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OUR RECOMMENDATIONS FOR QMED and LIMITED MARINE ENGINEER STUDY MATERIALS

[Contact MET for a price quotation on all books and chapters.]

The table below gives Marine Education Textbooks' recommendations for study material for all U.S. Merchant Marine Ratings (formerly unlicensed crewmembers) for Qualified Member of the Engine Department (QMED) and officer endorsements for licensed Engineers of vessels of less than 1,600 gross tons

QMED RATINGS									OFFICER ENDORSEMENT
Rating → Books ↓	Oiler	Fireman Watertender	Electrician	Refrigeration Engineer	Pumpman	Machinist	Deck Engineer	Junior Engineer	★ Limited Engineer Endorsement
Oiler★	✓	✓	✓	✓	✓	✓	✓	✓	✓
Boiler		✓				✓		✓	
Electricity			✓				✓	✓	
Machine Shop					✓	✓	✓	✓	
Refrigeration & A/C				✓				✓	
Limited Engineer Supplement★									✓

↑ BOOK TITLES AND ORDERING INFORMATION

- **Oiler** = QMED - Oiler, MET Stock# BK-0068.
- **Boilers** = QMED - Boilers, MET Stock# BK-0068-2.
- **Electricity** = QMED - Electricity, MET Stock# BK-0068-3.
- **Machine Shop** = QMED - Advanced Machine Shop, MET Stock# BK-0068-4.
- **Refrigeration Engineer ("Reefer")**. QMED Refrigeration and Air Conditioning uses Workboat Engineer, Chapter 8, "Refrigeration and Air Conditioning," MET Stock# BK-107C08.
- ★ Books in Table above for a Limited Engineer license. **Limited Engineer Supplement** = Limited Engineer Supplement, (LES) MET #BK-1007. International Conventions (i.e., treaties) and Coast Guard Regulations require engineer officer endorsements for service on vessels over 200 gross tons in coastwise and ocean service. **You must master the "concepts" the QMED Oiler book (★) before taking up the material in the Limited Engineer Supplement book listed above.**

bridge in Brooklyn?

On April 15, 2009, the old terms license⁽¹⁾ and Merchant Mariner Document (MMD or Z-card)⁽¹⁾ were replaced by new terms. Instead of obtaining these licenses and merchant mariner documents, you will obtain a **Merchant Mariner Credential (MMC)** that we hereafter will call a credential. The actual credential will look like a passport booklet and will contain endorsements that detail your personal qualifications and explain your operational limitations. [⁽¹⁾We may use both the old and new terminology!]

Like it or not, over the next five years the old engraved paper licenses and the plastic Z-card will give way to the new credential in passport form. When you renew, you will receive a new credential that contains all the endorsements you earned by meeting all of the qualifications.

Endorsements on credentials may sound like double-talk, but every mariner has **no choice** but to face these changes together as presented in the Coast Guard's rulemaking docket #USCG-2006-24371 in their usual take it or leave it style.

NEW TERMINOLOGY

The Coast Guard loves to make changes. They advertise every change as an improvement so that after controlling licenses and merchant mariner documents for over 60 years, by this time you might believe they developed a perfect system. If so, could we interest you in buying a truly historic

TWIC Cards Come First

In addition, starting on April 15, 2009, the Coast Guard will not issue any credential unless you have applied for and received a Transportation Workers Identity Credential commonly known as a TWIC. This is an expensive, state-of-the-art biometric identity card. If the Transportation Security Agency (TSA) denies you a TWIC, you can appeal the decision. However, the

Coast Guard will not review the TSA decision and will not process your application until you first satisfy TSA! Consequently, every mariner now must deal with two government agencies within the Department of Homeland Security and not just with the Coast Guard as in the past.

COAST GUARD EXAM QUESTIONS

In September 1988, the Coast Guard made public all of its exam questions in response to a request and subsequent appeal by Marine Education Textbooks under the Freedom of Information Act. The deck and engine questions, numbering about 22,000 were later published by the U.S. Government Printing Office. All these questions are now available to the public on the Coast Guard's National Maritime Center's website.

In January 2009, the Coast Guard's engineering database contained 12,850+ questions. It is organized into 5 "sorts" - General (Miscellaneous), Motor (diesel), Safety, Steam, and Electricity.

The Coast Guard plans to randomly generate their exams. This will make it very difficult to predict the actual questions that will appear on any test. Although many "license prep" instructors are adept at selecting questions, Marine Education Textbooks follows a different path. Here are a few points we would like to make:

- We analyze the published questions and separate them on a subject-by-subject basis. In this process, to save our readers' time, we remove all duplicate and most "similar" (i.e., nearly duplicate) questions.
- Absorbing the latest Coast Guard questions takes time. Changes will appear in the "List of Changes" posted in new textbooks. Lists of changes are available to our readers free of charge. Revised pages generally are available on a "page" basis plus postage.
- We notify the Coast Guard of any errors we encounter and/or ask for further information on certain selected questions.
- We identify "genuine" Coast Guard questions by their unique number that appears **directly above** the question number. The letter preceding a five-digit number refers to the major "sort" in which the question appears. The five digits reflect the Coast Guard's question number. Please refer to that number in any correspondence regarding a particular question. In this book the abbreviation "G" refers to questions taken from Engineering General database questions; "X" refers to questions taken from Engineering Safety database questions; "M" refers to Motor Plants, "V" refers to Steam Plants, and "E" refers to Electricity questions.
- You may feel that a given question is "too advanced" to apply to the endorsement you seek. However, consider the largest size or horsepower vessel the endorsement will cover, rather than the size of vessels you served on in the past.

Passing Coast Guard multiple choice exams only means one thing - **that you can pass a Coast Guard multiple choice exam!** You may be fully competent to perform the duties to safely operate the vessel you work on, but the **license you receive** from the Coast Guard indicates that you have the education, training, reading comprehension and vessel experience to be able to quickly adapt and learn to safely operate the engineering equipment on board **any other vessel** within the limitations of your license. If you can read and understand what the Coast Guard question seeks to

determine, then you can master instructions, manuals, catalogues, and other information sources that enable you to transfer to other vessels with different equipment and machinery and operate it safely and efficiently.

Don't be intimidated by all those sea stories from your shipmates such as: "the Coast Guard exams are 'no sweat' or 'with just a little studying, you will do fine. I got 100% on all my exams.'"

Just remember that you need a grade of **70% to pass your exam**. When you obtain the endorsement you want, then you can show the endorsement to prove it.

PREPARING FOR A QMED EXAM

What is a QMED?

QMED is an abbreviation for the ratings of a "Qualified Member of the Engineering Department" The Coast Guard regulations contain a number of different "QMED ratings." The most common for both steam and motor (diesel) ships is the "**Oiler**" rating.

Many older steam vessels also require the "Fireman/Watertender" rating. Tankships require "Pumpman," while vessels with electrical cargo gear carry an individual with an "Electricians" rating. Additional ratings include "Refrigeration Engineer," "Deck Engineer," "Machinist," and "Junior Engineer." If you obtain all of these ratings you may obtain a rating of "QMED-All Ratings."

A **special QMED rating was created for smaller, diesel-powered vessels** and is called "Oiler, Motor Vessels, Limited." The exam for this rating is built around module found under Exam Structure Sheet #4-9 that appears in the Coast Guard Engineering Guide. This QMED rating is limited to diesel powered vessels under 1,600 gross register tons that do **not** have any **steam powered equipment**.

