



BSI Standards Publication

Space systems — Methods to decide thermal vacuum test cycles of recurring production according to precipitation efficiency and reliability

National foreword

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**International
Standard**

ISO 9621

**Space systems — Methods to decide
thermal vacuum test cycles of
recurring production according
to precipitation efficiency and
reliability**

*Systèmes spatiaux — Méthodes pour déterminer les cycles
d'essais sous vide thermique de la production récurrente en
fonction de l'efficacité et de la fiabilité des précipitations*

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Foreword

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Introduction

The thermal vacuum test is one of the most important and expensive environment tests of space systems. The thermal vacuum test is required in general to demonstrate the ability of the test item to meet the design, function and performance requirements under the combination of vacuum conditions and temperature extremes experienced during spaceflight, and to screen out initial failure, known as infant mortality, such as workmanship error, integration error and latent material defect (ISO 15864). The number of thermal cycles, to be referred hence forth as simply cycles, is one of the test conditions in thermal vacuum test, is an essential parameter used to determine the screening effectiveness of initial failure. The number of cycles should be determined, generally based on technical aspects and with careful consideration of various factors such as test item complexity, heritage, and maturity of design and manufacturing, as well as reliability required of the test article. However as experienced in mass production industry, it is a natural expectation that as the design and manufacturing process of an item matures through continuous improvement of the manufacturing process, workmanship defects and initial failure will be reduced.

This document provides two technical methods specified to calculate the precipitation efficiency and reliability by the failure data to measure the quantity of screening effectiveness used to determine number of cycles of thermal vacuum test. These methods can be applied to reduce the number of cycles performed during a thermal vacuum test specified for recurring production of flight hardware, such as higher volume unit production runs and hardware produced for large constellation programs. This document supplements ISO 15864 used as either an option to reduce or a tailoring method to the baseline of thermal vacuum and thermal cycle acceptance tests specific for the recurring production hardware.

