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DEPARTMENT OF DEFENSE
TEST METHOD STANDARD

ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS

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FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense (DoD). Although prepared specifically for DoD applications, this standard may be tailored for commercial applications as well. While MIL-STD-810F incorporated a significant revision of MIL-STD-810E, MIL-STD-810G not only consolidates the basic -810F with its three change notices to result in one comprehensive document, but also includes a number of corrections, significant changes, and additions to the comprehensive -810F, to include five new test methods, one of which (Method 526) was extracted from Method 516. The primary emphases are still the same – (with the exception of Method 528) tailoring a materiel item's environmental design and test limits to the conditions that the specific materiel will experience throughout its service life, and establishing laboratory test methods that replicate the effects of environments on materiel, rather than trying to reproduce the environments themselves. However, the "G" revision continues the up-front explanation of how to implement the environmental tailoring process throughout the materiel acquisition cycle.

As in MIL-STD-810F, this revision recognizes that the environmental design and test tailoring process has expanded to involve a wide range of managerial and technical interests. Accordingly, this revision orients environmental design and test direction toward three basic types of users who have distinctly different, although closely associated, interests: program managers who, among other responsibilities, ensure proposed concepts and systems are valid and functional in intended operational environments; environmental engineering specialists (EES), who enter the acquisition process early to assist combat and materiel developer tailoring efforts by preparing life cycle environmental profiles and drafting tailored design criteria and test programs; and the design, test, and evaluation community, whose analysts, engineers, and facility operators use tailored designs and tests to meet user needs.

2. **Part One** describes management, engineering, and technical roles in the environmental design and test tailoring process. It focuses on the process of tailoring materiel design and test criteria to the specific environmental conditions a materiel item is likely to encounter during its service life. New appendices support the succinctly presented text of Part One. Annex A contains complete descriptions of environmental engineering tasks. These tasks, along with management information in Annex B and EES guidance in Annex C, will help to ensure the environmental design and test tailoring process is implemented and documented according to the disciplined, but flexible approach to materiel acquisition called for in Department of Defense (DoD) 5000-series documents (DoDD 5000.1). Terms used in this standard relating to the materiel acquisition process are limited to terms used in the DoD 5000-series documents; to avoid confusion and promote simplicity, service-specific terms/processes are not used.

3. **Part Two** contains environmental laboratory test methods to be applied according to the general and specific test tailoring guidelines described in Part One. It is important to emphasize that, with the exception of Method 528, these methods are not to be called out in blanket fashion, nor applied as unalterable routines, but are to be selected and tailored to generate the most relevant test data possible.

To support the tailoring process described in Part One, each test method in Part Two contains some environmental data and references, and identifies tailoring opportunities for the particular method. Some methods afford a wide latitude for tailoring; some can be tailored up to established limits, and some have relatively few tailoring options. Whenever possible, each method contains background rationale to help determine the appropriate level of tailoring. Each test method supports the test engineer and test facility operator by describing preferred laboratory test facilities and methodologies. Any specific tailoring information and values contained in these test methods should be supplanted by more up-to-date field/fleet or program-specific information when available.

When applied properly, the environmental management and engineering processes described in this standard can be of enormous value in generating confidence in the environmental worthiness and overall durability of materiel system design. However, it is important to recognize that there are limitations inherent in laboratory testing that make it imperative to use proper caution and engineering judgment when extrapolating these laboratory results to results that may be obtained under actual service conditions. In many cases, real-world environmental stresses (singularly or in combination) cannot be duplicated practically or reliably in test laboratories. Therefore, users should not assume that a system or component that passes laboratory tests of this standard also would pass field/fleet verification trials. DoD 5000-series documents call for component technology to be demonstrated in relevant environments to reduce risk on components and subsystems that have been demonstrated only in laboratory environments (DoDI 5000.2).

4. **Part Three** contains a compendium of climatic data and guidance assembled from several sources to include AR 70-38, "Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions," (1979), Draft AR 70-38 (1990) that was assembled using 1987 Air Land Battlefield Environment (ALBE) report information, "Environmental Factors and Standards for Atmospheric Obscurants, Climate, and Terrain," and MIL-HDBK-310, Global Climatic Data for Developing Military Products.

Part Three provides planning guidance for realistic consideration (starting points) of climatic conditions in the research, development, test, and evaluation (RDTE) of materiel and materials used throughout their life cycles in various climatic regions throughout the world. It is intended that this and related documents will help achieve the objective of developing materiel that will perform adequately under the environmental conditions likely to be found throughout its life cycle in the areas of intended use.

5. The US Department of Defense would like to thank the following individuals for their contributions toward the development and publication of MIL-STD-810G:

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6. This standard is intended to be a "living document" that will be updated as new concepts, technologies, and methodologies evolve.