Caution: If you take this exam, before you go to the exam room you may have to inform the REC that administers your exam that you prepared for the exam based upon the Exam Structure Sheet (ESS) #4-9 mentioned above if you discover that they gave you an exam with questions on steam equipment.

Oiler, Motor Vessels, Limited should be the most sought-after QMED rating because of the large number of offshore supply vessels (OSV) and inspected towing vessels. Your exam module number should be 89??? for the **Oiler, Motor Vessels, Limited** exam.

We do NOT recommend the Oiler (OSV) rating because it limits your employment opportunities, particularly when the offshore mineral and oil industry is laying up vessels. The Oiler with an OSV limitation is only valid on offshore supply vessels **and does not apply to tugboats, ferries, or other classes of vessels.**

Other QMED Ratings

Two additional QMED ratings were created for the modern ship power plants with varying degrees of automation. These ratings are the "Engineman" and the "Deck Engine Mechanic." These two ratings **do not require additional testing** after you obtain the required ratings, experience, and training specified in Coast Guard regulations.

The first five QMED books listed in the table (above) provide a listing of the principal concepts you must

understand before sitting for that exam. A "concept," as presented in each chapter of these books, is a very general statement or summary of a much larger body of knowledge. **For many individuals, such a statement plus a selected but very limited number of questions illustrating that concept should be sufficient.** However, if it is not so and you must make this decision based on your own background and knowledge of the subject so be prepared to study the subject in greater depth from selected sections of other General Science, Physics, or electrical text books and/or equipment manuals depending upon the extent of your educational background.

If you encounter specific problems, please share them with us in a letter, fax, or e-mail.

QMED Exams

In July 2009 the Coast Guard eliminated the QMED-General exam. All subject matter previously tested in that exam was added to the eight soRatingso Exams. Thus all future rating exams, such as soOiler,so are now composed of 70 questions and include the material previously presented in our QMED-General book that now appears in the QMED-Oiler book.

The "QMED-Oiler" exam module is now composed of those areas common to all of the ratings. It contains questions on these topics taken from the Coast Guard Engineering Safety database identified in questions numbered S followed by 5 digitsí .:

- First Aid
- Firefighting
- Breathing Apparatus
- Tank and Space Safety
- Combustible and Flammable Liquids and their Handling
- Pollution
- Emergency Signals
- Lifesaving
- Damage Control
- General Safety

í and questions from the Coast Guard General Subjects (G) database:í

- Vessel Terminology and Nomenclature
- Tools and their Uses.
- Piping Systems and Components.
- Filters, Strainers and Centrifuges
- Lubrication
- Bearings
- Air Compressor Systems and Pneumatics
- Steering Gear and Deck Machinery
- Hydraulics
- Refrigeration and Air Conditioning
- Miscellaneous so Oiler, including Evaporators

MET's Limited Engineer Series

The QMED so Oiler book is now the first in Marine Education Textbooksso (MET) soLimited Marine Engineeringso series. This book and the former QMED-General book were originally designed to cover the most common Coast Guard soLimited Tonnageso shipboard Engineering Department licensing and certification requirements. By including additional material, we supplemented these books to provide study materials to upgrade to the Designated Duty Engineer (DDE) officer endorsements.

Several years ago, the Coast Guard changed the exam

structure for the **DDE, Unlimited Horsepower** exam by adding an **entire exam module on electricity**. They also raised the number of questions in all the exam modules for DDE, Unlimited Horsepower exams from **50 to 70 questions each**.

Electricity always was the most difficult subject for soLimited tonnage/horsepowerso engineers to complete successfully. In addition, more inspected vessels of less **than 1,600 gross register tons are now in service**. These vessels normally require a licensed Chief Engineer (Limited) and sometimes an Assistant Engineer (Limited). Those exams also have four modules of 70 questions each. In fact, the exams for DDE, Unlimited Horsepower and Assistant Engineer, Limited tonnage are now the same.

In late 2009 we made an editorial decision to add a separate Limited Engineer Supplement book in our soLimited Marine Engineeringso series. We removed a number of questions previously contained in the former QMED-General and the QMED-Oiler books and placed them in the new Limited Engineer Supplement book. Within this new book, subject areas will be broken into two groups of questions.

The *first group of questions* is for the DDE-1,000 and 4,000 horsepower exam. The soConceptso for these questions remain in the new (revised) QMED-Oiler books. Questions that reflect these concepts are likely to appear on *either* a QMED or a DDE-1,000 or 4,000 horsepower Coast Guard exam.

The *second group of questions* are likely to appear on **DDE-Unlimited Horsepower, Assistant Engineer (Limited Tonnage) and Chief Engineer (Limited Tonnage)** exams. Many of these questions will refer to the appropriate soConceptso in the new QMED-Oiler books. Other questions may have new soconceptso that cover new material in a "**concept**" section placed preceding those questions. Examples would include lifesaving, stability, and the module on electricity.

The QMED-Oiler Book

This book will help you prepare for the Coast Guardso "QMED- Oiler" exam. Although this book contains actual Coast Guard questions and answers that appear in exam modules, you should study the concepts contained in each section rather than attempt to memorize the answers to individual questions. **Since many questions in the database cover the same concept, do not be surprised if your exam contains questions worded differently from those you studied.**

The Coast Guard has several different versions of each exam module. They constantly prepare new versions and write new questions. However, the concepts behind the questions they ask remain unchanged!

We made every attempt to cover all the concepts appropriate to your exam level. *However, we make no claim, expressed or implied, that this book contains all of the questions that you may see on your examination.*

We arranged this book with a concise discussion of concepts of subject matter followed by questions and answers that are based on those concepts. Remember, **study the concepts**. Then use the questions and answers to check your understanding of the concepts, and learn the various ways the Coast Guard may cover these concepts.

Many people believe some exam questions are "tricky," so it falls on you to learn the various types of tricks. "Tricks" often include grammar and usage (i.e., the way they write the question)

or language (i.e., using a "fancy" word, such as "illustration," instead of a more common word, such as "picture" or drawing.

Although we use the words "he," "him," and "his" sparingly to enhance communication, they are not intended to be gender driven nor to affront or discriminate against any female merchant mariner studying this book.

The QMED – Oiler Rating

The Oiler rating is the most common QMED rating. The need for the Oiler rating is found on both steam and diesel-powered deep-sea vessels that are traditionally manned. The Oiler rating is required aboard diesel vessels, whereas the Fireman/Watertender is not. Therefore, a person holding an **"unlimited" Oiler endorsement must be competent to serve aboard both steam and diesel powered vessels.**

This book serves as a basic book for all limited engineering personnel. It was designed to help you prepare for all engineering ratings, including **Oiler** (Steam and Motor/ Diesel) or **Oiler, Motor Vessels, Limited** as well as a **Limited Tonnage Engineer** endorsement.

Sections 1 through 28 cover basic subject areas that are common to both diesel and steam vessels such as engineering safety, tools, piping systems, bearings, lubrication, steering gear, hydraulics, refrigeration, etc. The questions used to illustrate the concepts presented come from four different Coast Guard question database "sorts" 1) Engineering Safety, 2) General, 3) Motor Plants and 4) Steam Plants as reflected in Coast Guard-numbered questions with the letters S, G, M and V respectively.

Generally speaking, the questions deal with concepts that apply to both diesel and steam vessels, although an individual question may seem to be directed at only one type of power plant by the way it is worded.

