

**National Recreation and Park Association  
Aquatic Facility Operator  
Examination**

**Candidate Handbook**



**National Recreation and Park Association  
National Certification Board  
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## INTRODUCTION

This examination is one of the principal requirements for certification as an "Aquatic Facility Operator" (AFO). The examination is administered under the auspices of the National Recreation and Park Association (NRPA), the Aquatic Facility Operator Certification Committee (AFOC) and the National Certification Board (hereafter referred to as NCB).

### **About the Aquatic Facility Operator Examination**

The AFO certification examination consists of 50 questions. The purpose of the AFO Exam is to ensure those certified have the following:

- Comprehension of all basic mechanical concepts involved in the functioning of a swimming pool
- Familiarity with all systems, equipment, and peripherals that are required to contain, circulate, filter, heat and treat swimming pool water
- Ability to perform preventative maintenance and basic repair on equipment
- Competence in all areas of water chemistry as it pertains to pools
- Knowledge of risk management

### **Examination Development**

NRPA understands that achieving the AFO certification does not make one an expert in the all operations of aquatic facilities. However, NRPA does recognize all program participants should acquire the knowledge and specific competencies necessary to attain certification as identified by the AFO Certification and Exam Committees. This knowledge properly and consistently applied in the field will help to create an experience level necessary to be considered an aquatic facility operator.

All examination questions have been written and reviewed by subject-matter experts representing aquatic facility operations experts and practitioners from many geographical regions. These individuals provide the job-related perspective and expertise that underlies valid examinations.

### **About the Testing Agency**

NRPA and the NCB have the overall responsibility for the examination and have contracted with a professional testing agency to facilitate the development of exam questions. Applied Measurement Professionals, Inc. is the professional testing agency contracted by NRPA and assists in the development of the exam based on the test specifications developed by the AFO Certification and Exam Committee.

### **About the AFO Education Program**

If you are participating in the Aquatic Facility Operator Education Course, you are embarking on a fun yet quite serious and significant training session – the completion of which should make you very proud. The AFO course is sponsored by the National Recreation and Park Association. Our nearly 100 highly qualified instructors with a wealth of experience in the field have performed several thousand AFO classes since inception, in almost every US state, Canada, Mexico, England, the Bahamas, the United Arab Emirates, China, Dubai and Japan. Class sizes have sometimes exceeded 70 students, although we often limit class size for a better rapport between instructor and operators.

The AFO program was designed specifically for owners, operators and managers of large, high-load, pools, comprising university, high-school, municipal, military-base, YMCA as well as public-park facilities. While we do offer many classes for the larger facility pools, we also hold many courses for hotels/motels, resorts, health clubs and community associations.

The AFO program is committed to remain up-to-date with the latest developments in aquatic technology and water chemistry. The AFO manual is currently in its sixth revised edition, but our leadership is always in the process of reviewing, updating, and expanding the curriculum, exam, and the course material.

The objective of the AFO program is to create better operators, who in turn give us safer water, more appealing facilities, and increasingly efficient programs for our popular aquatic venues. We are proud of our place in the comprehensive training of operators and health officials across the nation, and are confident you will be proud of your certificate as well, indicating that you have completed the finest operator's course anywhere.

## SECTION I: ADMINISTRATIVE POLICIES AND RULES FOR EXAMINATION

Individuals seeking certification as an AFO must receive a passing grade on the AFO certification examination. Maintenance of the AFO certification requires either 2.0 Continuing Education Units (CEUs) in aquatic related course or at least a passing grade on the AFO certification examination every five (5) years.

### Services for Individuals with Disabilities

The NRPA, NCB and Applied Measurement Professionals, Inc. comply with the Americans with Disabilities Act and strive to ensure that no individual with a disability is deprived of the opportunity to take the examination solely by reason of that disability. The candidate will be provided reasonable accommodations for individuals with disabilities.

A candidate who has a disability may request special accommodations; the request must be submitted in writing at the time of exam registration. The request form is available online at [www.nrpa.org/AFO](http://www.nrpa.org/AFO) or from the course host. A written description of the disability and verification from a licensed physician should be included with the application.

### Exam Preparation

Please read the following information carefully so that you are fully prepared on the examination day.

