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DEPARTMENT OF DEFENSE STANDARD PRACTICE

NUCLEAR COMPATIBILITY CERTIFICATION OF NUCLEAR WEAPON SYSTEMS, SUBSYSTEMS AND SUPPORT EQUIPMENT



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FOREWORD

1. This standard is approved for use by the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.
2. The purpose of this standard is to provide specific requirements for nuclear compatibility certification and information on the nuclear compatibility certification process.
3. This standard is structured and formatted to facilitate tailoring requirements to the specific system needs. Each system program office is encouraged to selectively apply and tailor these requirements during the acquisition process.
4. Comments, suggestions, or questions on this document should be addressed to the Defense Standardization Program Office (DSPO), 1551 Wyoming Blvd. SE Kirtland AFB, NM 87117-5624 or emailed to afnwc.dspo.workflow@us.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST online database at <https://assist.dla.mil>.

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1. SCOPE

1.1 General. This document outlines the specific tasks, analyses, and tests that are necessary to assure nuclear compatibility between nuclear mission stores and nuclear combat delivery weapon systems (excluding nuclear facilities). Specific requirements to ensure compatibility are under the purview of interface control documents and interface specifications and must take into consideration the Stockpile-to-Target Sequence. Nuclear weapon system compatibility certification authority is derived from Air Force Instruction (AFI) 63-125, Nuclear Certification Program.

a. The Air Force Nuclear Certification Process is described in detail in AFI 63-125. Major elements of nuclear certification are: design certification and operational certification. Components of design certification are: compatibility certification, nuclear safety design certification, safety rules development, and technical order certification. Although all components of design certification are closely related and arguably difficult to totally separate, this document will focus on nuclear compatibility certification. The Master Nuclear Certification List (MNCL) is the sole authority for determining equipment certification status and is managed by the AFNWC's certification management organization.

b. Nuclear Weapon System Compatibility is the capability of two or more nuclear weapon system components of equipment or materiel to exist or function in the same system or environment without mutual interference. Nuclear weapon system compatibility evaluations are a component of Operational Suitability as established in AFI 63-101/20-101. Release of the Nuclear Compatibility Certification Statement (NCCS) constitutes nuclear compatibility certification of the delivery system with the specific weapon indicated. Release of a Statement of Compatibility (SOC) letter by Sandia National Laboratory (SNL) documents the nuclear weapon system is compatible with a specific weapon. SNL will then publish an Aircraft Compatibility Control Drawing (ACCD) for nuclear gravity weapons and/or Compatibility Certification (CC) drawing for air launched missile warheads once compatibility certification activities have been completed.

c. Nuclear safety design certification requirements are closely related to compatibility requirements. They are described in detail in Air Force Manual (AFMAN) 91-118, Safety Design and Evaluation Criteria for Nuclear Weapon Systems, and AFMAN 91-119, Safety Design and Evaluation Criteria for Nuclear Weapon Systems Software, and are not repeated here. Once a Nuclear Safety Analysis Report (DI-NUOR-81405) is approved by the AFSEC, a nuclear safety design certification letter is issued at the completion of all safety design certification tasks. Where an NSAR is neither required nor appropriate, an Engineering Evaluation Report (DI-NUOR-81411) supports nuclear certification requirements.

d. Department of Defense Instruction (DoDI) 3150.09, Chemical, Biological, Radiological, and Nuclear (CBRN) Survivability Policy, 1.b, "Establishes policy, assigns responsibilities, and establishes procedures for the execution of the DoD CBRN Survivability Policy (including electromagnetic pulse (EMP))." AFI 10-2607, Air Force CBRN Survivability, 1.1.2, "The Lead Command/Sponsor must ensure nuclear systems, nuclear command and control (NC2) systems, and associated facilities and equipment are hardened against CBRN attacks and have a continuing nuclear hardness maintenance and hardness surveillance (HM/HS) program." Survivable nuclear weapons need survivable support equipment. To address the interrelation of survivability with

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safety and security, AFNWC established the Nuclear Technology Analysis (NTA) division, which provides scientific oversight of the RN part of the CBRN (Chemical, Biological, Radiological, Nuclear) survivability mission. NTA monitors development and modification of nuclear weapons, their components, or subassemblies for compliance with military characteristics and stockpile-to-target sequence survivability requirements.

e. Handbook MIL-HDBK-526 (formerly AFNWCH63-100) provides reference information for understanding the nuclear weapon compatibility certification process for USAF aircraft. This handbook references MIL-STD-1822 requirements and the aircraft compatibility certification portion of AFI 63-125.

