



DEPARTMENT OF FINANCIAL SERVICES

Division of State Fire Marshal
Bureau of Fire Standards and Training

Title: BFST/FFP/ATPC1302 Apparatus Operations

Revision: June 24, 2019

Section I - Course Information

Course Title: Apparatus Operations

Course Number(s): BFST/FFP/ATPC1302

Class Days/Time: If being taught at the Florida State Fire College Campus 11655 NW Gainesville Road, Ocala, FL 34482 Bldg. C – Classrooms – Monday - Friday 8 a.m.- 5 p.m. Additional coursework outside the classroom totaling five (5) hours of work may be assigned.

Section II - Points of Contact

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Section III – Course Description

This course covers the laws, rules and driving techniques for emergency vehicles as well as a review of hydraulics. Fireground evolutions and driving make up the practical part of the course. The evolution portion of the course includes the use of pre-connected lines, tandem pumping, drafting relays and master streams. The student should have a basic understanding of fire stream hydraulics prior to entering this course.

Section IV - Course Materials, Grading, and Attendance

Recommended Book: *Pumping Apparatus DRIVER/OPERATOR Handbook (3rd ed.); IFSTA Publishing (2015) ISBN: 0-87939-278-9*

Prerequisite(s): BFST/FFP/ATPC1301 Fire Service Hydraulics

Contact Hours: This class has 45 contact hours.

Continuing Educations Units (CEU's): None

Pre-Course Assignment: None

Required Materials: Paper, pens, USB portable storage device (thumb drive). Apparatus and appliances for driving/pumping operations; water sources; and safety equipment.

NOTE: Students must bring gloves, hardhat and proper attire for pumping operation exercises.

Grading: Students must achieve a minimum cumulative score of 70% to pass this course. Course grades are determined from assignments and activities including, but not limited to homework, projects, quizzes, exams, and presentations. Below is the breakdown of the final accumulative grading:

- Individual Exercises 20 points
- Quizzes 20 points
- Final Group project 30 points
- Final Written Exam 30 points

Attendance: Students are required to attend all sessions of the course.

- Excused absences - Students are permitted excused absences totaling no more than 10% of class (4.5 hours maximum); the instructor shall be the sole determining authority in the determination of an excused absence and may assign supplemental work to make up for missed class time.
- Unexcused absences - The instructor shall be the sole determining authority in the determination of an unexcused absence (i.e. “no call, no show”). The instructor has no obligation to offer the student an opportunity to make up assignments, including quizzes and/or exams, but may do so at his/her discretion.

Section V - Instructor Qualifications

As per Chapter 69A-37.065, Florida Administrative Codes, *Programs of Study and Vocational Courses*, instructors must meet the following qualifications to be authorized to teach this course:

F.A.C. 69A-37.065(1)(c)(1) Instructor Qualifications: An instructor providing training under this paragraph (a), must be qualified by the Bureau of Fire Standards and Training within the Division. Qualified instructors are:

(c) Instructor Qualifications.

1. An Instructor I shall hold a state certificate of competency for Pump Operator.
2. An Instructor II or III may teach providing he or she has successfully completed the course.

(d) A Pump Operator Certificate of Competency may be awarded to a person who has satisfactorily complied with the following requirements:

1. Successful completion of all required course work.
2. Passing a state examination with a score of 70% or higher.

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3. Submission of the required application (Form DFS-K4-1457), which is incorporated by reference in paragraph 69A-37.039(2)(u), F.A.C., and can be obtained where indicated in subsection 69A-37.039(1), F.A.C., with all supporting documentation and fees, to the Bureau of Fire Standards and Training.

Section VI – Job Performance Requirements Applicable Fire and Life Safety Initiatives

Given information from discussion and reading materials, the student will satisfy the Job Performance Requirements (JPR) of the applicable National Fire Protection Association (NFPA) standards, as well as any applicable skill sheets.

NFPA 1002, Standard for Fire Apparatus Driver/Operator Professional Qualifications, 2014 Edition

4.1 General. Prior to operating fire department vehicles, the fire apparatus driver/operator shall meet the job performance requirements defined in Sections 4.2 and 4.3.

4.2 Preventive Maintenance.

4.2.1* Perform routine tests, inspections, and servicing functions on the systems and components specified in the following list, given a fire department vehicle, its manufacturer's specifications, and policies and procedures of the jurisdiction, so that the operational status of the vehicle is verified:

- (1) Battery(ies)
- (2) Braking system
- (3) Coolant system
- (4) Electrical system
- (5) Fuel
- (6) Hydraulic fluids
- (7) Oil
- (8) Tires
- (9) Steering system
- (10) Belts
- (11) Tools, appliances, and equipment

(A) Requisite Knowledge. Manufacturer specifications and requirements, policies, and procedures of the jurisdiction.