- To sit for the exam, a candidate needs to present a government-issued photo identification.
- The NRPA and AFO hosts maintain examination administration standards that are designed to assure that all candidates are provided the same opportunity to demonstrate their abilities.
- Examinations are proprietary. No cameras, notes, tape recorders, personal digital assistants (PDAs), pagers or cellular phones are allowed in close proximity of testing candidates. Use of cellular phone or other electronic devices is strictly prohibited and will result in dismissal from the examination.
- Candidates are permitted to use the AFO manual, a calculator and Calcium Saturation Index slide-rule during the exam. The candidates may not use study sheets, a graphing calculator, a calculator that can save formulas, or a calculator in a cell or PDA.
- No guests, visitors or family members are allowed in the testing room.
- No personal items, valuables, or weapons should be brought to the testing room.
- You will be provided with scratch paper and a pencil to use during the examination, which must be returned to the supervisor at the completion of testing. No documents or notes of any kind may be removed from the examination room.
- No questions concerning the content of the examination may be asked during the examination.
- Eating, drinking, or smoking will not be permitted in the testing room. You may take a break whenever you wish, but you will not be allowed additional time to make up for time lost during breaks.
- Three hours are allotted to complete the examination.
- Choices of answers to the examination question are identified as A, B, C, or D. Indicate your choice by filling in the bubble sheet.
- Your score is based on the number of questions you answer correctly. You are advised to use your time effectively and mark the best answer you can to every question, even if you are not sure of the answer you mark. However, do not spend too much time on questions that are too difficult for you. Go on to other questions and come back to the difficult ones later, if you can. In the final analysis, it is better to guess than to leave a question unanswered.
- **YOU ARE TO INDICATE YOUR ANSWERS TO ALL QUESTIONS ON THE SEPARATE ANSWER SHEET. No credit will be given for anything written in this examination book.**
- Individuals who engage in any of the following conduct may be dismissed from the examination, their scores will not be reported and examination fees will not be refunded. Examples of misconduct are when a candidate:
  1. *creates a disturbance, is abusive, or otherwise uncooperative;*
  2. *displays and/or uses electronic communications equipment such as pagers, cellular phones, PDAs;*
  3. *gives or receives help or is suspected of doing so;*
  4. *attempts to record examination questions or make notes;*
  5. *attempts to take the examination for someone else; or*
  6. *is observed with notes or other aids*

### **English as a Second Language**

AFO Candidates who speak English as a second language may use one or both of the accommodations listed below. The Candidate must request the accommodation when registering for the course and exam.

Option 1 - Time Extension: If a candidate's primary language is not English and he or she wants to request a time extension he/she must submit a request to the host for a time extension at the time of registration for the course. The proctor may allow 90 minutes to the time allowed for the exam.

Option 2 - Translation Dictionary: If a candidate's primary language is not English and he or she wants to use a strict translation dictionary (book form only, no electronic dictionaries allowed), he or she must submit a request to the host at the time of registration. Unless a time extension is also requested the candidate will be required to complete the exam within the standard 3 hours. The dictionary will be inspected prior to use to ensure exam security.

### **Copyrighted Examination Questions**

All examination questions are copyrighted property of The NRPA. It is forbidden under federal copyright law to copy, reproduce, record, distribute or display these examination questions by any means, in whole or in part. Doing so may subject you to severe civil and criminal penalties.

### **Release of Information**

The NRPA is committed to protecting the confidentiality of candidate records and have adopted policies to ensure their privacy. Candidate's examination scores are not routinely released to any third party. Notification of pass/fail goes directly from the host/instructor to the NRPA. Successful candidates are added to the NRPA AFO registry available at [www.nrpa.org/AFO](http://www.nrpa.org/AFO).

### **Following the Examination and Scoring of Results**

The passing score for the examination reflects the amount of knowledge that a committee of experts has determined to be appropriate for certification. Your ability to pass the examination depends on the amount of knowledge you display, and not on the other individuals taking the test. Passing the examination has historically required candidates to answer approximately 78 percent of the questions correctly.

### **Duplicate Certificate Request**

Candidates may purchase additional copies of their certificate at a cost of \$25 per copy. Requests for the duplicate certificate form can be emailed to [certification@nrpa.org](mailto:certification@nrpa.org) with your name, address, telephone number, and date of examination. Duplicate certificates will be mailed within approximately two weeks after receipt of the request.

### **Appeals**

Applicants desiring to appeal their examination score may write a letter of appeal to the AFO Certification Committee. In the letter, candidates should state reasons why they do not agree with the examination outcome. Written appeals must be received within sixty (60) days of the examination date for the appeal to be considered. Send to AFO Certification Committee, c/o National Recreation and Park Association, 22377 Belmont Ridge Road, Ashburn, VA 20148.