1.2 Purpose. This military standard identifies the requirements that are necessary to assure compatibility between National Nuclear Security Administration (NNSA) developed nuclear weapons and DoD operational nuclear weapon delivery systems and support equipment. Requirements for evaluation and reporting for nuclear compatibility certification are also delineated.

1.3 Applicability. This document applies to Air Force nuclear weapon systems. Modified portions of nuclear weapon systems will also comply with this document. This document complements AFI 63-125.

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are referenced in sections 3, 4, or 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, Standards, and Handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE DIRECTIVE/INSTRUCTIONS

MIL-STD-962	Defense Standards Format and Content
MIL-STD-963	Data Item Descriptions (DIDs)
MIL-STD-1289	Airborne Stores, Ground Fit and Compatibility Requirements
MIL-STD-8591	Airborne Stores, Suspension Equipment and Aircraft-Store Interface (Carriage Phase)

(Copies of this document are available online at <http://www.dtic.mil/dtic/>)

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-E-7016	Electric Load and Power Source Capacity, Aircraft, Analysis of
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(Copies of this document are available online at <http://www.dtic.mil/dtic/>)

DEPARTMENT OF DEFENSE HANDBOOK

MIL-HDBK-526	Aircraft Nuclear Compatibility Certification Handbook
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(Copies of this document are available online at <http://www.dtic.mil/dtic/>)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent

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specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE DIRECTIVES/INSTRUCTIONS

DoDD 3150.09	Chemical, Biological, Radiological, and Nuclear (CBRN) Survivability Policy
DoDD 5000.01	The Defense Acquisition System

(Copies of these documents are available on line at <http://www.dtic.mil/whs/directives/>)

AIR FORCE INSTRUCTIONS/MANUALS

AFI 10-2607	Air Force Chemical, Biological, Radiological, and Nuclear (CBRN) Survivability
AFI 63-101/20-101	Integrated Life Cycle Management
AFI 63-125	Nuclear Certification Program
AFMAN 91-118	Safety Design and Evaluation Criteria for Nuclear Weapon Systems
AFMAN 91-119	Safety Design and Evaluation Criteria for Nuclear Weapon Systems Software

(Copies of these documents are available on line at <http://www.e-publishing.af.mil/>.)

AIRCRAFT MONITOR AND CONTROL (AMAC) PROJECT OFFICERS GROUP (POG) INTERFACE SPECIFICATIONS

SYS 1001	AMAC POG System 1 Basic Interface Specification
SYS 2001	AMAC POG System 2 Basic Interface Specification

(Copies of AMAC POG Basic Interface Specifications are available from the AFNWC/NTS, Kirtland AFB, NM 87117)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. DEFINITIONS AND ACRONYMS

3.1 Aircraft Monitor and Control (AMAC). Equipment installed in aircraft to permit nuclear weapon monitoring and control of all AMAC functions of nuclear weapons or nuclear weapon systems.

3.2 Aircraft Compatibility Control Drawing (ACCD). A controlled drawing prepared and maintained by SNL for the NNSA; SNL designs and integrates the nuclear gravity weapon's safety and security systems. The ACCD establishes the extent of compatibility and restrictions between a nuclear gravity weapon and an aircraft.

3.3 Basic Certification Requirements Plan (BCRP). The BCRP is a preparatory Certification Requirements Plan document containing nuclear certification tasks (including compatibility certification tasks) and schedules prepared by the AFNWC's certification management organization.

3.4 Certification Requirements Plan (CRP). A document (DI-NUOR-81409) containing nuclear compatibility certification tasks and schedules submitted by the Single Manager to the AFNWC's nuclear certification organization; also contains other certification tasks discussed in 1.1a.

3.5 Combat Delivery Vehicle. In the context of this document, a combat delivery vehicle is a human or automated airborne controlled vehicle, with its installed equipment and components, used to deliver a nuclear weapon(s) on a target.

3.6 Compatibility Certification (CC) Drawing. A controlled air launched missile drawing prepared and maintained by SNL for the NNSA; SNL designs and integrates the nuclear weapon's safety and security systems. The CC establishes the extent of compatibility and restrictions between a nuclear warhead and the air launched missile. (Note: There is no equivalent document for warheads on Intercontinental Ballistic Missiles (ICBMs). The documents that identify warheads with ground launched ICBMs are defined in the system's Military Characteristics, Major Assembly Release, Stockpile-To-Target Sequence, and Interface Control Documents.)