Questions about this document's technical content may be addressed to the following offices:

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The Preparing Activity for MIL-STD-810 transfers from Air Force Code 11 to Army Code TE concurrent with the publication of this Revision G.

Comments, suggestions, or questions on this document should be addressed to US Army Developmental Test Command, 314 Longs Corner Road, ATTN: CSTE-DTC-TM-B, Aberdeen Proving Ground, MD 21005-5055; or e-mailed to apgr-TEdtStandards@conus.army.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

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PART ONE –
ENVIRONMENTAL ENGINEERING PROGRAM GUIDELINES

1. SCOPE.

1.1 Purpose.

This standard contains materiel acquisition program planning and engineering direction for considering the influences that environmental stresses have on materiel throughout all phases of its service life. It is important to note that this document does not impose design or test specifications. Rather, it describes the environmental tailoring process that results in realistic materiel designs and test methods based on materiel system performance requirements. Figure 1-1 summarizes this direction.

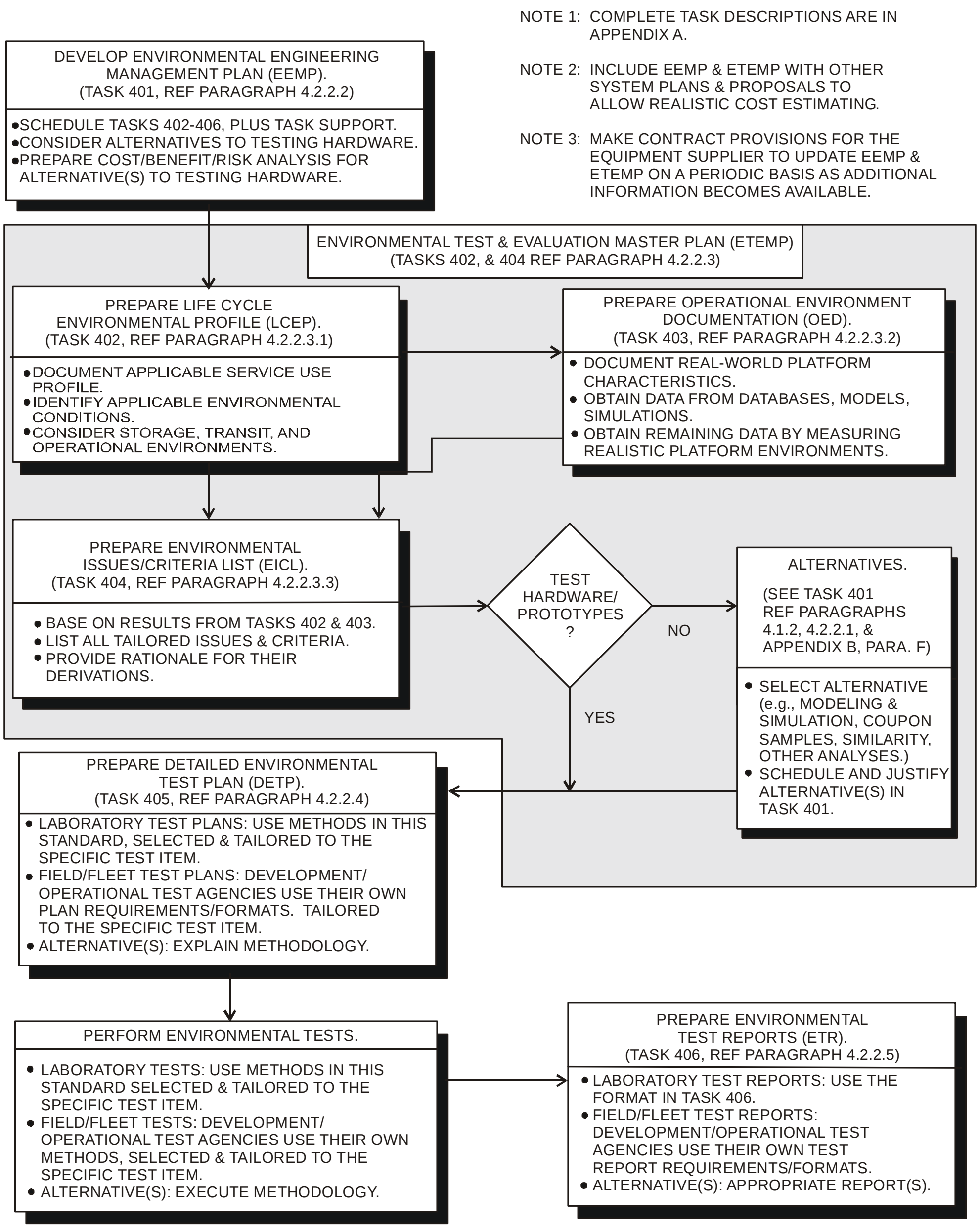

Figure 1-1. Environmental engineering program guide.