### **Your Status as an Aquatic Facility Operator**

If you pass the AFO Examination you will be awarded the AFO designation as a Certified Aquatic Facility Operator. Your AFO course host will issue your AFO certificate and wallet card. Your certification is valid for five (5) years. No additional examinations will be required during that time. To facilitate communications, Aquatic Facility Operator are required to advise NRPA of address, phone and email changes.

### **Statement of Non-Discrimination**

The NRPA, NCB and Applied Measurement Professionals, Inc. do not discriminate among applicants on the basis of age, gender, race, religion, national origin, disability, or marital status.

## SECTION II: STUDY GUIDE

### General Examination Preparation

The study and test-taking advice described here may be helpful as you prepare for the examination. Try to be objective about yourself and your individual learning needs when you are deciding how best to proceed with your study.

#### A. Study Advice

Determine how you study best. Some students seem to learn faster by hearing the information, while others need to see it written or illustrated, and still others prefer to discuss material with colleagues. A combination of these alternatives can often produce the most effective study pattern. If you had success in lecture courses with little outside review, it may be that you need to hear information for best retention. If you find that you prefer to read material, then you might consider jotting down important facts on a 3x5 card. You can refresh your memory by periodically reviewing these cards. This technique is especially effective if you write the material thoughtfully and concisely, allowing you to digest the material through both reading and writing. You may wish to organize a study group or find a study partner. Once you decide on the method most effective and comfortable for you, focus on that preference and use the other techniques to complement it.

Plan your study schedule well in advance. Use learning techniques, such as reading or audio-visual aids. Be sure you find a quiet place to study where you will not be interrupted.

#### B. Test-Taking Advice

The advice offered here is presented primarily to familiarize you with the test directions.

- 1. Read all instructions carefully.**
- 2. The actual examination will be timed (three hours). Proctors will update you periodically on how much time is remaining during the examination.**
- 3. For best results pace yourself by periodically checking your progress. This will allow you to make any necessary adjustments. Remember, the more questions you answer, the better your chances of achieving a passing score.**
- 4. Be sure to record an answer for each question, even those of which you are uncertain. You can leave questions blank and come back. Avoid leaving any questions unanswered; this will maximize your chances of passing. It is better to guess than to leave a question unanswered; there is no penalty for guessing.**

#### Re-Examination

Candidates who fail the examination may be admitted to a future examination, provided they complete all current registration procedures and pay applicable fees. Please contact your exam host or the NRPA to schedule a re-examination.

## Content of the Aquatic Facility Operator Examination

The following is a breakdown of the topics included in the exam and the major subject area domains:

AFO EXAM CONTENT DOMAINS		WEIGHT
I.	OPERATIONS	39%
II.	MECHANICAL SYSTEMS	29%
III.	CHEMICALS	32%

**Exam Content Outline:** The specific subject areas are as follows:

CONTENT DOMAIN - SUB CONTENT AREA	ITEM TARGETS
<b>I. OPERATIONS</b>	20 ITEMS
<ul style="list-style-type: none"> <li>A. SYSTEMS APPROACH</li> <li>B. MEASUREMENT AND CALCULATIONS</li> <li>C. WATER COLLECTION SYSTEMS</li> <li>D. APPLICATIONS AND LIMITATIONS OF SANITATION AND OXIDATION SYSTEMS</li> <li>E. SPECIAL-USE POOLS</li> <li>F. FACILITY MAINTENANCE</li> <li>G. FACILITY SAFETY AND RISK MANAGEMENT</li> <li>H. PURCHASING</li> </ul>	
<b>II. MECHANICAL SYSTEMS</b>	14 ITEMS
<ul style="list-style-type: none"> <li>A. CONCEPTS</li> <li>B. APPLICATIONS</li> </ul>	
<b>III. CHEMICALS</b>	16 ITEMS
<ul style="list-style-type: none"> <li>A. TESTING METHODS AND CALCULATIONS</li> <li>B. POOL-WATER TREATMENT APPLICATIONS</li> <li>C. ACID/BASE WATER CHEMISTRY</li> <li>D. SANITIZE AND OXIDIZE</li> <li>E. COMBINED CHLORINE</li> </ul>	

### Important Terminology:

pH:

Alkalinity:

Chlorine:

Calcium Hardness:

Disinfection

Hypochlorous Acid

ORP: Oxydation Reduction Potential -

Oxidation

PPM:

PSF:

Sodium Thiosulfate

Stabilizer

**Study Questions:**

*PLEASE NOTE...The questions on the exam are in a multiple choice format. These questions are designed as study questions alone and candidates should recognize the questions on the exam do not follow this format.*