3.7 Data Item Description (DID). A DID is a standardization document that defines the data content, preparation instructions, format, and intended use of data required of a contractor.

3.8 Department of Energy (DOE). An agency of the U.S. government created in October 1977 responsible for: (1) long-range, high-risk research and development of energy technology; (2) power marketing at the federal level; (3) the promotion of energy conservation; (4) oversight of the nuclear weapons program; (5) regulatory programs; and (6) the collection and analysis of energy data.

3.9 Design Certification. Design certification occurs when each of the four design certification components is accomplished for the weapon system. Design Certification components are: (1) Compatibility Certification; (2) Nuclear Safety Certification; (3) Weapon System Safety Rules (WSSRs) approval; and (4) Technical Orders Certification.

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3.10 Download. The act of removing a mission store from the aircraft.

3.11 Electrical Interface Control Drawing (EICD). The EICD documents the physical, electrical power and logical signal circuits in the delivery system between the avionics components at the NNSA/AF interfaces. The EICD (DI-NUOR-81410) includes all types of electrical interfaces in the monitor and control circuits of the nuclear weapon(s) and nuclear weapon system, including man-machine, discrete lines and multiplex data buses.

3.12 Engineering Evaluation Report (EER). The EER (DI-NUOR-81411) supports nuclear certification recommendations where a Nuclear Safety Analysis Report (NSAR), is neither required nor appropriate. The analyses and tests which are conducted under this standard should be documented in an EER for the specific type of equipment being developed or modified.

3.13 Final Design Approval Report (FDAR). The FDAR is a document prepared by the AAC designer to demonstrate that the design of the AMAC system will meet the requirements of the nuclear weapon/nuclear weapon delivery vehicle interface specification. The FDAR (DI-NUOR-81408) is a part of the EICD and will contain a description of an aircraft's cockpit display, aircraft software logic, and the weapon release system.

3.14 Hardware. Hardware is a generic term dealing with physical items, as distinguished from their capability or function, such as equipment, assemblies, subassemblies, components, and parts. In data automation, hardware is the physical equipment or devices forming a computer and peripheral components.

3.15 ICBM Compatibility Certification. Compatibility Certification for ICBMs is similar to that for aircraft systems as it certifies the equipment item or weapon system meets mechanical and electrical compatibility requirements between the delivery vehicle and the nuclear warhead. ICBM Compatibility Certification is the responsibility of the ICBM NCM in coordination with Air Force Global Strike Command (AFGSC). Interface and coordination with DOE/NNSA is required to obtain the Major Assembly Release. Any special testing or analysis necessary to complete the compatibility certification will be identified in the Certification Requirements Plan.

3.16 Joint Test Assembly (JTA). A configuration developed by the DOE/NNSA for use in the joint flight test program. It includes or combines the Joint Test Subassembly and DOE war reserve nuclear weapon components to approximate the appearance and physical characteristics of the war reserve configuration without the capability to produce a nuclear yield. A Development JTA (DJTA) can also be used as part of the full weapon system drop test.

3.17 Lead Command. The Major Command (MAJCOM) that serves as an operators' interface with the Single Manager for a weapon system as defined by AFPD 10-9. This term is not to be confused with that MAJCOM designated by HQ USAF as Office of Primary Responsibility (OPR) for authoring a requirements document (i.e., that MAJCOM would be the Using Command). In most cases, however, the MAJCOM designated by HQ USAF to sponsor a requirement will become the "Lead Command" for a weapon system.

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3.18 Load. Load is attaching the mission store by its appropriate umbilical's, lanyards, and Suspension & Release Equipment (S&RE).

3.19 Major Assembly Release (MAR). The MAR is a statement prepared and signed by Sandia National Laboratory (SNL) and either Los Alamos National Laboratory (LANL) or Lawrence Livermore National Laboratory (LLNL) and approved and transmitted to DoD by DOE. It states that war reserve (WR) weapon material is satisfactory for release on a designated effective date to the DoD for specified uses that are possibly qualified by exceptions and limitations.

3.20 Master Nuclear Certification List (MNCL). A domain controlled web-site data base that identifies equipment (hardware and software) that is nuclear certified per AFI 63-125. The MNCL is the sole authority for determining equipment certification status and is managed by the AFNWC's certification management organization.