Most questions in sections 1 through 28 are S (Safety) or G (General) questions, but M (Diesel) and V (Steam) questions are included if they apply to both type of vessels.

Sections 29 through 38 cover **Oiler – Motor Plants** (M). These sections cover subject matter for the Oiler working aboard diesel powered vessels. Candidates preparing for both the **Oiler** and the **Oiler, Motor Vessels, Limited** ratings should study these sections.

Sections 39 through 45 cover **Oiler - Steam Plants** (V). Since the **Oiler, Motor Vessels, Limited** rating does not cover steam vessels, persons not seek a steam rating can skip these sections.

If you do seek a steam rating, Section 31 covers an introduction to boiler operations. The material covered here is basically boiler construction and nomenclature (i.e., names of parts) and those operations an Oiler is routinely involved in such as soot-blowing, or operations that will cause a change in his "readings." Detailed and in-depth boiler operations subject matter more properly belongs in the realm of the Fireman/Watertender and is covered in our Boiler book.

Repeat: Study the concepts, not the specific questions! The questions you see on your exam may be worded differently than the questions in this book. However, if you understand the concepts and have adequate reading comprehension you can handle the Coast Guard word games that

any slight wording changes present.

Use the questions to check your understanding of the concepts. We recommend that you read and study the concepts several times before even attempting to answer the questions.

We made every attempt to cover the subject matter that is most likely to appear on the Oiler (rating), and Limited Engineer (officer) exams. However you may encounter questions that cover concepts you don't recognize. We invite your e-mails, calls, faxes or letters to discuss any problem areas with the Oiler, Oiler, Motor Vessels, Limited or Limited Tonnage Engineer exam after you use these QMED Oiler and Limited Tonnage Engineer books to prepare for it. We included a Feedback Sheet in each book for this purpose and for your convenience.

The "Boiler" Book

This book goes beyond the Introduction to Boilers in Section 39 of the Oiler book. The Boiler book goes into more depth about the equipment, maintenance and operations in the boiler room on steam-powered vessels. We prepared the boiler book for the **Fireman and Watertender** ratings found only on steam powered vessels. You must study the Boiler book along with the QMED-Oiler book.

The "Electricity" Book

This book deals with electricity in its entirety. Its coverage of electricity arguably is deeper than the limited tonnage engineering officer endorsements.

An **Electrician** must have a broad knowledge of all marine equipment that electricity either powers or controls. Electrician candidates also must study the QMED-Oiler book since many of these concepts will also be on the Electrician rating exam.

The "Machine Shop" Book

The **Machinist** rating is seldom required by the vessel's Coast Guard Certificate of Inspection (COI). However, some vessels carry Machinists who primarily perform day work (from 8 AM to 5 PM) involving general maintenance and repairs including work on lathes, milling machines, and other specialized equipment including cutting, welding, brazing, and other shop functions.

The Machinist rating requires a detailed knowledge of measuring instruments such as micrometers and Vernier calipers, etc.. Reading and calibrating these instruments and transferring dimensions to advanced machine shop equipment that may be installed on the vessel is included in this rating. Machinist candidates also must study the QMED-Oiler book since many of these concepts will also be on the Machinist rating exam.

The "Refrigeration and Air Conditioning" Book

The **Refrigeration Engineer** used to stand watches on refrigerated cargo ships such as banana boats that required precise temperatures maintained within 1 to 3 degrees. He is a specialist in refrigeration and climate control (i.e., HVAC and air conditioning). A Refrigeration Engineer must also study the QMED-Oiler book since many of these concepts will also be on the Refrigeration Engineer rating exam.

The Shortcut to "QMED All-Ratings"

[By V.J. Gianelloni, III, Chief Engineer]

You must pass all eight "QMED" rating examinations AND fulfill the requirements for Engineman and/or Deck Engine Mechanic to obtain the "QMED-All Ratings" endorsement.

However, there is another way of obtaining an equivalent endorsement of "**Any unlicensed rating in the Engine Department.**" This provision of the regulations appears at 46 CFR §12.02-11(d)(2) and states:

"A merchant mariner's document issued to an engineer officer endorsed to serve on inspected vessels of over 2,000 horsepower will be endorsed for any unlicensed rating in the engine department and will be a certificate of service authorizing the holder to serve in any unlicensed capacity in the engine department, without being required to serve under the authority of his officer endorsements."

If you have two (2) years sea time including at least 18 months in the engine department (possibly even including a deckhand with duties in the engineroom), you are eligible for a "Designated Duty Engineer" endorsement for 4,000 horsepower. The exam for this endorsement consists of three modules of 70 questions each for a total of 210 questions.

When you file your application for a DDE, 4000 horsepower license, you should also state in Section II of the application "Upon receiving my DDE 4000 hp endorsement, I also apply for Any Unlicensed Rating in the Engineering Department as provided for in 46 CFR §12.02-11(a)(2)."

This route is really not that more difficult than passing all the QMED exams and does not go into refrigeration and electricity as deeply as do the "Refrigeration Engineer," "Electrician" and "Junior Engineer" QMED endorsements. In addition, tutoring or classroom instruction may be more readily available for this endorsement than it is for individual QMED ratings. You can obtain this endorsement for Motor and/or Steam propulsion.

ENGINEERING OFFICER ENDORSEMENTS

If you are preparing for an Engineering Officer Endorsement, you must **also** study the **new (revised) QMED-Oiler** book. These books contain many concepts covered by additional questions that are included in the Limited Engineer Supplement book because of their more complex sentence structure or reading level.

If you are sitting for any of the six "limited tonnage" Engineer Endorsements, we strongly recommend that you study all the "concepts" in the new/revised QMED-Oiler books. **Study them until you understand them!** These concepts are included in a great many **other** Coast Guard questions in addition to those we selected. Many such questions contain only changes in wording and structure.

List of Lower-Level Engineer Officer Endorsements

- Designated Duty Engineer (DDE) 1,000 Horsepower. ⁽¹⁾
- Designated Duty Engineer (DDE) 4,000 Horsepower. ⁽¹⁾
- Designated Duty Engineer (DDE) Unlimited Hp. ⁽¹⁾
- Assistant Engineer, Limited. ⁽²⁾
- Chief Engineer, Near Coastal, Limited. ⁽²⁾
- Chief Engineer, Oceans, Limited. ⁽²⁾

⁽¹⁾ Up to 500 Gross Tons. ⁽²⁾ Up to 1,600 gross tons, horsepower limits are determined by the formula in Coast

Guard regulation 46 CFR Part 10.]

Paperwork Required to Obtain a Credential or Endorsement

You must provide the following:

- A completed Coast Guard **credential application form**. Contact your local Regional Exam Center for the latest form.
- Proof of **U.S. Citizenship** or resident alien document. ("Green Card")
- A **physical examination** reported on the latest Coast Guard approved form.
- A **DOT five-panel drug test or certification** that you are subject to testing by your employer.
- Documentation of **Sea Service** (i.e., letters from your employers or discharge certificates).
- **First aid and CPR Certificates** from a Coast Guard-approved class. Longer 30-hour course for officers only.
- An **advanced firefighting certificate** granted after attending fire school for a week!
- A **Lifeboatman certificate** after attending a one-week class.
- **Pay** a "User Fee" to have your paperwork examined and evaluated by the Coast Guard's National Maritime Center. You will have to **pay** another fee for your exam and **still another fee** for the Coast Guard to issue your credential or an endorsement to be placed on it.
- You must provide **proof of age** (i.e., a birth certificate or equivalent). You must be 18 years old for the DDE-1,000 horsepower endorsement, age 19 for the DDE-4,000 HP endorsement, and 21 for any remaining endorsements.