(B) Requisite Skills. The ability to use hand tools, recognize system problems, and correct any deficiency noted according to policies and procedures.

4.2.2 Document the routine tests, inspections, and servicing functions, given maintenance and inspection forms, so that all items are checked for operation and deficiencies are reported.

(A) Requisite Knowledge. Departmental requirements for documenting maintenance performed and the importance of keeping accurate records.

(B) Requisite Skills. The ability to use tools and equipment and complete all related departmental forms.

4.3 Driving/Operating.

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4.3.1* Operate a fire apparatus, given a vehicle and a predetermined route on a public way that incorporates the maneuvers and features that the driver/operator is expected to encounter during normal operations, so that the vehicle is operated in compliance with all applicable state and local laws and departmental rules and regulations.

(A) Requisite Knowledge. The importance of donning passenger restraint devices and ensuring crew safety; the common causes of fire apparatus accidents and the recognition that drivers of fire apparatus are responsible for the safe and prudent operation of the vehicle under all conditions; the effects on vehicle control of liquid surge, braking reaction time, and load factors; effects of high center of gravity on roll-over potential, general steering reactions, speed, and centrifugal force; applicable laws and regulations; principles of skid avoidance, night driving, shifting, and gear patterns; negotiating intersections, railroad crossings, and bridges; weight and height limitations for both roads and bridges; identification and operation of automotive gauges; and operational limits.

(B) Requisite Skills. The ability to operate passenger restraint devices; maintain safe following distances; maintain control of the vehicle while accelerating, decelerating, and turning, given road, weather, and traffic conditions; operate under adverse environmental or driving surface conditions; and use automotive gauges and controls.

4.3.2* Back a vehicle from a roadway into restricted spaces on both the right and left sides of the vehicle, given a fire apparatus, a spotter, and restricted spaces 12 ft (3.7 m) in width, requiring 90-degree right-hand and left-hand turns from the roadway, so that the vehicle is parked within the restricted areas without having to stop and pull forward and without striking obstructions.

(A) Requisite Knowledge. Vehicle dimensions, turning characteristics, spotter signaling, and principles of safe vehicle operation.

(B) Requisite Skills. The ability to use mirrors and judge vehicle clearance.

4.3.3* Maneuver a vehicle around obstructions on a roadway while moving forward and in reverse, given a fire apparatus, a spotter for backing, and a roadway with obstructions, so that the vehicle is maneuvered through the obstructions without stopping to change the direction of travel and without striking the obstructions.

(A) Requisite Knowledge. Vehicle dimensions, turning characteristics, the effects of liquid surge, spotter signaling, and principles of safe vehicle operation.

(B) Requisite Skills. The ability to use mirrors and judge vehicle clearance.

4.3.4* Turn a fire apparatus 180 degrees within a confined space, given a fire apparatus, a spotter for backing up, and an area in which the vehicle cannot perform a U-turn without stopping and backing up, so that the vehicle is turned 180 degrees without striking obstructions within the given space.

(A) Requisite Knowledge. Vehicle dimensions, turning characteristics, the effects of liquid surge, spotter signaling, and principles of safe vehicle operation.

(B) Requisite Skills. The ability to use mirrors and judge vehicle clearance.

4.3.5* Maneuver a fire apparatus in areas with restricted horizontal and vertical clearances, given a fire apparatus and a course that requires the operator to move through areas of restricted horizontal and vertical clearances, so that the operator accurately judges the ability of the vehicle to pass through the openings and so that no obstructions are struck.

(A) Requisite Knowledge. Vehicle dimensions, turning characteristics, the effects of liquid surge, spotter signaling, and principles of safe vehicle operation.

(B) Requisite Skills. The ability to use mirrors and judge vehicle clearance.

4.3.6* Operate a vehicle using defensive driving techniques, given an assignment and a fire apparatus, so that control of the vehicle is maintained.

(A) Requisite Knowledge. The importance of donning passenger restraint devices and ensuring crew safety; the common causes of fire apparatus accidents and the recognition that drivers of fire apparatus are responsible for the safe and prudent operation of the vehicle under all conditions; the effects on vehicle control of liquid surge, braking reaction time, and load factors; the effects of high center of gravity on rollover potential, general steering reactions, speed, and centrifugal force; applicable laws and regulations; principles of skid avoidance, night driving, shifting, gear patterns; and automatic braking systems in wet and dry conditions; negotiation of intersections, railroad crossings, and bridges; weight and height limitations for both roads and bridges; identification and operation of automotive gauges; and operational limits.