This document supports the functions of three different groups of personnel involved in the materiel acquisition process. Each of these groups is critical to the goal of successfully incorporating environmental considerations into materiel design, test, and evaluation. Although each group has different tasks to perform, none of these tasks can be isolated from the others in a successful acquisition program. As shown on Figure 1-2, this information is intended for the following:

a. Materiel acquisition program managers among whose responsibilities is ensuring materiel will function as required in intended operational environments. (See 4.1, below.)

b. Environmental engineering specialists (EES) who assist combat and materiel developers throughout the acquisition process to tailor their materiel designs and test designs to environmental stresses/constraints expected during the materiel's service life. (See 4.2, below.)

c. Design, test, and evaluation community analysts, engineers, and facility operators who meet user needs by focusing on tailored designs and tests. (See 4.3, below, and Part Two of this standard.)

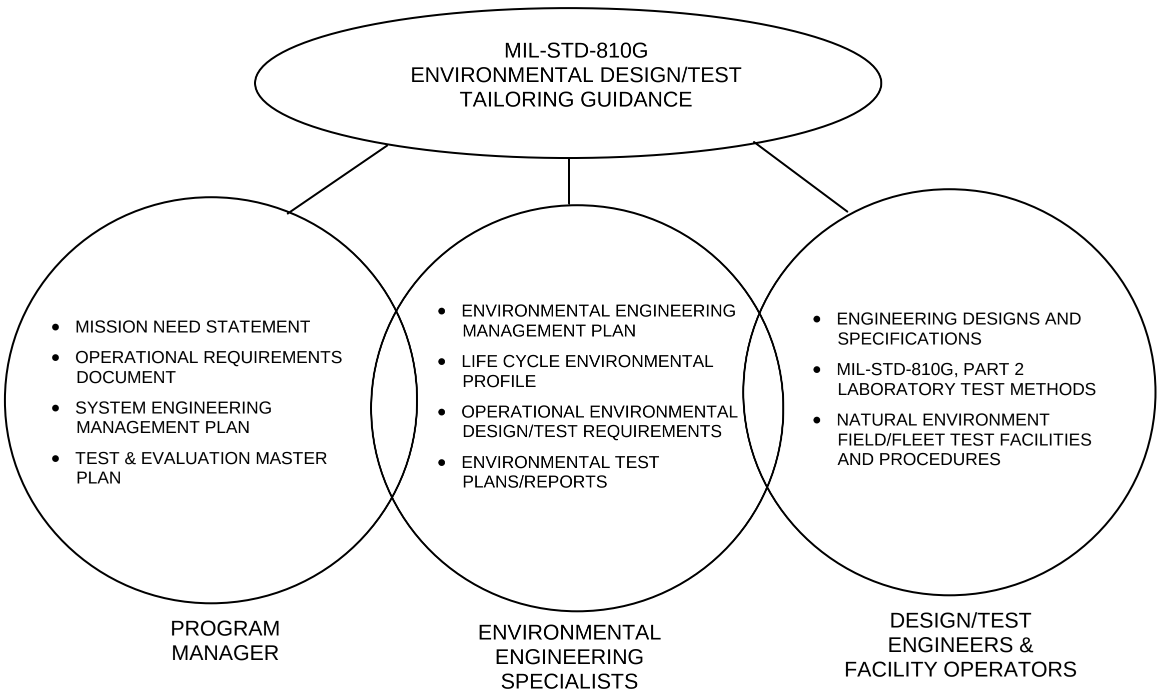

Figure 1-2. Roles of acquisition personnel in the environmental design/test tailoring process.

1.2 Application.

The tailoring process described in this standard (i.e., systematically considering detrimental effects that various environmental factors may have on a specific materiel system throughout its service life) applies throughout the materiel acquisition cycle to all materiel developed for military or commercial applications, including foreign and non-development item (NDI) procurements, procurements, or modifications of Allied systems or materiel, and cooperative development opportunities with one or more Allied nations to meet user and interoperability needs (DoDD 5000.1).

a. Part One lays out a disciplined, tailored approach for acquiring systems that will withstand the stresses of climatic, shock and vibration environments that they expect to see in their service lives. The basic process for acquiring materiel that satisfies users' needs from this environmental engineering viewpoint is depicted on Figure 1-1.

b. Part Two also is an integral part of the environmental tailoring process. It contains tailoring information, environmental stress data, and laboratory test methods. The environmental data contained in the methods may help, but should not be used exclusively to define environmental stresses that materiel will encounter throughout its service life. This will help engineers to tailor analyses and tests to specific materiel and its defined life cycle. It is not valid to call out all of the methods in this standard in