Additionally for Engineering officer endorsements

- **First aid and CPR Certificates** from a Coast Guard-approved class.
- An **advanced firefighting certificate** granted after attending fire school for a week!
- A **Lifeboatman certificate** after attending a one-week class.

REGULATIONS THAT APPLY TO QMED RATINGS [Source: Title 46, Code of Federal Regulations, Part 12.]

46 CFR Subpart 12.13 - Persons Designated To Provide Medical Care on Board Ship

[Source: CGD 95-062, 62 FR 34537, June 26, 1997, unless otherwise noted.]

Data is current as of Jan. 20, 2010

46 CFR §Subpart 12.13 – Persons Designated To Provide Medical Care on Board Ship.

[Source: CGD 95-062, 62 FR 34537, June 26, 1997, unless otherwise noted.]

46 CFR §12.13-1 Documentary evidence required.

Each person designated to provide medical first aid on board ship, or to take charge of medical care on board ship, shall hold documentary evidence attesting that the person has attended a course of training in medical first aid or medical care, as appropriate.

[CGD 95-062, 62 FR 34537, June 26, 1997, as amended by USCG-2004-18884, 69 FR 58343, Sept. 30, 2004]

46 CFR §12.13-3 Basis of documentary evidence.

The Officer in Charge, Marine Inspection will issue such documentary evidence to the person, or endorse his or her MMC, on being satisfied that the training required under section 12.1361 of this section establishes that he or she meets the standards of competence set out in STCW Regulation VI/4 and Section A-VI/4 of the STCW Code.

[CGD 95-062, 62 FR 34537, June 26, 1997, as amended by USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR §Subpart 12.15 – Qualified Member of the Engine Department

46 CFR §12.15-1 Credentials required.

(a) Every person serving under the authority of a rating endorsement as qualified member of the engine department on any United States vessel requiring qualified members of the engine department shall produce an endorsement as qualified member of the engine department to the United States Customs and Border Protection Port Director or his or her representative or master before signing articles of agreement.

(b) No endorsement as qualified member of the engine department is required of any person employed on any unrigged vessel, except seagoing barges.

[USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR §12.15-3 General requirements.

(a) A qualified member of the engine department is any person below officer and above the rating of coal passer or wiper, who holds an MMC or MMD endorsed as qualified member of the engine department issued by the Coast Guard.

(b) For purposes of administering this part the rating of assistant electrician is considered a rating equal to coal passer or wiper.

(c) An applicant, to be eligible for an endorsement as qualified member of the engine department, shall be able to speak and understand the English language as would be required in the rating of qualified member of the engine department and in an emergency aboard ship.

(d) An STCW endorsement will be issued or renewed only when the candidate for endorsement as a qualified member of the engine department also produces satisfactory evidence, on the basis of assessment of a practical demonstration of skills and abilities, of having achieved or maintained within the previous 5 years the minimum standards of competence for the following 4 areas of basic safety:

(1) Personal survival techniques as set out in table A-VI/1-1 of the STCW Code (incorporated by reference in §12.0163).

(2) Fire prevention and fire-fighting as set out in table A-VI/1-2 of the STCW Code.

(3) Elementary first aid as set out in table A-VI/1-3 of the STCW Code.

(4) Personal safety and social responsibilities as set out in table A-VI/1-4 of the STCW Code.

(e) An STCW endorsement will be issued or renewed only when the candidate for endorsement as a qualified member of the engine department meets the standards of competence set out in STCW Regulation III/4 and Section A-III/4 of the STCW Code (incorporated by reference, see §12.0163), if the candidate will be serving as a rating forming part of a watch

in a manned engine-room, or designated to perform duties in a periodically unmanned engine-room, on a seagoing ship driven by main propulsion machinery of 750 kW [1,000 hp] propulsion power or more.

[CGFR 65-50, 30 FR 16640, Dec. 30, 1965, as amended by CGD 95-062, 62 FR 34538, June 26, 1997; USCG-2000-7790, 65 FR 58458, Sept. 29, 2000; USCG-1999-5610, 67 FR 66069, Oct. 30, 2002; USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR §12.15-5 Physical and medical requirements.

The physical and medical requirements for an endorsement as QMED are found in §10.215 of this chapter.

[USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR §12.15-7 Service or training requirements.

(a) An applicant for an endorsement as qualified member of the engine department shall furnish the Coast Guard proof of qualification based on six months' service in a rating at least equal to that of wiper or coal passer.

(b) Training programs approved by the Commanding Officer, National Maritime Center, may be substituted for the required service at sea in accordance with the following:

(1) A graduate of a school ship may qualify for a rating endorsement as qualified member of the engine department upon satisfactory completion of the course of instruction. For this purpose, *school ship* is interpreted to mean an institution which offers a complete course of instruction, including a period of sea training, in the skills appropriate to the rating of qualified member of the engine department.

(2) Training programs other than those classified as a school ship may be substituted for up to one-half of the required service at sea.

(c) To qualify to receive an STCW endorsement for service as a rating forming part of a watch in a manned engine-room or designated to perform duties in a periodically unmanned engine-room on a seagoing vessel driven by main propulsion machinery 750 kW [1,000 hp] propulsion power or more, an applicant shall prove seagoing service that includes training and experience associated with engine-room watchkeeping and involves the performance of duties carried out under the direct supervision of a qualified engineer officer or a member of a qualified rating in the engine department. The training must establish that the applicant has achieved the standard of competence prescribed in table A-III/4 of the STCW Code (incorporated by reference in §12.0163), in accordance with the methods of demonstrating competence and the criteria for evaluating competence specified in that table.

[CGD 80-131, 45 FR 69241, Oct. 20, 1980, as amended by CGD 95-072, 60 FR 50460, Sept. 29, 1995; CGD 95-062, 62 FR 34538, June 26, 1997; CGD 95-062, 62 FR 40140, July 25, 1997; USCG-1998-4442, 63 FR 52189, Sept. 30, 1998; USCG-1999-5610, 67 FR 66069, Oct. 30, 2002; USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR §12.15-9 Examination requirements.

(a) Each applicant for endorsement as a qualified member of the engine department in the rating of oiler, watertender, fireman, deck engineer, refrigeration engineer, junior engineer, electrician, or machinist shall be examined orally or by other means and only in the English language on the subjects listed in paragraph (b) of this section. The applicant's general knowledge of the subjects must be sufficient to satisfy

the examiner that he is qualified to perform the duties of the rating for which he makes application.