3.21 Mechanical Interface Control Drawing (MICD). The MICD (DI-NUOR-81407) defines the physical and mechanical interfaces between the aircraft and the nuclear weapon(s). The MICD includes dimensions, clearances, forces, installations, etc. associated with the weapon's suspension and release equipment (for aircraft, on the wing or in the weapons bay).

3.22 Military Characteristics (MCs). A Department of Defense document submitted to the National Nuclear Security Administration (NNSA) that specifies performance requirements and physical characteristics for a nuclear warhead, gravity bomb, or basic assembly to be compatible with a specific weapon system or systems.

3.23 National Nuclear Design Laboratories. The NNSA's nuclear security enterprise spans eight sites, including three national laboratories. NNSA's Sandia National Laboratories (SNL) are responsible for the development, testing, and production of specialized nonnuclear components and quality assurance and systems engineering for all of the United States' nuclear weapons. Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL) are the design laboratories responsible for the safety and reliability of the nuclear explosives package in nuclear weapons.

3.24 National Nuclear Security Administration (NNSA). The National Nuclear Security Administration is part of the United States Department of Energy. NNSA is the DOE agency responsible for improving national security through the military application of nuclear energy. The NNSA is also responsible for maintaining and improving the safety, reliability, and performance of the United States nuclear weapon stockpile, including the ability to design, produce, and test nuclear weapons, in order to meet national security requirements.

3.25 Non-combat Delivery Vehicle. A vehicle and its installed equipment used to move, load, or ship nuclear weapons.

3.26 Nuclear Certification. The Air Force Nuclear Certification Program, defined in AFI 63-125, ensures all procedures, software, personnel, equipment, facilities, and organizations are certified before conducting nuclear operations with nuclear weapons or nuclear weapon systems. Nuclear Certification occurs when a determination is made by the Air Force Nuclear Weapons

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Center's Commander that: (1) procedures, software, equipment, and facilities are sufficient to perform nuclear weapon functions (Design Certification); and (2) personnel and organizations are capable of performing assigned nuclear missions (Operational Certification).

3.27 Nuclear Certification Impact Statement (NCIS). The document, defined in DI-NUOR-81888, is issued by the Single Manager to initiate the nuclear certification process. This statement advises the Air Force Nuclear Weapons Center's Certification Manager and other certification process owners that a new weapon system or a change to an existing weapon system, equipment item, software, or procedure needs to be evaluated. The process owners determine if this change impacts nuclear certification of the system. If nuclear certification is required, the AFNWC's Certification Engineer releases a Basic Certification Requirements Plan.

3.28 Nuclear Compatibility Certification. Nuclear Compatibility Certification is the process of verifying that the equipment item or weapon system meets design and evaluation requirements for the electrical, mechanical, and aerodynamic interfaces between the delivery vehicle or equipment item and the nuclear weapon. Nuclear Compatibility Certification is a joint effort of DOE/NNSA and DoD to integrate a nuclear weapon into a weapon system.

3.29 Nuclear Compatibility Certification Statement (NCCS). A document issued by the Air Force Nuclear Weapons Center when all aspects of aircraft compatibility certification have been completed. The NCCS documents the nuclear weapon system configuration, carriage/delivery parameters, test information and references pertaining to compatibility of the delivery system with the nuclear weapon(s). Release of the NCCS constitutes nuclear compatibility certification of the delivery system with the specific weapon indicated.

3.30 Nuclear Safety Analysis Report (NSAR). A comprehensive assessment of the safety design features and operational procedures of a nuclear weapon component, assembly, or system. The aircraft NSAR (DI-NUOR-81405) is a primary source of input to the nuclear safety design certification process of weapon systems which ensures maximum safety consistent with operational requirements

3.31 Nuclear Safety Design Certification Letter. A letter issued by Air Force Safety Center (AFSEC) to notify the AFNWC's Certification Manager that all nuclear safety design certification actions have been completed.

3.32 Nuclear Weapon. A nuclear weapon is a mission store in which an explosion results from energy (equivalent to four (4) pounds or greater of TNT) being released by reactions involving atomic nuclei; reactions may be either by fission, fusion, or both.

3.33 Nuclear Weapon Release. Nuclear weapon release is: (1) the intentional separation of a free-fall store from its suspension equipment for purposes of employment of the store, or (2) separation of a missile from a carrier aircraft with the intended result being programmed flight to target. Release is a critical function.

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3.34 Nuclear Weapon System. A nuclear weapon system includes: (1) a nuclear weapon and a means for delivering it to the target, (2) associated support equipment, (3) facilities, (4) procedures, (5) personnel, and (6) any vehicles peculiar to the system used for weapon transport.

