



Aquatic Facility Operator (AFO) Examination Candidate Handbook

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INTRODUCTION

The Aquatic Facility Operator (AFO) program is offered by the National Recreation and Park Association (NRPA), under the authority of the National Certification Board (NCB).

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.
- Competence in all areas of water chemistry as it pertains to pools
- Ability to perform preventative maintenance and basic repair on equipment.
- Knowledge of Risk Management and Safety.

The 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 expert.

Examination Development

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.

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 courses or at least a passing grade on the AFO certification examination every five (5) years.

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. PSI Services (PSI) 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 over 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, managers of large high-load pools, comprising universities, high-schools, municipals, military-bases, YMCA's and 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 seventh revised edition, but our leadership is always in the process of reviewing, updating, and expanding the curriculum, exam, and 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

Services for Individuals with Disabilities

The NRPA, NCB and PSI 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 or from the course host.

Services for English as a Second Language Candidates

Time extension – If a candidate's primary language is not English and he or she wants to request a time extension to take the Aquatic Facility Operator (AFO) exam they must submit the *ESL Request Form* (available online at www.nrpa.org/AFO) which includes additional fee information and the signature of a supervisor, professor, or the employee's human resources representative. The ESL Form must be submitted to the host at the time of registration for the course. The proctor may add 90 minutes to the time allowed for the exam.

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 an *ESL Request Form* (available online at www.nrpa.org/AFO) 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. NRPA does not release candidate's examination scores to third parties absent special, compelling circumstances. 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.

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. Your exam will



be scored by the proctor and you will be given your results that day, unless you take an AFO Off-Site Proctor Exam.

AFO Certificate

Candidates with a passing result will receive their AFO Certificate via email from NRPA within 2-4 weeks. Candidates may order one free print copy of their AFO Certificate through NRPA's online store.

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. Appeals will be reviewed at the quarterly AFO Certification Committee meeting and a letter will be sent to all appealing professionals following decision of the committee.

Re-Examination

Candidates that were unsuccessful in passing the AFO Exam may apply to re-take the exam either at a classroom course or through an approved proctor. For an approved proctor he or she must submit an *AFO Off-Site Request Form* (available online at www.nrpa.org/AFO).

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 certification is valid for five (5) years. No additional examinations will be required during that time. NRPA will provide information about maintenance of certification with your certificate. To facilitate communications, Aquatic Facility Operators are required to advise NRPA of address, phone and email changes.

Recertification

Individuals wishing to renew their AFO certification must successfully complete the AFO examination prior to their expiration date or obtain 2.0 Continuing Education Units in aquatics operations or management field. Aquatic Facility Operator Instructors (AFOI's) must renew their AFO certification using only the CEU option.

Expiring AFO's will receive a renewal reminder prior to their expiration date via email. It is an individual's responsibility to keep NRPA updated with current contact information.

Certification Extension Policy

AFO's certified by the NRPA who are active duty members, reservists, civilian employees recalled to active duty and civilian employees deployed into war/hostile fire zone or any equivalent area designated by the armed forces will be granted additional time (commensurate with deployment/active duty time) to earn needed CEU's for certification continuance. It is the



responsibility of the individual to request an extension and to provide official documentation regarding the circumstance.

If a serious health condition or extreme personal emergency has prevented an individual from completing all recertification requirements, a request for extension may be submitted along with a letter from the training physician confirming fitness to practice.

Extension requests, along with all documentation, should be provided to NRPA within 30 days of certification deadline. All extension requests will be reviewed on a case by case basis. If an extension is granted, a letter will be sent to the certificant stating their new certification deadline as one year from the present deadline.

Statement of Non-Discrimination

The National Recreation and Parks Association, National Certification Board and the testing company shall not discriminate on the basis of race, disability, religion, color, national origin, age, gender, covered veterans status, marital status, personal appearance, sexual orientation, family responsibilities, political affiliation, source of income, place of business or residence, pregnancy, childbirth, or any other unlawful basis. This policy is in compliance with Title VII of the Civil Rights Act, the Americans with Disabilities Act, and the Age Discrimination in Employment Act.



SECTION II: EXAM ADMINISTRATION

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 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, pagers, or cellular/smart phones are allowed while taking the exam. Use of cellular phones 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 a Calcium Saturation Index slide-rule during the exam. The candidates may **NOT** use study sheets, a graphing calculator, or a calculator that can save formulas.
- 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.
- No Eating, drinking, or smoking will 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 wisely. If you are not sure of an answer move on to the next question and come back later.
- ***You are to indicate your answers on a separate answer sheet.*** No credit will be given for anything written in the 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



SECTION III: 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.

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.

Test-Taking Advice

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

- 1. Read all instructions carefully.***
- 2. The actual examination will be timed.***
- 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 answer questions and mark them for review if time allows. 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.***



Exam Content Outline

Aquatic Facility Operator Exam Content Outline	
1. WATER CHEMISTRY AND DISINFECTION	18 items
A. Testing Methods and Calculations	
B. Pool Water Treatment	
C. Pool Water Balance	
D. Acid/Base Water Chemistry	
E. Sanitation and Oxidation	
2. MECHANICAL SYSTEMS AND OPERATIONS	12 items
A. Facility Environment (e.g., systems approach, automation vs. automatic)	
B. Water Collection and Circulation	
C. Mechanical Devices (e.g., pumps, flow meters, heaters, feeders)	
D. Filters & Filtration	
E. Maintenance (e.g., corrective, preventive, record-keeping)	
F. Measurement and Calculations	
3. HEALTH AND SAFETY	13 items
A. Risk Management (e.g., recreational water illness & injury prevention, record, keeping, signage)	
B. National Standards and Organizations (accessibility & ADA, CDC, Model Aquatic Health Code)	
4. OPERATIONS	7 items
A. Daily/Routine Operations	
B. Air Quality & Air Circulation	
C. Weatherizing	
D. Facility Maintenance, Renovation & Design	
E. Aquatic Facility Types	
F. Spas & Therapy Pools	

Important Terminology:

pH
Alkalinity
Chlorine
Calcium Hardness
Disinfection
Hypochlorous Acid

ORP: Oxidation 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 Adjustor
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. _____

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

- a. _____
- b. _____
- c. _____

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

- a. _____
- b. _____

Utilize the following information to fill out the Dosage Chart and answer 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

26. What is the current CSI: _____

27. How much Chlorine would it take to superchlorinate this pool?

- a. Liquid Chlorine _____
- b. Gas Chlorine _____
- c. Granular Chlorine _____

28. How much Sodium Bicarbonate is needed to increase the alkalinity to 80 ppm?

29. How much Calcium Chloride is needed to increase the Calcium Hardness to 350 ppm?

30. 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	Amount needed to change (i.e. 1ppm, 4ppm, 50ppm)	Total Chemical needed for the best change
Liquid Chlorine	1 gal.	X _____	(1ppm) = _____	X _____	
Gas Chlorine	1 lb.	X _____	(1 ppm) = _____	X _____	
Granular Chlorine	1.5 lbs.	X _____	(1ppm) = _____	X _____	
Sodium Bicarbonate	18 lbs.	X _____	(1ppm) = _____	X _____	
Calcium Chloride	13 lbs.	X _____	(1ppm) = _____	X _____	

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

- a. _____
- b. _____
- c. _____

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