(B) Requisite Skills. The ability to operate passenger restraint devices; maintain safe following distances; maintain control of the vehicle while accelerating, decelerating, and turning, given road, weather, and traffic conditions; operate under adverse environmental or driving surface conditions; and use automotive gauges and controls.

4.3.7* Operate all fixed systems and equipment on the vehicle not specifically addressed elsewhere in this standard, given systems and equipment, manufacturer's specifications and instructions, and departmental policies and procedures for the systems and equipment, so that each system or piece of equipment is operated in accordance with the applicable instructions and policies.

(A) Requisite Knowledge. Manufacturer's specifications and operating procedures, and policies and procedures of the jurisdiction.

(B) Requisite Skills. The ability to deploy, energize, and monitor the system or equipment and to recognize and correct system problems.

5.1* General. The requirements of Fire Fighter 1 as specified in NFPA1001 (or the requirements of Advanced Exterior Industrial Fire Brigade Member or Interior Structural Fire Brigade Member as specified in NFPA1081) and the job performance requirements defined in Sections 5.1 and 5.2 shall be met prior to qualifying as a fire department driver/operator—pumper.

5.1.1 Perform the routine tests, inspections, and servicing functions specified in the following list in addition to those in 4.2.1, given a fire department pumper, its manufacturer's specifications, and policies and procedures of the jurisdiction, so that the operational status of the pumper is verified:

- (1) Water tank and other extinguishing agent levels (if applicable)
- (2) Pumping systems
- (3) Foam systems

(A) Requisite Knowledge. Manufacturer's specifications and requirements, and policies and procedures of the jurisdiction.

(B) Requisite Skills. The ability to use hand tools, recognize system problems, and correct any deficiency noted according to policies and procedures.

5.2 Operations.

5.2.1 Produce effective hand or master streams, given the sources specified in the following list, so that the pump is engaged, all pressure control and vehicle safety devices are set, the rated flow of the nozzle is achieved and maintained, and the apparatus is continuously monitored for potential problems:

- (1) Internal tank
- (2)*Pressurized source
- (3) Static source
- (4) Transfer from internal tank to external source

(A) Requisite Knowledge. Hydraulic calculations for friction loss and flow using both written formulas and estimation methods, safe operation of the pump, problems related to small-diameter or dead-end mains, low-pressure and private water supply systems, hydrant coding systems, and reliability of static sources.

(B) Requisite Skills. The ability to position a fire department pumper to operate at a fire hydrant and at a static water source, power transfer from vehicle engine to pump, draft, operate pumper pressure control systems, operate the volume/pressure transfer valve (multistage pumps only), operate auxiliary cooling systems, make the transition between internal and external water sources, and assemble hose lines, nozzles, valves, and appliances.

5.2.2 Pump a supply line of 2 1/2 in. (65 mm) or larger, given a relay pumping evolution the length and size of the line and the desired flow and intake pressure, so that the correct pressure and flow are provided to the next pumper in the relay.

(A) Requisite Knowledge. Hydraulic calculations for friction loss and flow using both written formulas and estimation methods, safe operation of the pump, problems related to small-diameter or dead-end mains, low-pressure and private water supply systems, hydrant coding systems, and reliability of static sources.

(B) Requisite Skills. The ability to position a fire department pumper to operate at a fire hydrant and at a static water source, power transfer from vehicle engine to pump, draft, operate pumper pressure control systems, operate the volume/pressure transfer valve (multistage pumps only), operate auxiliary cooling systems, make the transition between internal and external water sources, and assemble hose lines, nozzles, valves, and appliances.

5.2.3 Produce a foam fire stream, given foam-producing equipment, so that properly proportioned foam is provided.

(A) Requisite Knowledge. Proportioning rates and concentrations, equipment assembly procedures, foam system limitations, and manufacturer's specifications.

(B) Requisite Skills. The ability to operate foam proportioning equipment and connect foam stream equipment.

5.2.4 Supply water to fire sprinkler and standpipe systems, given specific system information and a fire department pumper, so that water is supplied to the system at the correct volume and pressure.