1. What is an Aquatic Facility Operator? \_\_\_\_\_  
\_\_\_\_\_
2. How much does 120,000 gallons of water weigh? \_\_\_\_\_
3. Surface Area = \_\_\_\_\_ x \_\_\_\_\_
4. How do we determine the total number of gallons of water in a pool?  
\_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_
5. How do we determine the PSF (Pool Size Factor)?  
\_\_\_\_\_  
\_\_\_\_\_
6. Name the Various 3 Basic Types of Filters:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
7. What is Turnover?  
\_\_\_\_\_  
\_\_\_\_\_
8. What is the acceptable range for the following:
  - a. Alkalinity \_\_\_\_\_
  - b. pH \_\_\_\_\_
  - c. Calcium Hardness \_\_\_\_\_
9. What is Oxidation?  
\_\_\_\_\_  
\_\_\_\_\_
10. What is Hypochlorous Acid (HOCl)?  
\_\_\_\_\_  
\_\_\_\_\_
11. What bi-product is created when you add the following chlorines to water, what effect on pH do they have and what pH adjuster do we use?

Chlorine	Bi-Product	Effect on pH	pH Adjuster
Sodium Hypochlorite			
Lithium Hypochlorite			
Gas Chlorine			
Calcium Hypochlorite			
Di-Chlor			
Tri-Chlor			

12. What is the difference between PPM and ORP?
- a. PPM is a \_\_\_\_\_ measure and measures:  
\_\_\_\_\_
  - b. ORP is a \_\_\_\_\_ measure and measures:  
\_\_\_\_\_  
\_\_\_\_\_
13. What is pH's effect on chlorine's work ability?  
\_\_\_\_\_  
\_\_\_\_\_
14. What chemical is used to raise the alkalinity of a pool? \_\_\_\_\_
15. What chemical is used to raise the calcium hardness in a pool?  
\_\_\_\_\_
16. What chemical is used to lower the alkalinity in a pool? \_\_\_\_\_
17. What is ozone?  
\_\_\_\_\_  
\_\_\_\_\_
18. What is an ionizer?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
19. What is an on-site chlorine generator?  
\_\_\_\_\_  
\_\_\_\_\_
20. What is superchlorination and what does it do in the water?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
21. Total Chlorine – Free Chlorine = \_\_\_\_\_
22. In order to eliminate chloramines or combined chlorine in the water we multiply the  
\_\_\_\_\_ x \_\_\_\_\_
23. What are the four parameters that we use to calculate pool-water balance?
- a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_

Utilize the following information to fill out the Dosage Chart and the following CSI Questions: A swimming pool with 360,000 gallons in it with the following parameters: Alkalinity 40, Calcium Hardness: 200, Temperature 80, pH: 7.8. Total Chlorine: 3.2, Free Chlorine: 2.1

- 24. What is the current CSI: \_\_\_\_\_
- 25. How much Chlorine would it take to superchlorinate this pool?
  - a. Liquid Chlorine \_\_\_\_\_
  - b. Gas Chlorine \_\_\_\_\_
  - c. Granular Chlorine \_\_\_\_\_
- 26. How much Sodium Bicarbonate is needed to increase the alkalinity to 80 ppm?  
\_\_\_\_\_
- 27. How much Calcium Chloride is needed to increase the Calcium Hardness to 350 ppm?  
\_\_\_\_\_
- 28. With the new alkalinity and calcium hardness above, what is the new calcium saturation index?  
\_\_\_\_\_

### Pool Dosage Chart

Chemical	Base Dosage (how much used in 120,000 gallons)	PSF = (PSF = # of gallons/120,000)	Amount of chemical needed for base change in your pool	Amount Needed to change (i.e. 1 ppm, 4 ppm, 50 ppm)	Total Chemical needed for appropriate change
Liquid Chlorine	1 gal.	X _____	(1 ppm) = _____	X _____	
Gas Chlorine	1 lb.	X _____	(1 ppm) = _____	X _____	
Granular Chlorine	1.5 lbs.	X _____	(1 ppm) = _____	X _____	
Sodium Bicarbonate	18 lbs.	X _____	(10 ppm) = _____	X _____	
Calcium Chloride	13 lbs.	X _____	(10 ppm) = _____	X _____	

29. What 3 things detract the ability of chlorine's work value?

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

30. What are the important things to know if you must superchlorinate to remove the chloramines/combined chlorine from your water?

a. \_\_\_\_\_

b. \_\_\_\_\_