3.35 Nuclear Weapon System Definition Document (NWSDD). The NWSDD (DI-NUOR-81413) defines the nuclear configuration of the aircraft's avionics and nuclear weapon delivery systems, including test and support equipment. The NWSDD supports maintaining the Master Nuclear Certification List (MNCL).

3.36 Operational Certification. This occurs when the Lead Command/Using Command qualifies its personnel to perform the mission, certifies them in the Personnel Reliability Program (PRP), trains them in nuclear surety and assigns a Ready rating on an Initial Nuclear Surety Inspection (INSI) or a Satisfactory rating for a NSI. Notification of completion of all Operational Certification requirements identified in the Certification Requirements Plan is made to the AFNWC's Certification Management Organization by the MAJCOM via the Operational Certification Letter (or by signing the CRP when no operational certification impacts exist).

3.37 Project Officers Group (POG). A working-level body that coordinates activities associated with a particular nuclear weapon/nuclear weapon system. The POG provides a forum for the mutual development and transmission of information describing a new weapon/weapon system or sustainment of an existing weapon system. POG members include the AFNWC, DOE and the National Laboratories, NNSA, DTRA, Military Services, using commands and others as required. POG members have the authority to carry out assigned responsibilities of their parent organization and act as points of contact for their agencies in coordinating the development/sustainment of nuclear weapons/systems and in assuring compatibility of associated weapon interfaces.

3.38 Software. A set of computer programs, procedures, roles, data, and associated documentation (including firmware with programs and data) concerned with the operation of a digital processing system; for example, compilers, library routines, manuals, and software design/data flow diagrams.

3.39 Statement of Compatibility (SOC). An NNSA letter documenting the nuclear weapon system is compatible with a specific weapon.

3.40 Stockpile-to-Target Sequence (STS). A document that defines the logistical and employment concepts and related normal and abnormal environments, including vulnerability criteria, involved in the delivery of a nuclear weapon from the stockpile to the target. It may also define the logistical flow involved in moving nuclear weapons to and from the stockpile for quality assurance testing, modification and retrofit, and the recycling of limited-life components.

3.41 Support Equipment. Includes all equipment required to prepare, mate/de-mate, and transport the nuclear weapon to a delivery system. Support equipment includes tools; test equipment; automatic test equipment; organizational, field and depot support equipment; and computers with related software.

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3.42 Temperature Shock. Temperature shock is the temperature gradient specific to the combat delivery vehicle during its employment phase.

3.43 Unload. Unload is the removal of the nuclear mission store by safe removal of umbilical's, lanyards, and from the attaching suspension and release equipment.

3.44 User. The unit (squadron, wing, etc.) actually operating a system on a daily basis.

3.45 Using Command. The MAJCOM operating a system, subsystem or item of equipment. Generally applies to those operational commands or organizations designated by Headquarters, USAF, to conduct or participate in operations or operational testing (e.g., Air Combat Command (ACC), AFGSC, United States Air Force Europe (USAFE)).

3.46 Acronyms and abbreviations used in this standard.

ACC	Air Combat Command
ACCD	Aircraft Compatibility Control Drawing
AF	Air Force
AFGSC	Air Force Global Strike Command
AFI	Air Force Instruction
AFNWC	Air Force Nuclear Weapons Center
AFSEC	Air Force Safety Center
ALCM	Air Launched Cruise Missile
AMAC	Aircraft Monitor and Control
AMSC	Acquisition Management System Control (number)
ASSIST	Acquisition Streamlining and Standardization Information System
BCRP	Basic Certification Requirements Plan
CBRN	Chemical, Biological, Radiological, and Nuclear
CC	Compatibility Certification Drawing
CD	Command Disable
CONOPS	Concept of Operations
CRP	Certification Requirements Plan
DID	Data Item Description
DJTA	Development Joint Test Assembly

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DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DOE	Department of Energy
DOF	Degrees of Freedom
DTRA	Defense Threat Reduction Agency
EER	Engineering Evaluation Report
EICD	Electrical Interface Control Drawing
EM	Electromagnetic
EMP	Electromagnetic Pulse
FDAR	Final Design Approval Report
HQ	Headquarters
ICBM	Intercontinental Ballistic Missile
ICD	Interface Control Document
JTA	Joint Test Assembly
INSI	Initial Nuclear Surety Inspection
LANL	Los Alamos Nuclear Laboratory
LLNL	Lawrence Livermore National Laboratory
MAJCOM	Major Command
MAR	Major Assembly Release
MC	Military Characteristics
MICD	Mechanical Interface Control Drawing
MNCL	Master Nuclear Certification List
NCIS	Nuclear Certification Impact Statement
NCCS	Nuclear Compatibility Certification Statement
NCM	Nuclear Certification Manager
NEP	Nuclear Explosive Package
NNSA	National Nuclear Security Administration
NSAR	Nuclear Safety Analysis Report

