide each team of learners with a hoseline. If possible teams should be limited to no more than five learners to maximize practice and minimize session duration. If possible, the same nozzles that will be used operationally should be used for this drill.

Training Prop

This evolution requires an open area on the drill ground where water can be discharged and sufficient water supply to allow all learners to have ample opportunity to practice their skills. If possible, a vertical wall and several three dimensional targets should be provided for learners to practice painting and penciling techniques.

CFBT Instructors

One instructor is required for each team of learners during this lesson.

Learners

The maximum number of learners is dependent on the availability of resources and instructors.

Safety

Inspect the training area prior to conducting this evolution to ensure that there are no walking or working surface hazards. Instruct the participants to use caution when directing water from hoselines.

Personal Protective Equipment

Learners should wear structural firefighting clothing during this drill. However, in hot weather this requirement can be reduced to helmet and gloves.

Scene Control

Scene control will vary to some extent based on the specific training location. The immediate training area will be limited to participants and (accompanied) observers of the training activity.

If in-service apparatus is at the training location, position it to ensure ease of egress.

Instructional Activities

This lesson involves the following instructional activities. Base your instructional approach on learners experience level and understanding as the lesson progresses.

1. Detailed briefing focused on the intent of the lesson and the skills that learners will be practicing.
 - a. **Short Pulse:** Have the learners imagine opening and closing the nozzle as quickly as possible. Then tell them that the short pulse is slightly quicker than that (to emphasize that this needs to be an extremely short application of water). Water hammer is not an issue due to the minimal duration of the pulse and small amount of water involved.
 - b. **Long Pulse:** A long pulse is anything longer than a short pulse. The duration of long pulses is dependent on compartment configuration and fire conditions. In practicing this skill, learners should apply pulses from several seconds up to 15 or 20 seconds. The long pulse requires that the nozzle be opened quickly (to provide maximum pressure and obtain the desired droplet size) and closed relatively slowly (to minimize potential for water hammer).
 - c. **Painting:** Developing a thin film of water on a hot surface requires gentle application. This requires opening the nozzle only enough for water to reach the intended target. Overly vigorous application results in water bouncing off and not cooling the intended surface.
 - d. **Penciling:** Penciling is similar to pulsing (short or long), but with a straight stream. This technique is used to maximize reach when applying water to hot surfaces. Brief application uses the same quick operation of the nozzle shutoff as a short pulse, longer application requires quick opening and slower closing of the shutoff in the same manner as a long pulse.

These nozzle techniques are simple, individual skills which will be integrated into team based hoseline operations in later drills.

2. Demonstrate each technique (short pulse, long pulse, painting, and penciling) immediately before the learners practice the skill.
3. Have the learners practice each technique (short pulse, long pulse, painting and penciling).

The instructor should provide hands-off, diagnostic feedback to assist the students in mastering each of the skills. Learners should develop proficiency in each skill prior to moving on to the next.

- a. Keep nozzle out in front (don't hug the nozzle) to permit good control
 - b. Use of a pistol grip is a matter of personal preference. The important thing is proper nozzle position. If nozzles are equipped with a pistol grip, have the learners try the techniques both with and without using the pistol grip at various flow rates to determine the best approach.
 - c. Short pulse requires quick action with the shutoff (open and closed). Key on differences between ball and slide valves (ball valve must be opened fully; slide valve may be opened partially).
 - d. When applying longer pulses (particularly at high flow rate) open quick, close slightly slower.
 - e. Pattern control is critical. All learners must know which way to turn the control for straight and fog patterns without hesitation.
 - f. Have the learners determine how far to turn the pattern control to go from a straight stream to a medium fog pattern (as a basic reference). This will vary considerably with different makes and models of nozzle.
 - g. Painting requires gentle application. Have the learners practice applying water to the top of a wall so that water flows down the surface without splashing off. Painting is also used on three dimensional fuel packages, have the learners practice gentle application to other surfaces to develop proficiency in this technique.
4. Pulses are applied to cool the hot gas layer and as such need to be directed so that water vaporizes in the gas layer and not on surfaces. Once learners have developed basic familiarity with the nozzle, Position them at a given distance from a wall and have them adjust the angle of the fog pattern so that pulses just barely reach the wall (without force). Then change the distance, moving the learners closer or further away (at random) and repeat the same exercise.
 5. Debrief all participants focusing on observations and conclusions.

Integration

Hose and Nozzle Technique Drill 1 can be used as a stand-alone training exercise or elements of this drill can be integrated into other training activity. For example, when conducting hose evolutions (focused on deployment of supply and attack lines), elements of Hose and Nozzle Technique Drill 1 can be integrated with deployment of attack lines. In fact, any time that a charged line is being used for training focused on structural firefighting, elements of this drill can be integrated to maximize the effectiveness and efficiency of training in nozzle techniques.