(b) List of subjects required:

Subjects	Machinist	Refrigerating engineer	Fireman/Watertender	Oiler	Electrician	Junior engineer	Deck engineer
1. Application, maintenance, and use of hand tools and measuring instruments	X	X	X	X	X	X	X
2. Uses of babbitt, copper, brass, steel, and other metals	X	X	X	X	X	X	X
3. Methods of measuring pipe, pipe fittings, sheet metal, machine bolts and nuts, packing, etc	X	X	X	X	X	X	X
4. Operation and maintenance of mechanical remote control equipment	X		X	X	X	X	X
5. Precautions to be taken for the prevention of fire and the proper use of firefighting equipment	X	X	X	X	X	X	X
6. Principles of mechanical refrigeration; and functions, operation, and maintenance of various machines and parts of the systems		X		X		X	
7. Knowledge of piping systems as used in ammonia, freon, and CO ₂ , including testing for leaks, operation of bypasses, and making up of joints		X				X	
8. Safety precautions to be observed in the operation of various refrigerating systems, including storage of refrigerants, and the use of gas masks and firefighting equipment	X	X	X	X	X	X	X
9. Combustion of fuels, proper temperature, pressures, and atomization			X	X		X	
10. Operation of the fuel oil system on oil burning boilers, including the transfer and storage of fuel oil			X	X		X	X
11. Hazards involved and the precautions taken against accumulation of oil in furnaces, bilges, floor plates, and tank tops; flarebacks, leaks in fuel oil heaters, clogged strainers and burner tips	X	X	X	X	X	X	
12. Precautions necessary when filling empty boilers, starting up the fuel oil burning system, and raising steam from a cold boiler			X	X		X	
13. The function, operation, and maintenance of the various engine room auxiliaries	X	X	X	X	X	X	
14. Proper operation of the various types of lubricating systems	X	X	X	X	X	X	X
15. Safety precautions to be observed in connection with the operation of engine room auxiliaries, electrical machinery, and switchboard equipment	X	X	X	X	X	X	X
16. The function, operation, and maintenance of the bilge, ballast, fire, freshwater, sanitary, and lubricating systems	X	X	X	X		X	X
17. Proper care of spare machine parts and idle equipment	X	X	X	X	X	X	X
18. The procedure in preparing a turbine, reciprocating, or Diesel engine for standby; also the procedure in securing			X	X		X	
19. Operation and maintenance of the equipment necessary for the supply of water to boilers, the dangers of high and low water and remedial action			X	X		X	
20. Operation, location, and maintenance of the various boiler fittings and accessories	X		X	X		X	
21. The practical application and solution of basic electrical calculations (Ohm's law, power formula, etc.)					X	X	X
22. Electrical wiring circuits of the various two-wire and three-wire D.C. systems and the various single-phase and polyphase A.C. systems					X	X	X
23. Application and characteristics of parallel and series circuits					X	X	X
24. Application and maintenance of electrical meters and instruments					X	X	X
25. The maintenance and installation of lighting and power wiring involving testing for, locating and correcting grounds, short circuits and open circuits, and making splices					X	X	X
26. The operation and maintenance of the various types of generators and motors, both A.C. and D.C					X	X	X
27. Operation, installation, and maintenance of the various types of electrical controls and safety devices					X	X	X
28. Testing and maintenance of special electrical equipment, such as telegraphs, telephones, alarm systems, fire-detecting systems, and rudder angle indicators					X	X	
29. Rules and Regulations and requirements for installation, repair, and maintenance of electrical wiring and equipment installed aboard ships					X	X	X
29a. Pollution laws and regulations, procedures for discharge containment and cleanup, and methods for disposal of sludge and waste from cargo and fueling operations	X	X	X	X	X	X	
30. Such further examination of a nonmathematical character as the Officer in Charge, Marine Inspection, may consider necessary to establish the applicant's proficiency	X	X	X	X	X	X	X

(c) Each applicant for an endorsement as a qualified member of the engine department in the rating of pumpman shall, by oral or other examination, demonstrate sufficient knowledge of the subjects peculiar to that rating to satisfy the Officer in Charge, Marine Inspection, that he or she is qualified to perform the duties of that rating.

(d) Applicants for an endorsement as qualified members of the engine department in the rating of deck engine mechanic or engineman, who have proved eligibility for such endorsement under either §12.15613 or §12.15615, will not be required to take a written or oral examination for such ratings.

[CGFR 65-50, 30 FR 16640, Dec. 30, 1965, as amended by CGFR 66-46, 31 FR 13649, Oct. 22, 1966; CGD 71-161R, 37 FR 28263, Dec. 21, 1972; CGD 74-75, 42 FR 24741, May 16, 1977; CGD 94-029, 61 FR 47064, Sept. 6, 1996; USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR §12.15-11 General provisions respecting an endorsement as qualified member of the engine department.

The holder of an endorsement with one or more qualified members of the engine department ratings may serve in any unqualified rating in the engine department without obtaining an additional endorsement. This does not mean that an endorsement of one qualified member of the engine department rating authorizes the holder to serve in all qualified member of the engine department ratings. Each qualified member of the engine department rating must be a separate endorsement. When, however, the applicant qualifies for all ratings covered by an endorsement as a QMED, the endorsement may read QMED ó any rating. The ratings are as follows:

- (a) Refrigerating engineer.
- (b) Oiler.
- (c) Deck engineer.
- (d) Fireman/Watertender.
- (e) Junior engineer.
- (f) Electrician.
- (g) Machinist.
- (h) Pumpman.
- (i) Deck engine mechanic.
- (j) Engineman.

[CGFR 65-50, 30 FR 16640, Dec. 30, 1965, as amended by CGFR 66-46, 31 FR 13649, Oct. 22, 1966; CGD 74-45, 42 FR 24741, May 16, 1977; USCG-2006-24371, 74 FR 11257, Mar. 16, 2009]

46 CFR § 12.15-13 Deck engine mechanic.

(a) An applicant for an endorsement as *deck engine mechanic* shall be a person holding an MMC or MMD endorsed as *junior engineer*. The applicant shall be eligible for such certification upon furnishing one of the following:

(1) Satisfactory documentary evidence of sea service of 6 months in the rating of *junior engineer* on steam vessels of 4,000 horsepower or over; or,

(2) Documentary evidence from an operator of an automated vessel that he has completed satisfactorily at least 4 weeks indoctrination and training in the engine department of an automated steam vessel of 4,000 horsepower or over; or,

(3) Satisfactory completion of a course of training for *deck engine mechanic* acceptable to the Commanding Officer, National Maritime Center.

(b) The Officer in Charge, Marine Inspection, who is satisfied that an applicant for the rating of *deck engine mechanic* meets the requirements specified in this section, will endorse this rating on the current MMC held by the applicant.

(c) Any holder of an MMC or MMD endorsed for *any unlicensed rating in the engine department* or *QMED—any rating* is qualified as a *deck engine mechanic* and that endorsement will not be entered on his or her credential.

[CGFR 66-46, 31 FR 13649, Oct. 22, 1966, as amended by CGD 95-072, 60 FR 50460, Sept. 29, 1995; CGD 95-028, 62 FR 51196, Sept. 30, 1997; USCG-1998-4442, 63 FR 52189, Sept. 30, 1998; USCG-2006-24371, 74 FR 11258, Mar. 16, 2009]

46 CFR §12.15-15 Engineman.

(a) An applicant for an endorsement as engineman shall be a person holding an MMC or MMD document endorsed as fireman/watertender and oiler, or junior engineer. The applicant shall be eligible for such endorsement upon furnishing one of the following:

(1) Satisfactory documentary evidence of sea service of 6 months in any one or combination of *junior engineer*, *fireman/watertender* or *oiler* on steam vessels of 4,000 horsepower or over; or,

(2) Documentary evidence from an operator of a *partially automated* steam vessel that he has completed satisfactorily at least 2 weeks indoctrination and training in the engine department of a *partially automated* steam vessel of 4,000 horsepower or over; or

3) Satisfactory completion of a course of training for *engineman* acceptable to the Commanding Officer, National Maritime Center.