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NWSDD	Nuclear Weapon System Definition Document
OPR	Office of Primary Responsibility
PDR	Preliminary Design Report
POG	Project Officers Group
POL	Petroleum, Oil, Lubrication
S&RE	Suspension & Release Equipment
SNL	Sandia National Laboratories
SOC	Statement of Compatibility
STS	Stockpile-to-Target Sequence
TO	Technical Order
USAF	United States Air Force
USAFE	United States Air Force Europe
VFA	Vibration Fly-Around
WR	War Reserve
WSSR	Weapon System Safety Rules

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4. GENERAL REQUIREMENTS

4.1 Nuclear weapon system compatibility certification.4.1.1 Compatibility certification activities.

- a. Nuclear weapon compatibility shall apply to a specific weapon system configuration.
- b. Shall apply only to a particular combat delivery platform: hardware configuration(s), software configuration(s), firmware configuration(s), mass property range(s), and nuclear load outs/applicable downloads
- c. Shall apply only to a particular nuclear mission store: hardware configuration(s), software configuration(s), firmware configuration(s), and mass property range(s).
- d. Shall apply only to particular support equipment and technical data: hardware configuration(s), software configuration(s), firmware configuration(s), and mass property range(s)
- e. Shall be valid across carriage envelope, employment envelope, jettison envelope, climatic conditions, and other constraints as required.
- f. The nuclear weapon shall be capable of performing its intended mission when loaded on the platform in accordance with Technical Orders using authorized support equipment. The platform shall be capable of monitoring and controlling the nuclear mission store as defined in applicable Specifications, Air Force Manuals, Air Force Instructions, and Platform Store Interface Control Documents as defined in the Certification Requirements Plan.

4.1.2 Loading Phase.

- a. The Loading phase starts when the nuclear mission store is transported to the combat delivery platform and is attached to the combat delivery platform. Attachment includes connecting any umbilical cables or lanyards as necessary as well as setting and pinning the suspension and release equipment as required.
- b. The technical data for loading the nuclear store shall be: unambiguous, accurate, and sufficient to load the nuclear mission store(s) on the combat delivery platform.
- c. The support equipment necessary to load the nuclear mission store onto the appropriate combat delivery platform store station shall be certified to perform that function.
- d. The nuclear mission store shall be capable of being loaded onto the combat delivery platform with sufficient clearances for maintainers to perform any required actions.
- e. The nuclear mission store shall fit on to the combat delivery platform carriage S&RE with clearances in accordance with paragraph 4.3 (excluding paragraph 4.3.3.2.1 Navy requirements) and paragraph 4.4 of MIL-STD-1289.

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f. Sufficient clearance shall be provided to allow loading at maximum combat delivery platform gross takeoff weight with tires flat and struts fully compressed.

g. There shall be sufficient clearances to allow maintainers to access, connect and actuate all necessary controls, umbilical's, adjust bomb rack settings, insert or remove pins, or any other ground operations necessary to load the nuclear mission store(s) and prepare it for carriage, jettison, employment and unloading.

h. The Nuclear mission store shall be capable of operating in the presence and exposure to aircraft POL, maintenance fluids, firefighting chemicals, surface preservatives, chemical warfare agents, and chemical agent decontaminants during various operations and maintenance scenarios.

4.1.3 Carriage Phase.

a. Carriage phase starts when the nuclear mission store is successfully loaded to the combat delivery platform carriage S&RE and ends with downloading or release of the nuclear mission store.

b. The nuclear mission store shall maintain clearances per paragraph 4.3 of MIL-STD-1289.

c. The nuclear mission store shall meet Sway Bracing requirements per paragraph 5.8.4.1 of MIL-STD-8591.

d. The S&RE sway braces shall contact the nuclear mission store on the sway brace areas as annotated per paragraph 4.3.2 of MIL-STD-1289.

e. The nuclear mission store shall have sufficient strength to withstand before, during, and after g loading experienced during the carriage phase on the combat delivery vehicle.

f. The nuclear mission store shall have sufficient strength to withstand an impulse load before, during, and after release or jettison from the combat delivery vehicle.

g. The nuclear mission store shall be capable of operating in the various environments as defined in the Stockpile-To-Target Sequence.

h. The nuclear mission store shall operate in the presence and exposure to ozone as experienced during the carriage phase on the combat delivery vehicle.

i. The nuclear mission store shall operate in the presence and exposure to solar radiation as experienced during the carriage phase on the combat delivery vehicle.

j. The nuclear mission store shall operate in the presence of and attack by fungus and mold as experienced during the carriage phase on the combat delivery vehicle.