(A) Requisite Knowledge. Calculation of pump discharge pressure; hose layouts; location of fire department connection; alternative supply procedures if fire department connection is not usable; operating principles of sprinkler systems as defined in NFPA 13, NFPA 13D, and NFPA 13R; fire department operations in sprinklered properties as defined in NFPA 13E; and operating principles of standpipe systems as defined in NFPA 14.

(B) Requisite Skills. The ability to position a fire department pumper to operate at a fire hydrant and at a static water source, power transfer from vehicle engine to pump, draft, operate pumper pressure control systems, operate the volume/pressure transfer valve (multistage pumps only), operate auxiliary cooling systems, make the transition between internal and external water sources, and assemble hose lines, nozzles, valves, and appliances.

Section VII – Plan of Instruction

The following is the plan of instruction used during course offerings held at the Florida State Fire College. It also serves as the suggested instructional block format for other approved training providers who use the recommended text book. All class offerings **must** satisfy the JPRs listed in *Section VI – Job Performance Requirements* regardless of textbook used.

Day/Date	Chapters	Activities
Day 1	Class Introductions and Orientation Chapter 1 – Types of Apparatus Equipment with a Pump Chapter 2 – Apparatus Inspection and Maintenance Chapter 3 – Apparatus Safety and Operating Emergency Vehicles Chapter 4 – Positioning Apparatus Chapter 5 – Principals of Water Practical Evolutions (Apparatus Inspections)	<ul style="list-style-type: none"> • Introductions • Practical skills
Day 2	Quiz – Chapters 1-5 Chapter 10 – Operating Fire Pumps Chapter 11 – Static Water Supply Chapter 12 – Relay Pumping Operations Practical Evolutions (Fire Pump Inspection and Operation)	<ul style="list-style-type: none"> • Quiz 1 • Videos • Practical skills
Day 3	Quiz – Chapters 10-12 Chapter 13 – Water Shuttle Operations Chapter 14 – Foam Equipment and Systems Chapter 15 – Apparatus Testing Practical Evolutions (Serpentine Course/Pumping Evolutions)	<ul style="list-style-type: none"> • Quiz 2 • Videos • Practical skills
Day 4	Quiz – Chapters 13-15 Practical Evolutions (Serpentine Course/Pumping Evolutions)	<ul style="list-style-type: none"> • Quiz 3 • Videos • Practical skills
Day 5	Final Exam Practical Exam Course Completion	<ul style="list-style-type: none"> • Final written exam • Final practical exam

Section VIII – Final Practical and Grading Rubric

Description of Assignment:

The Final Written Exam will consist of 100 questions.

The Final Practical Skills Check-off is designed for the student to demonstrate competency of the skills identified through the following JPR's in NFPA 1002.

- Students will be required to complete a Driving course designed for Emergency Apparatus that is to include the following activities:
 1. Given a vehicle and a route on a public way or closed course, operate a fire apparatus safely following all state and local laws and AHJ rules.
 2. Given a restricted space, back a vehicle from a roadway into the restricted space from both the right and left sides.
 3. Given a fire apparatus and a spotter for backing, maneuver a vehicle safely around obstructions while going forward and in reverse.
 4. Given a course with restricted horizontal and vertical clearances, safely maneuver the apparatus through the restricted areas.
 5. Use defensive driving techniques while operating a fire apparatus.
 6. Turn a fire apparatus 180 degrees within a confined space, given a fire apparatus, a spotter for backing up, and an area in which the vehicle cannot perform a U-turn without stopping and backing up, so that the vehicle is turned 180 degrees without striking obstructions within the given space.

- Students will be required to complete practical skills to include the following skills identified by NFPA 1002:
 1. Perform routine tests, inspections and servicing functions on the systems and components of a fire department vehicle.
 2. Document routine tests, inspections and servicing functions.
 3. Given various apparatus with systems and equipment, operate all fixed systems and equipment on the instructions and policies.
 4. Assure the operational status of the pumper is verified by performing routine tests, inspections, and servicing functions to include water tank and other extinguishment agent levels; pumping systems; and foam systems.
 5. Engage the pump, set pressure control and vehicle safety devices, and achieve and maintain the rated flow of the nozzle of a hand line or master stream device.
 6. Given a relay pumping evolution, pump a supply line 2 ½ inch or larger assuring the correct pressure and flow are provided to the next pumper in the relay.
 7. Given foam-producing equipment, product a foam fire stream.
 8. Supply water to fire sprinkler and standpipe systems.

Format and Grading of Assignment:

Students will be given a practical skills evaluation based on those acquired skills learned under NFPA 1002 JPRs. Points will be awards per skill sheets to be applied to the final course grade.