



Chapter 1.6

How to Write an Equipment Test

1.0 Document Purpose

- 1.1 The Nanolab's MercuryWeb system houses the equipment testing database. This database administers and records equipment tests for most Nanolab equipment that requires a written qualification exam. This manual will explain how to create a Nanolab equipment test.

2.0 Definitions & Process Terminology

- 2.1 Single Choice: A question with a single answer chosen from many answers.
- 2.2 Multiple Choice: A multiple choice question with multiple correct statements that must all be checked.
- 2.3 Mandatory Choice: A multiple choice question which must be answered correctly to pass.
- 2.4 All of the Above: A multiple choice question where selecting all boxes OR the "All of the above" line is the correct answer.
- 2.5 None of the above: A multiple choice question where selecting "None of the Above" is the correct answer
- 2.6 True/False: A true or false statement
- 2.7 Essay: Members must submit a long form explanation; these questions cannot be graded automatically.

3.0 Equipment Re-qualification Quiz Guidelines

- 3.1 Equipment re-qualification quizzes are intended to address a structural training deficiency in the qualified member base on the tool.
- 3.2 Quizzes are appropriate when:
 - 3.2.1 Tool usage policy changes in a significant fashion that denies previously approved processes access to the tool
 - 3.2.2 Severe abuse of the tool has occurred throughout the member base
 - 3.2.3 Tool hardware changes have dramatically changed operation, safety procedures, or processing procedures on the tool.
- 3.3 Re-qualification should focus the specific changes being made to the tool and any/or any relevant reminders of policy the process engineering staff believe should be included.
- 3.4 Re-qualification quizzes typically have 5 questions, though more is acceptable.
- 3.5 Tests typically have 1 "mandatory" questions which must be answered correctly or the member immediately fails the test.
 - 3.5.1 Mandatory questions must be clearly marked with a (Mandatory) in the beginning of the question
 - 3.5.2 Mandatory question answers must be easily located in the manual and clearly defined. A lab member who is studying after failing a tests should be able to use the find function in a manual to find relevant information pertaining to a mandatory question. Use exactly wording where possible.

- 3.5.3 Mandatory questions must be directly related to the policy or operational changes that caused the quiz to be put in place.

4.0 Equipment Qualification Test Guidelines

- 4.1 Equipment tests are intended to check a lab member's knowledge of basic operation and processing on a piece of equipment.
- 4.2 Tests should include the following topics:
 - 4.2.1 Operational procedures
 - 4.2.2 Any relevant safety procedures
 - 4.2.3 Standard processes and their purpose
 - 4.2.4 Quirks of operation that separate the tool in question from similar tools
- 4.3 Tests typically have 10-20 questions, though more is acceptable.
- 4.4 Tests typically have 2-4 "mandatory" questions which must be answered correctly or the member immediately fails the test.
 - 4.4.1 Mandatory questions must be clearly marked with a (Mandatory) in the beginning of the question
 - 4.4.2 Mandatory question answers must be easily located in the manual and clearly defined. A lab member who is studying after failing a test should be able to use the find function in a manual to find relevant information pertaining to a mandatory question. Use exact wording where possible.
- 4.5 Remember that essay type questions require a manual grading scheme. Tests without essay questions are auto-graded upon completion.

5.0 Process Procedure

- 5.1 Login to MercuryWeb
- 5.2 Go to Staff
- 5.3 Click Online Tests
- 5.4 Create a test to edit under "Equipment Qualification Test" or "Equipment Re-Qualification Quiz"
 - 5.4.1 If you are creating a new test, click the "new" line, enter a tool name.
 - 5.4.2 If you are editing a test, click the "View all" line and enter a tool name.
 - 5.4.2.1 Click the two pages icon next to the current test for that tool; this creates a new copy.
- 5.5 Header information
 - 5.5.1 Write in a Title -- be sure to add the toolname to the title!
 - 5.5.2 Write in an introduction -- use the boilerplate in Appendix A and modify as necessary
 - 5.5.3 Write in the Pass and Fail messages -- see Appendix A - Boilerplate
- 5.6 Assign a primary and secondary grader (typically process engineer 1 and 2, or equipment engineer 1 in lieu or process engineer 2)
- 5.7 Note passing percent should be at least 90% unless special considerations are made.
- 5.8 Allow retake of 1 hour for standard tests. Special exceptions can be made.

5.9 Click add questions, then click add question on the next screen.

5.10 Select your question type (see definitions above).

5.11 Type in your question prompt.

5.12 Type in your choices and select the correct answer.

5.12.1 Remember, tests should never have a “Gotcha” question/answer. Tests should be clear. The goal is not to fail half of a bell curve, but to ensure that the trainers have covered all the material.

5.13 Hit Save.

5.14 Hit Save again.

5.15 Hit Save a third time -- this saves your test to the database and prevents loss of data.

5.16 Click the edit line, type in the tool name.

5.17 Click through to the grader screen, and repeat steps 5.9 through 5.14 as necessary.

6.0 **Troubleshooting Guidelines**

6.1 Problem: The testing system will not save my test and is giving a “Unicode #####” error.

6.2 Solution: The mercury database does not handle punctuation that functions as a mathematical operator effectively. Remove all dashes, quotation marks, and apostrophes.

7.0 **Appendix A -- Boilerplate**

7.1 Title:

7.1.1 Equipment Qualification Tests - <toolname>

7.2 Introduction:

7.2.1 Welcome to the Equipment Qualification Test for the <toolname>!

A passing grade is 90% with no mandatory questions failed.

Nanolab tests are not part of your academic records or coursework. The point is to document familiarity with the tools and procedures of the lab.

Nanolab tests are closed book. You may not refer to manuals, the internet, your phone, etc while completing a test. Please put your phone and all written materials away, close all other browser windows, and only take the test. Failure to do so will result in your test automatically failing and you will be asked to study for a re-test the next day.

If you feel unsure about a test question, make the best effort you can, complete the test, and submit for grading. If you do not pass, review the training materials again and ask process staff regarding any items needing clarification. Retake the test when ready.

Good luck!

7.3 Pass Message

7.3.1 Do not cut and paste this text -- it gives a unicode error in MercuryWeb.

7.3.2 Congratulations!

You passed the <toolname> equipment test! Please contact a superuser to arrange verbal qualification on the tool.

7.4 Fail Message

7.4.1 Do not cut and paste this text -- it gives a unicode error in MercuryWeb.

7.4.2 Unfortunately you did not pass the <toolname> qualification test. Please seek additional study & training and try again after 1 hour has passed.
If you have failed twice, contact staff to review.