(b) The Officer in Charge, Marine Inspection, who is satisfied that an applicant for the rating of engineman meets the requirements specified in this section, will endorse this rating on the applicant's MMC.

(c) Any holder of an MMC or MMD endorsed for any rating in the engine department, QMEDó any rating or deck engine mechanic is qualified as an engineman and that endorsement will not be entered on his or her credential.

[CGFR 66-46, 31 FR 13650, Oct. 22, 1966, as amended by CGD 95-072, 60 FR 50460, Sept. 29, 1995; CGD 95-028, 62 FR 51196, Sept. 30, 1997; USCG-1998-4442, 63 FR 52189, Sept. 30, 1998; USCG-2006-24371, 74 FR 11258, Mar. 16, 2009]

STCW REQUIREMENTS

[Warning: *The Coast Guard made major changes to all credentialing regulations in April 2009. They propose to make additional sweeping regulatory changes in a Notice of Proposed Rulemaking, Docket #USCG-2004-17914 on Nov. 16, 2009 at 74 FR 59354-59442. Some of these proposed changes would change the STCW information that follows.]*

Until 1995 American mariners were primarily concerned with obtaining licenses and, if serving aboard vessels greater than 100 gross tons, in obtaining a Merchant Mariners Document (MMD or "Z-card") to serve in an unlicensed position.

The situation changed on July 5, 1995 with the international acceptance of the 1995 "amendments" to the (international) Standards of Training, Certification and

Watchkeeping Convention. The new "STCW Code," consisting of 255 pages of international regulations, added a new set of hurdles for individuals who serve on vessels greater than 200 gross tons that either engage in foreign voyages or simply sail beyond the "boundary line" as described in 46 CFR Part 7. The requirements to hold a "STCW-95" endorsement are in addition to the requirements of earning a license or upgrading your endorsements beyond the entry level of Ordinary Seaman (Deck Department), Wiper (Engine Department), and Food Handler. (Steward's Department).

STCW, in most cases, requires you to attend Coast Guard-approved courses of instruction. These courses are neither "exam-prep" nor "home-study" courses. A listing of all Coast Guard-approved courses, including (but not limited to) STCW courses is available from the National Maritime Center, 100 Forbes Drive, Martinsburg, WV 25404. Phone: (304) 433-3400; Fax (304) 433-3413; Internet: <http://www.uscg.mil/nmc>.

Understanding STCW can be a daunting task. In April 1999, the Coast Guard, for the first time, released a brief description of STCW that was designed to explain STCW to the general public. That description follows:

STCW and How it Affects You

STCW is an international agreement providing for improved Standards of Training, Certification, and Watchkeeping for seafarers throughout the world and the United States, which will:

- Ensure safer seas
- Safer Navigation.
- Reduce seaman deaths and injuries.
- Protect the public in U.S. ports from maritime disasters.
- Conserve our marine environment.
- Improve the competitiveness of the U.S. maritime industry
- Prepare mariners to utilize rapidly changing technology to benefit from the competitive advantages it can provide.
- Reduce the economic advantages of "flags of convenience" employing poorly trained "crews of convenience."

Basic Information

- STCW applies to all present and future mariners who sail beyond the boundary lines of the United States. (In the U.S. the Coast Guard exempted mariners from STCW requirements who serve on vessels less than 200 gross register tons sailing on domestic voyages.)
- STCW emphasizes "hands-on" demonstrations of your skill and ability to prove that you are qualified to serve aboard seagoing vessels. Most U.S. mariners have already done this in their careers. The biggest change with STCW is that it formalizes⁽¹⁾ the documentation of your ability to perform these tasks.
- Completing a Coast Guard approved training course may be the least complicated way to meet the additional STCW qualification requirements.⁽²⁾ You may also demonstrate your knowledge and ability for STCW "covered" tasks before a Designated Examiner (DE) and keep your STCW Qualifications up-to-date. A Designated Examiner is an individual qualified to observe your performance and assess your competence. (This process is in the early stages of development.)⁽³⁾
- If you meet the requirements of STCW you will be issued an "STCW 95 endorsement."⁽⁴⁾ You may still maintain

your credentials without a STCW endorsement but without it you will be limited to "inland waters only" employment.⁽⁵⁾

- Mariners who began training or service before Aug. 1, 1998 had one-time "gap-closing" requirements to meet before Feb. 1, 2002. Existing mariners could upgrade their license or document (and STCW certificate) before that date.
- Persons beginning training or service employment on or after August 1, 1998 must be part of an organized training program approved by the Coast Guard in order to upgrade their STCW certification beyond entry-level qualifications.

Basic STCW Qualifications

- **All mariners** except those in non-qualified entry-level positions (ordinary seaman, wiper, food handler) must show that they are competent in four areas of basic safety. These areas are 1) basic firefighting, 2) personal survival techniques, 3) elementary first aid, and 4) personal safety and social responsibility.
- **Engineers** must show knowledge, skill, and ability to operate a lifeboat and obtain Lifeboatman certification. Again, this may be done by attending an approved course or demonstrating proficiency before a Designated Examiner. Academy graduates initially examined and qualified as "Lifeboatman" have already met this requirement. This is a one time only requirement.

Medical Care Provider certification also is required. This requires formal classroom training of about a week.

- **Deck officers** must demonstrate proficiency in Bridge Teamwork Procedures. This can be accomplished by taking an approved course, or if you have served on vessels practicing Bridge Resource Management, documenting your ability during that service. This is a one time only requirement.
- **Deck officers** must attend an approved training program and obtain certification as GMDSS Operator⁽⁷⁾ to serve on a GMDSS-equipped ship after February 1, 2002. (After Feb. 1, 1999 there must be at least two GMDSS operators⁽⁸⁾ aboard every such vessel. Since all vessels greater than 300 gross tons must have GMDSS equipment, the GMDSS training will apply to most deck officers.) This is a one time only requirement.
- **Deck officers** must pass an approved ARPA course⁽⁹⁾ for service on ARPA-equipped vessels after Feb. 1, 2002.
- **Officers** must receive training in Advanced Firefighting⁽¹⁰⁾ if they wish to be the "individual designated to control firefighting operations" aboard ship.
- Persons wishing to serve on tank vessels, RO-ROs⁽¹¹⁾, or to operate Fast Rescue Craft must complete additional training programs.
- Keep documentation for all training you have received together in a "record of training."⁽¹⁾ The Coast Guard Regional Exam Center will use this to verify your

eligibility for a STCW 95 Endorsement.

New Mariners

- All new mariners who began seagoing service on or after Aug. 1, 1998 must complete an approved Basic Safety Course (or demonstrate their ability before a Designated Examiner) before being certificated as a qualified rating or as an officer.
- All new mariners must be enrolled in, or be a part of, a Coast Guard approved training program in order to be issued a STCW certificate as a qualified rating or as an officer.⁽⁶⁾
- Under this program new mariners must demonstrate the ability to perform certain tasks in the presence of a Designated Examiner. If the task is completed correctly the Designated Examiner will "sign off" that item in that person's "record of training." Entry-level officers must use a Coast Guard approved Training Record Book (TRB) for this purpose. The Training Record Book must be completed to qualify for a license or STCW certificate. All existing regulations still apply to obtaining an initial credential. These include minimum age, citizenship, security and medical requirements,⁽¹²⁾ as well as obtaining a drug test, and recommendations attesting to your character.

