

Course: Steam Generators

Department of Marine Engineering
Steam Generators / EN-3131
Fall 2015

Instructor: LCDR Jonathan McDonnell
2015

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Office Hours: Fourth Period on Monday, Wednesday, and Friday

Prerequisite: SM-2113

Learning Objectives

Demonstrate Knowledge and understanding of the following STCW elements:

- OICEW-A4.1 Basic construction and operation principles of marine boilers
- OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for steam boiler and associated auxiliaries
- OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for steam systems
- OICEW-B1.2 Steam boiler automatic controls
- RFPEW-A2.1 Safe operation of boilers

Demonstrate proficiency in the following skills

- OICEW-5-2D Boiler water test

Required Text:

Modern Marine Engineer's Manual, Vol. 1 (Hunt)

Recommended Texts:

Engineering Training Manual TS Kennedy (Haynes)

Marine Engineering Workbooks, Vol. 1, 2, 3 (Haynes) 6th or 7th Ed.

Handouts will be distributed during class lectures and lab instruction

Caution: Cell phones will be taken and given to the Dean. Students are expected to bring notebooks, writing utensils, etc.

Uniform: No boiler suits allowed in class, only uniform of the day. Only long sleeve boiler suits allowed in lab (no short sleeves)

Course Description: To prepare the student in understanding the design, construction, and operation of marine boilers.

Attendance:

- Attendance is mandatory for all class lectures and lab instruction. Special liberties DO NOT COUNT as excused.
- Students with perfect attendance will have their lowest quiz grade dropped. There will be NO make-up quizzes offered even with an excused absence and NO QUIZZES WILL BE DROPPED. Missing a quiz equals zero.
- Students will be allowed two excused absences from class lectures only provided they provide notification twenty-four hours before the scheduled class. Students will have to make-up all required work. For each unexcused lecture absence, the final grade will be reduced by 2 percent.
- Lab instruction classes are **mandatory**. Disciplinary action will be taken if needed. An "Incomplete" grade will be issued if all labs are not completed.

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Grading:

- Quizzes (Weekly) 70%
- Final Examination 20%
- Lab and Attendance 10%

Note: *This is a STCW required course, the only grades earned in this class will be “A, B, C or F”, there will be no “D”.*

Reading Assignments: Additional handouts will be given out as needed.

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| 1. Introduction to Course – Fundamental thermodynamic concepts | MMEM p.1-1 to 1-28 |
| 2. Properties of Steam | MMEM p.1-1 to 1-28 |
| 3. Boiler Capacity Limitations | Handout |
| 4. Boiler Classification, Fire Tube Boilers, Water Tube Boilers | MMEM p.5-1 to 5-13 |
| 5. Design and Construction of Boilers | Handout |
| 6. Boiler Refractories | MMEM p.5-26 to 5-27 |
| 7. Internal Boiler Fittings, Sootblowers | MMEM p.5-43, 5-47:49 |
| 8. Superheaters and Desuperheaters | MMEM p.5-27 to 5-33 |
| 9. Heat Recovery Devices | MMEM p.5-33 to 5-38 |
| 10. Boiler Water Chemistry | MMEM p. 5-80 to 5-87 |
| 11. External Boiler Fittings | MMEM p.5-39 to 5-42 |
| 12. Feedwater Regulators, Gauge Glass, Drum Level Indicators | MMEM p.5-44 to 5-47 |
| 13. Combustion – Atomizers, Registers, Fuel Oil, Fuel Oil Systems | MMEM p.5-21 to 5-26 |
| 14. Combustion – Chemistry of Combustion, Stack Gas Analysis | MMEM p.5-13 to 5-20 |
| 15. Boiler Operation and Controls | MMEM p. 5-49 to 5-79 |

All of the above material may be amended or rearranged depending on subject emphasis and/or student needs.

Course: Steam Generators

Student Learning Outcomes: The main objective of the course is to give the student an understanding of the design, construction, and operation of marine boilers.

Learning Objectives:

At the completion of this course, the student should be able to:

- Understand the design, construction, and operation of marine boilers.
- Understand basic thermodynamics and steam tables
- Understand how to perform fundamental engineering calculations
- Understand both fire tube and water tube boiler fundamentals and operation
- Understand boiler refractories
- Understand internal boiler fittings
- Understand superheaters and desuperheaters
- Understand heat recovery devices
- Understand external boiler fittings
- Understand combustion theory
- Understand boiler water chemistry and treatment
- Understand boiler operation
- Fulfill the USCG requirement of Standards of Training, Certification, and Watchkeeping (STCW) for the skill sets developed during the lab and lecture portions of this course.

The laboratory consists of locating and identifying all components relating to the training ship's boiler and steam systems. Light off the fire tube boiler in the boiler lab. Conduct boiler water tests. Demonstrate proficiency in the following STCW element: OICEW-5-2D Boiler water tests

MMA is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they need accommodations in this class are required to contact Mr. Fran Tishkevich, Director of Disability Compliance, within the first two weeks of class at ext. 2208 or by email at ftishkevich@maritime.edu.