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k. The nuclear mission store shall operate in a fuel-air explosive atmosphere without causing ignition.

l. The nuclear mission store shall operate in the presence of and after acceleration as experienced during the carriage phase on the combat delivery vehicle.

m. The nuclear mission store shall operate in the presence of and after vibration as experienced during the carriage phase on the combat delivery vehicle.

n. The nuclear mission store shall operate in the presence of and the acoustic environment as experienced during the carriage phase on the combat delivery vehicle.

o. The nuclear mission store shall operate in the presence of and the mechanical shock as experienced during the carriage phase on the combat delivery vehicle.

4.1.4 Communication requirement. The platform and store shall communicate in accordance with the Platform Store Interface Control Document (PSICD) and appropriate annexes and appendices. The PSICD implements the relevant requirements from the AMAC POG Interface Specifications (i.e. System 2).

4.1.5 Power Requirement. The platform shall provide power and discrete signals in accordance with the PSICD and appropriate annexes and appendices. The PSICD implements the relevant requirements from the AMAC POG Interface Specifications (i.e. System 2).

4.1.6 Jettison from the combat delivery vehicle. The nuclear mission store shall be capable of being jettisoned from the combat delivery vehicle during the carriage phase.

4.1.7 Employment from combat delivery vehicle.

a. The nuclear mission store shall be capable of being employed from the combat delivery vehicle.

b. The nuclear mission store shall move away from the aircraft while maintaining the 10 degree fall lines in all of the three dimensional x,y,z directions.

c. The combat delivery vehicle shall accurately monitor the presence of the nuclear mission store(s).

4.1.8 Nuclear Survivability. Nuclear survivability requirements are included in the STS for nuclear weapons and shall be analyzed in accordance with the aircraft's operational processes and procedures to verify that nuclear effects environments are below the weapon's STS limits. Aircraft with established nuclear weapon capability may have new equipment added that is used in conjunction with a nuclear mission. New equipment shall be assessed to assure that it meets or exceeds survivability levels. Associated DIDs are DI-NUOR-80156, 80926, 80927, 80928, and 80929.

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4.1.9 Unloading Phase.

- a. The unloading phase starts when the loading support equipment is transported to the side of the combat delivery platform and the nuclear mission store is detached from combat delivery platform. This includes the setting and pinning, if necessary, the S&RE and the detachment of any umbilical cables, lanyards as necessary.
- b. The technical data for unloading the nuclear mission store shall be: unambiguous, accurate, and sufficient to unload the nuclear mission store(s) off of the combat delivery vehicle.
- c. The support equipment necessary to unload the nuclear mission store off the combat delivery vehicle shall be qualified at the necessary levels in order to perform that function.
- d. The platform shall be capable of having the nuclear mission store unloaded with sufficient clearances for maintainers on any particular carriage position(s) as annotated by the platform specification.
- e. The platform support equipment used to transport the nuclear mission store shall have clearances in accordance with 4.3.1 of MIL-STD-1289.
- f. The platform shall be designed to allow the unloading of the nuclear mission store(s) at maximum aircraft gross take-off weight with tires flat and landing gear struts fully compressed.

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5. DETAILED REQUIREMENTS

5.1 Aircraft Compatibility Verification Activities. The following verification activities are required to be performed to achieve nuclear certification on an aircraft platform. The requirements for each activity shall be defined in the Basic and/or Certification Requirements Plan (BCRP/CRP).

5.1.1 Six (6) Degrees of Freedom (6 DOF) system analysis. The 6 DOF model/analysis shall be performed to allow potential critical operations to be identified and aid in the development of follow-on wind tunnel and separation testing.

5.1.2 Wind Tunnel Tests. Wind tunnel tests shall be performed to obtain store loads data and separation data prior to conducting flight tests.

