

ENGINEERING PRACTICE STUDY
TITLE: SEAL INSPECTION OF HERMETICALLY SEALED RELAYS FOR
MIL-R-5757, MIL-PRF-6106, MIL-PRF-28750, MIL-PRF-28776, MIL-PRF-39016,
MIL-PRF-83536, AND MIL-PRF-83726
PROJECT NUMBER 5945-2014-003

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STUDY PROJECT

FINAL REPORT

Study Conducted by Erika Baker

Prepared by:

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ENGINEERING PRACTICE STUDY

Investigation of modifying the requirements for the seal inspection
of hermetically sealed relays, for
MIL-R-5757, MIL-PRF-6106, MIL-PRF-28750, MIL-PRF-28776, MIL-PRF-39016,
MIL-PRF-83536, AND MIL-PRF-83726

- I. **OBJECTIVES:** Survey the manufacturers and document custodians/reviewers to determine the acceptability of modifying the stated documents to revise seal test requirements to clarify intent and eliminate confusion by:
- 1) Eliminating reference to MIL-STD-202 as a test method (keep requirement to use MIL-STD-883),
 - 2) Clarifying the limit specified is the standard leak rate (L) of the Howl-Mann Equation identified in MIL-STD-883, Method 1014.
 - 3) Changing the standard leak rate (L) from implied value of 1×10^{-8} atm cm³/s of air (typical R near 1×10^{-11}) to 1×10^{-6} atm cm³/s of air (typical R near 5×10^{-8}).
- II. **BACKGROUND:** DLA Land and Maritime was notified of confusion between the standard leak rate (L) and the measured leak rate (R) in the subject relay seal procedures. The subject specifications include MIL-STD-202 as a test method option and they do not clearly identify the standard leak rate value “L” of the Howl-Mann Equation identified in MIL-STD-883, Method 1014:14.

First, eliminating the MIL-STD-202 Test Method would allow relays to be tested to one test method, MIL-STD-883. Second, identifying the standard leak rate, L of the Howl-Mann Equation in MIL-STD-883, Method 1014, as 1×10^{-6} atm cm³/s of air would reduce confusion of specified value being the standard leak rate (L) or the measured leak rate (R). The standard leak rate of 1×10^{-6} atm cm³/s of air would allow a R value near 5×10^{-8} . This value is representative of the fielded relays and can be supported by 100% of the listed QPL manufacturers with their current equipment. See table below for additional information.

	Current	Proposed
L and R Values:	Standard leak rate (L) of 1×10^{-8} atm of air, Measured leak rate (R) near 1×10^{-11} . This is implied and not clearly identified.	Identify Standard leak rate (L) of 1×10^{-6} atm cm ³ /s of air which leads to a Measured leak rate (R) near 5×10^{-8} .
Current QPL Manufacturers Ability to Comply:	10% of QPL Manufacturers are currently meeting requirement	100% of QPL Manufacturers are currently meeting requirement
Equipment Consideration to Support Testing	May require purchase of Kr85, CHLD, or use of third party laboratory	QPL Manufacturers can use current equipment

	Current	Proposed
Required Testing Duration (typical)	Bomb time could be 1,000 hours or longer (using current equipment)	Bomb time of 4-10 hours

III. **RESULTS:** A survey letter was sent to all QPL manufacturers and document custodians/reviewers. The response identified the following:

- 1) Object to eliminating reference to MIL-STD-202 and maintaining MIL-STD-883 as a test method. MIL-STD-883 imposes additional test equipment requirements (i.e. pressurized chamber).
- 2) Support clarifying the limit specified is the standard leak rate (L) of the Howl-Mann Equation identified in MIL-STD-883, Method 1014.
- 3) Support changing the standard leak rate (L) from implied value of 1×10^{-8} atm cm³/s of air (typical R near 1×10^{-11}) to 1×10^{-6} atm cm³/s of air (typical R near 5×10^{-8}).

IV. **CONCLUSION:** It was determined that DLA Land and Maritime will update the stated specifications to reflect the following:

- 1) Maintain the current reference to MIL-STD-202 and MIL-STD-883 as a test method.
- 2) Clarify the limit specified is the standard leak rate (L) of the Howl-Mann Equation identified in MIL-STD-883, Method 1014.
- 3) Change the standard leak rate (L) from implied value of 1×10^{-8} atm cm³/s of air (typical R near 1×10^{-11}) to 1×10^{-6} atm cm³/s of air (typical R near 5×10^{-8}).

V. **RECOMMENDATION:** If there is a specific need to further modify The stated specifications please notify Erika Baker (614) 692-4481 or Email Erika.Baker@dla.mil. I will be glad to work with the manufacturers and document custodians/reviewers to find a solution.

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