For Further Information: FIRST ó Refer to the Coast Guard's STCW web site at: www.uscg.mil/nmc. SECOND ó Contact your employer. THIRD ó Call the nearest Regional Exam Center. FOURTH ó Call the National Maritime Center at (304) 433-3400.

These are OUR endnotes on the foregoing article:

- ⁽¹⁾**Vocabulary: "Formalize"** = Cover it with bureaucratic paperwork..
- ⁽²⁾*Don't expect it to be cheap!*
- ⁽³⁾*This means that you may not have any choice until Designated Examiners are approved and are in place.*
- ⁽⁴⁾*The STCW-95 certificate is NOT (repeat NOT) the same as the STCW-78 certificate that used to be provided free of charge by the Regional Exam Centers.*
- ⁽⁵⁾*Without a STCW-95 certificate, a "near-coastal" or "oceans" license can only be used on inland waters.*
- ⁽⁷⁾**Vocabulary: GMDSS** = Global Maritime Distress Safety System. This system conforms to "new" international radio requirements and will require attendance at a 70-hour course of instruction.
- ⁽⁸⁾*...appropriately licensed by the Federal Communications Commission (a two-day course).*
- ⁽⁹⁾**Vocabulary: ARPA** = Automatic Radar Plotting Aids.
- ⁽¹⁰⁾*"Advanced firefighting" is distinguished from the regular fire fighting course familiar to many licensed mariners.*
- ⁽¹¹⁾**Vocabulary: RO-RO** = Roll-on, roll-off cargo and ferry vessels. These vessels are particularly vulnerable to flooding and capsizing. (e.g., the *ESTONIA* that sank in the Baltic Sea and *HERALD OF FREE ENTERPRISE* that capsized outside Zbrugge, Belgium with considerable loss of life.)
- ⁽¹²⁾*The Coast Guard plans to apply the broad standards found in NVIC 04-08 as well as the physical exam*

requirements listed in the Code of Federal Regulations at 46 CFR 12.05-5(a) and 46 CFR 10.205(d).

ADDITIONAL ENGINEERING STUDY MATERIALS

STUDY OUTLINE FOR CHIEF AND ASSISTANT ENGINEER, LIMITED, AND DESIGNATED DUTY ENGINEER by V. J. Gianelloni, 1992, 140 pgs., ISBN 1-879778-07-6, MET Stock# BK-104.

This study outline reflects over thirty years of study, work, and instructional experience as ship's engineer, Coast Guard Officer, engineering instructor, attorney, and former Director of the Louisiana Marine and Petroleum Institute. The material is organized according to the Merchant Marine Exam structure for Engineer officer endorsements of limited tonnage or uninspected fishing vessels.

This outline was designed primarily as class hand-out material. Many people may find it difficult to understand the concepts, ideas, and information in these notes unless they attend the author's class for Limited Engineers. However, many former students have asked to buy a copy of these notes. Additionally many people from distant locations have called Marine Education Textbooks looking for materials designed for the Coast Guard's Limited Engineering officer endorsements. Since many can't come to south Louisiana for class, they are just looking for some guidance in what to study.

This study outline gives officer candidates a good idea of the breadth and depth of knowledge covered on the Coast Guard examination for limited tonnage engineers.

The material contained has been included for one or more of the following reasons:

1. To help make you a better engineer.
2. The Coast Guard exam has questions on these concepts.
3. These concepts will probably be on future Coast Guard exams.

This outline will be updated/revised after the Marine Engineer supplement is published.

There are over 12,850+ engineering questions in the Coast Guard's exam question data bank. These questions are available free on the internet. They used to be available in print in a series of Coast Guard "Yellow books." Since these books are no longer available, Marine Education Textbooks sells a published set of comparable books, Marine Engineering Workbook edited by William E. Haynes of the Massachusetts Maritime Academy that contain only Coast Guard engineering questions and answers with no explanatory text. The set also includes the necessary illustrations. In these books you can find all of the approximately 12,850+ engine questions covering material required for QMED ratings and officer endorsements.

However, if you buy all the Coast Guard engineering questions on the planet or access them on the internet, memorizing questions and answers is not the best way to learn any subject.

To prepare for any QMED rating or engineering officer endorsement exam, you must have access to the illustrations many questions refer to. The Merchant Marine Engineering Examination Illustration Book, MET Stock #BK-679 contains all the Coast Guard illustrations. You will need this book to prepare for any engineering exam although our **Limited Marine Engineering Series** books include most of

the important illustrations.

WORKBOAT ENGINEER, Revised Edition "D." By Robert J. ("Bob") Ward, Richard A. Block, Editor, Glenn L. Pigott, Consultant, 1999, approximately 1,100 pages. , published by Marine Education Textbooks..

- Book 1 ISBN 1879778734 MET Stock #BK-107-1.
- Book 2 ISBN 1879778742 MET Stock #BK-107-2
- Book 3 ISBN 1879778750 MET Stock #BK-107-3

These books are revised to keep up with current changes.

If you need additional explanations and text material, other than just questions and answers, we designed and revised our Workboat Engineer textbook for "limited tonnage/horsepower" engineers such as those who work on oilfield supply vessels (OSV), large tugs and towboats, as well as for large fishing industry vessels over 200 gross tons. Many of the chapters from Workboat Engineer can be of value for in-depth explanations. Each chapter contains text material covered on the exams. Multiple choice questions and answers are selected from the same Coast Guard database as questions used in Limited Marine Engineering series. Like those questions, they are limited in the extent of their coverage. We arranged these questions in order within their chapters with explanatory notes and defined significant vocabulary terms. You may buy the individual chapters you need (or an entire book). Please order them by stock number. Call us for a price quotation.

46 U.S. Code §8301 states that an offshore supply vessel of more than 200 gross tons may not be operated without a properly credentialed engineer officer.

Workboat Engineer provides the study material required to obtain an endorsement as a Designated Duty Engineer on an offshore supply vessel (OSV) and uninspected vessels of similar size and horsepower. This will become more important as towing vessels are brought under inspection.

The author, "Bob" Ward, is a retired Coast Guard Engineer Officer, former Marine Manager, Dowell Division, Dow Chemical, USA, and the Past President of the Propeller Club, Port of Lafourche, LA. The editor, Richard A. Block, is a 1,600-ton Master and Secretary of the National Mariners Association.

