



The MSIAC Self-Audit to Improve How Testing Facilities Conduct IM & HC Tests

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- Today's munitions are often developed and/or manufactured by groups of nations, by multinational corporations or by international consortiums. This may result in a **munition being tested at IM/HC tests in several different test organizations**, sometimes located in different nations. A detrimental consequence could be that IM/HC testing is not consistent across the different test organizations due to different test capabilities and competences, and due to a variability in the way test organizations carry out IM/HC testing.
- The MSIAC catalogues of testing facilities (L-106 for IM testing and L-196 for environmental testing) provide a useful database on testing facilities, but they do not provide sufficient information to assess test organizations' capabilities or competences in any significant manner.
- This is the reason why the MSIAC self-audit procedure was created, to provide confidence in interpretation and implementation of IM test requirements specified within NATO standardization documents, which are not sufficiently prescriptive.
- The **4th version of the MSIAC self-audit** is based on the most recent versions of AOP-39 (Ed D V2), AOP-39.1 (Ed A V1) and IM test AOPs (Ed A V2).

Why Conduct an MSIAC Self-Audit?

- For munition developers, the MSIAC self-audit allows them to have a **common understanding on the way IM/HC tests are conducted in the different test organizations they contract**. It is indeed of the utmost importance that agencies requesting IM/HC testing obtain consistent and reliable information from the different IM/HC test organizations.
- From the test organization point of view, it is of obvious interest for them to **demonstrate their capability to consistently and reliably perform IM/HC testing**.

- The 4th edition of the MSIAC self-audit procedure includes:
 - The **L-150 report** that introduces the self-audit procedure and provides guidance on how to complete it; and
 - An **excel spreadsheet** including different questionnaires that aim to demonstrate the ability for the IM/HC test organization to fulfil the requirements and recommendations of the NATO and UN standardized test procedures related to IM/HC testing
- It can be used:
 - in a **self-audit (or internal audit) mode** to identify their own forces and weaknesses in IM testing, and take actions to improve the way they conduct the tests; or,
 - in **preparation of a formal audit**, as it allows the identification of possible non-conformities.



Chapter / Section	Type	Requirement / Recommendation	Questions	Answer
Common Test Specifications				
Chapter 1 TEST SPECIFICATIONS Section 1.1 Test Requirements	Information	There are three methods for performing the Fast Heating (FH) test: 1) Manual: Conducted by performing the required number of cycles (2) in a part of a test battery (Munitions Test, Qualification Test, etc.) 2) Automatic: Conducted by performing the required number of cycles (2) in a test battery (Munitions Test, Qualification Test, etc.) 3) Manual: Conducted by performing the required number of cycles (2) in a test battery (Munitions Test, Qualification Test, etc.)	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.2 Test Requirements	Information	The criteria for AT (T) tests is as follows: 1) The test is performed at a temperature of 20°C ± 2°C. 2) The test is performed at a pressure of 101.3 kPa ± 2 kPa. 3) The test is performed at a relative humidity of 50% ± 5%. 4) The test is performed at a test speed of 1000°C per minute. 5) The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.3 Test Requirements	Information	There are three methods for performing the Fast Heating (FH) test: 1) Manual: Conducted by performing the required number of cycles (2) in a part of a test battery (Munitions Test, Qualification Test, etc.) 2) Automatic: Conducted by performing the required number of cycles (2) in a test battery (Munitions Test, Qualification Test, etc.) 3) Manual: Conducted by performing the required number of cycles (2) in a test battery (Munitions Test, Qualification Test, etc.)	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.4 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.5 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.6 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.7 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.8 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.9 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	
Chapter 1 TEST SPECIFICATIONS Section 1.10 Test Requirements	Information	The test is performed at a temperature of 20°C ± 2°C. The test is performed at a pressure of 101.3 kPa ± 2 kPa. The test is performed at a relative humidity of 50% ± 5%. The test is performed at a test speed of 1000°C per minute. The test is performed at a test speed of 1000°C per minute.	How many methods are performed per test organization? Are all methods performed at the test organization?	

Who?

- This self-audit is mainly targeted to **IM/HC test organizations** as it represents a way to promote their capabilities and competences in IM/HC testing. It is also beneficial to identify weaknesses and take action to improve the way the test organizations conduct IM/HC testing.
- The self-audit should involve **all personnel related to IM/HC testing**: the project team, the relevant safety authority and, where appropriate, subject matter experts from research establishments as well as from the testing organization itself.
- For those test organizations that rely on contractors, the test organization should seek to involve also **the personnel from any relevant support organizations** as part of the audit process.

When?

- Any time!
- It could even be beneficial to conduct this self-audit more than once, and **ideally on a regular basis**, for a self-assessment of the evolution of the test organization's capabilities and competences. Conducting such a self-audit on a regular basis can also be a good way to ensure that the test organization still meets the requirements of the latest editions of the standards.
- This process may **take a significant time and effort** to be fully accomplished, depending on the extent of IM/HC capabilities and competences of the test organization. A duration of **three to six months is typically necessary** to properly complete the full self-audit procedure for the first time.

Where?

- The questions of the self-audit refer to documents and procedures related to IM/HC personnel and testing, but also to the test set-ups and instrumentation used for IM/HC testing.
- It is then strongly encouraged to conduct the self-audit **in the test organization facility**, where the elements to answer the questionnaires can be easily accessible.

- **Step 1: Planning the MSIAC self-audit**
 - Make sure that the management line supports this activity
 - Define a calendar and work in “project mode”
- **Step 2: Completing the Excel Spreadsheet**
 - This represents the core activity of the self-audit
 - The excel spreadsheet is divided into 3 general tabs and 6 specific tabs for each one of the 6 IM test AOPs
 - In total, it includes 150+ questions/actions
- **Step 3: Reporting the self-audit results**
 - A structure is proposed in order to maintain consistency between self-audit reports

- **Step 4: Capitalizing, Promoting and sharing the self-audit experience**
 - At the minimum, the test organization that have conducted the MSIAC self-audit shall capitalize the results and **take action if it does not fulfil some of the requirements**. The test organization should also consider taking action to improve the way they conduct IM/HC tests.
 - It is also encouraged for the test organization to **share the results of the self-audit** they have conducted by, e.g. providing the self-audit report to MSIAC for the benefit of the MSIAC community or presenting it at an international meeting/conference.
 - This will result in two benefits:
 - For the test organization who conducted the self-audit, **to promote its capabilities and competences to carry out IM/HC tests in a reliant and consistent way**.
 - For the other test organizations, **to encourage them to also conduct an MSIAC self-audit**.

- **Step 5: Providing feedback**
 - Test organizations are encouraged to add to this procedure everything they consider relevant and **provide feedback to MSIAC** on these additions.
 - MSIAC would be very grateful if the test organizations that have conducted this self-audit could help improve this procedure by providing feedback on any improvements that could be introduced in this self-audit procedure, on any aspects.

Conclusion & Way Forward

- The ultimate goal of this self-audit procedure is **to obtain internationally acceptable IM/HC test results, reports and signatures** as well as **recognized IM/HC test organizations**.
- With as many test organizations as possible following this self-audit procedure, it will hopefully result in **a trustable and internationally recognized network of test organizations suitable to carry out IM/HC certification tests**.
- The next step is to advertise the updated MSIAC self-audit procedure as widely as possible!