The principal subject areas covered by Workboat Engineer include:

- **WORKBOAT ENGINEER, Book 1** (MET Stock #BK-107-1) contains these chapters:
 - (BK-107C01) - Workboat Engineer Training, Licensing, and Manning. (WE)
 - (BK-107C02) - Useful Information for Licensed and Unlicensed Workboat Engineers. (U)
 - (BK-002C12) - Basic Principles of Watchkeeping. (WAT)
 - (BK-107C04) - Care and Use of Common Hand Tools. (HT)⁽¹⁾
 - (BK-107C05) - Fundamentals of Diesel Engines. (DE)⁽¹⁾
 - (BK-107C06) - Diesel Engines: Questions and Answers. (DEQ)⁽¹⁾
 - (BK-107C07) - Auxiliary Machinery. (AUX)⁽¹⁾**(Individual chapters from this book are available.)**
- **WORKBOAT ENGINEER, Book 2** (MET Stock #BK-107-2) contains these chapters:
 - (BK-107C08) - Refrigeration and Air Conditioning. (REF)⁽¹⁾

- (BK-107C09) - Electricity. (E)⁽¹⁾
 - (BK-107C10) - Electricity: Multiple Choice Questions. (EQ)⁽¹⁾
 - (BK-001C04E)- Pollution Control for Engineers. (PCE)⁽¹⁾
 - (BK-004C40) - Rules and Regulations for Offshore Supply Vessels. (OSV)
 - (BK-004C38E)- Operational and Safety Information for Engineers. (OSIE)⁽¹⁾
 - (BK-004C39E)- Tank Safety. (TS)⁽¹⁾
- (Individual chapters from this book are available.)**

- **WORKBOAT ENGINEER, Book 3** (MET Stock #BK-107-3) contains these chapters:

- (BK-002C19E)- Fires, Firefighting, and Fire Prevention for Engineers. (FFE)⁽¹⁾
 - (BK-003C21E)- Practical Stability. (STABE))
 - (BK-107C17E)- Temporary Repairs. (TRE))
 - (BK-001C06E)- First Aid. (FAE)⁽¹⁾
 - (BK-105C01) - Lifeboatman. (LBE)⁽¹⁾
 - (BK-002C15) - Survival at Sea. (SAS)⁽¹⁾
 - (BK-002C14) - Emergency Procedures. (EMER)⁽¹⁾
- (Individual chapters from this book are available.)**

⁽¹⁾*We believe the chapters marked with ⁽¹⁾ will be particularly useful for QMED candidates.]*

MERCHANT MARINE ENGINEERING EXAMINATION ILLUSTRATION BOOK, MET Stock #BK-679 USCG, COMDTPUB P16721.7C. This book contains all the illustrations used in all engineering exams.

DIESEL TECHNOLOGY. Norman, A; Corinchock, J; Scharff, R. 2001. 672p. App. Intro. Gloss. Index. Fully illus. ISBN 1-56637-733-1. MET Stock #BK-0860.

This book is designed to provide students in the rapidly changing diesel engine field with up-to-date information on the construction, operation, service, and repair of diesel engines that are used to power ships, generators, pumps, compressors, trucks and construction equipment. It also contains information on the latest developments in the diesel engine field including control computers, fuel management and emissions control systems. Today's diesel technicians must understand how these components and systems operate to service them properly. It is both an ideal text for the beginning diesel student and a valuable resource for diesel technicians currently working in the field of servicing and repairing diesel engines.

Chapters include: Introduction to Diesel Engines; Shop Safety; Tools, Precision Tools and Fasteners; Principles of Operation; Engine Blocks; Crankshafts: Pistons, Rings and Connecting Rods; Cylinder Heads and Related Components; Camshaft and Valve Train Components; Lubrication Systems; Cooling Systems; Air Intake Systems; Exhaust Systems; Diesel Fuels; Basic Fuel Systems; Fuel Filters and Conditioners; Injection System Fundamentals; Injection Nozzles; Governors and Acceleration Controls; Multiple Plunger Inline Injection Pumps; Distributor Injection Pumps; Unit Injector Fuel Injection Systems; Cummins Pressure-Time Injection Systems; Basics of Electricity; Electronic Engine Controls and Fuel Injection; Diesel Engine Charging Systems; Diesel Starting Systems; Engine Reassembly and Installation; Preventive Maintenance and Troubleshooting; Career Opportunities.

DIESEL ENGINES by Naval Education and Training Command (NAVEDTRA 10625) MET Reprint, 1976, 281 pgs., illustrations. Index. MET Stock# BK-408.

This text is intended to serve as a reference for personnel actually working on, or supervising work on, diesel engines and also to support a course of nonresident study for those who anticipate duties associated with diesel engines.

For the benefit of personnel who have gained practical experience in diesel engine operation and maintenance, this text offers a general coverage of theory, design, and thermodynamics of diesel engines. For those who have gained an academic grounding in diesel engineering, the text describes specific design, maintenance, and operating procedures related to the most commonly used diesel engines.

Contents Include: Introduction, Basic Principles, Reciprocating Internal-Combustion Engines, Principal Stationary Parts, Principal Moving and Related Parts, Operating Mechanisms for Engine Parts, Fuel Systems and Engine Control, Air Intake and Exhaust Systems, Lubricating Oil Systems, Cooling Systems, Starting Systems, Transmission of Engine Power, Diesel Engine Operating Procedures, Troubleshooting, Index.

For STEAM ENGINES AND STEAM PLANTS ...

PRACTICAL MARINE ENGINEERING by Reno C. King, Jr., 2nd. ed. 524p. plus index. ISBN 0-924114-60-9. MET Stock #BK-448.

MET reprinted a limited number of copies of this classic marine engineering textbook, last printed in 1969, for which many people in the marine industry expressed an interest. The main topics covered by this book include: Introduction to the Marine Power Plant; Boiler Construction-General Requirements; Construction of Scotch Boilers; Water-Tube Boilers; Combustion; Boiler Operation and Maintenance; Boiler-Water Problems; Reciprocating Steam Engines; Steam Turbines; Electricity; Refrigeration; Pumps and Unfired Pressure Vessels; Miscellaneous Equipment; Respiratory Apparatus; Firefighting Equipment, Rules and Regulations; Engine Room Mathematics. The book is simply written, profusely illustrated and well edited, and although somewhat dated, remains a valuable and outstanding text.

[Study Guide: These numbered "sections" in Mr. King's book are ones that deserve special attention: SECTIONS #10, 14, 19 thru 22, 24 thru 27, 29 thru 31, 46 thru 51, 56 thru 73, 77,97 thru 111, 115 thru 127, 133 thru 140, 143 thru 145, 163 thru 169, and 173.]

MODERN MARINE ENGINEER'S MANUAL, VOLUME 1. by Hunt, E. C. (Editor). 3rd ed. 1999. 1,296p. Photographs. Figures. Tables. Index. ISBN 0-87033-496-4. MET Stock #BK-344.

MODERN MARINE ENGINEER'S MANUAL VOL. II. Hunt, Everett C. et al. 3rd ed. 2002 976p. Photos. Figs. Tables. Index. Glossary, Review Questions. ISBN 0870335375. MET Stock #BK-345.

Steam turbine propulsion systems are included but the coverage is reduced in recognition of the popularity of main propulsion diesel engines, covered in Volume II, and the anticipated increasing applications of aero-derivative gas turbines that are covered in detail. Pumps, pumping systems,

and heat ex-changers are given extensive coverage. Computer applications for machinery and system management are presented, including planning the system, system hardware, system applications, database development, and data communications. The relevant material on international and national laws, regulatory rules, and standards such as ISO 9000 and the ISM code is included in the text. The characteristics of fuels, fuel chemical treatment, fuel mechanical processing, and the avoidance of combustion chamber deterioration are presented. A chapter on safety and management discusses shipboard engineering operations, shipyard repair planning and economics, safety management, and safety organization. Each chapter includes review questions and references for additional study. Metric measurements and customary USA units are interchanged throughout the text to assure familiarity with both systems.

BOILER TECHNICIAN – 3RD AND 2ND. by U.S. Navy. 1991. MET Stock #BK-720.

This book serves as an aid to performing duties in these areas: administration and management; steam engineering; the engineering plant; boiler fittings and instruments; automatic boiler controls; propulsion boiler operation; boiler water/feedwater test and treatment; auxiliary machinery; valves, pipe fittings, and piping.