5.1.3 Lug and sway brace loads analysis. Lug and sway brace loads analysis shall be performed to determine the mechanical loads imposed on weapon lugs and on the weapon case where the lugs attach and where the bomb rack sway braces make contact during loading and carriage per the requirements of paragraphs 4.1.2 and 4.1.3 respectively.

5.1.4 Static Ejection Tests. Static Ejection Tests shall be performed to measure the magnitude of shock spectra that will be imposed on weapon components during ejection. Static ejection tests are used to determine the bomb pitch and ejection velocity that will occur during weapon release.

5.1.5 Electromagnetic (EM) test and analysis. EM environments at weapon carriage points shall be determined to verify that they are below the STS limits.

5.1.6 Mechanical Fit Tests. Mechanical fit tests shall be performed to verify the information given in the Mechanical Interface Control Drawings.

5.1.7 Vibration Fly-Around (VFA) tests and analysis. VFA tests and analyses shall be conducted to determine the vibration and thermal environment imposed on components inside the bombs when carried on the aircraft. The vibration spectra obtained from this flight testing must be lower than the spectra for which the weapon components were originally tested and qualified in order for the aircraft to be judged as compatible with a particular bomb.

5.1.8 Non-combat delivery vehicle test and analysis. Non-Combat vehicles shall be tested to verify that the vehicle does not allow environmental inputs to be imposed on components inside the bombs when carried on the vehicle.

5.1.9 Weapon separation tests and analysis. Weapon separation tests and analysis shall be performed to assure the safe release of weapons from the platform throughout the release envelope to verify that the store is released from the aircraft with the proper aerodynamic parameters. This includes testing System 2 umbilical's to evaluate satisfactory timing of the aircraft and weapon messages and signals.

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5.1.10 Mechanical Interface Control Drawing (MICD). A MICD, per the requirements of DI-NUOR-81407, shall provide the detail of the physical configuration of an aircraft loaded with nuclear weapons.

5.1.11 Preliminary Design Report (PDR). Required to define the design concept to the extent that the components, as well as the operational capability of the AMAC system, are clearly understood. A PDR, per the requirements of DI-NUOR-81408, shall be prepared and presented by the AMAC designer to SNL and AFNWC at a time sufficiently in advance of final design submittal as to allow for design changes. The PDR supports a preliminary AMAC test. Any changes occurring after PDR approval must be concurred by all concerned prior to inclusion in the Final Design Approval Report (FDAR).

5.1.12 Final Design Approval Report (FDAR). Required to document the production AMAC design and ensures the AMAC system meets the requirements as defined in System 1 and or 2 AMAC specifications. The FDAR (DI-NUOR-81408) shall be prepared and presented by the AMAC designer to SNL and AFNWC and is part of the Electrical Interface Control Drawing (EICD). The FDAR may be submitted separately from the EICD.

5.1.13 Electrical Interface Control Drawing (EICD). An EICD, per the requirements of DI-NUOR-81410, shall provide the detail of the entire AMAC system and associated electrical systems.

5.1.14 Preliminary weapon/aircraft electrical interface tests. Preliminary AMAC tests are conducted as early as possible when developing a new weapon delivery system or performing a major upgrade. These tests verify that the design at a given point in time will lead to the system meeting nuclear compatibility certification requirements. The PDR is required prior to conducting the first preliminary test.

5.1.15 Final weapon/aircraft interface and AMAC electrical tests. Final AMAC electrical interface tests on five aircraft shall be required to ascertain compliance of the aircraft AMAC system with the required AMAC specification and Platform Store Interface Control Document. The tests establish that the aircraft is indeed electrically compatible with the required set of nuclear weapons in both ground and flight tests. The MICD, EICD, FDAR, and Technical Order documents are required prior to conducting the final aircraft tests for compatibility certification.

5.1.16 Full Weapon System Drop Test. A Full Weapon System Drop Test shall be required using a Joint Test Assembly (JTA), or Development JTA (DJTA) test asset, to exercise the entire weapon system from beginning to end. Operational aircraft, maintenance crews, weapon loading crews, flight crews, and Technical Orders are required to conduct this test. This is the last test conducted to evaluate the entire system to achieve nuclear certification.

5.1.17 Establish Resident Compatibility Technical Basis. Aircraft platform program offices shall ensure Sandia National Laboratories is able to obtain and store data in DOE facilities from tests associated with compatibility certification activities in order to form the technical basis necessary to issue decisions and advice.

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6. NOTES

6.1 Intended use. This document is intended for use in the procurement or modification of Air Force nuclear weapon systems, subsystems and support equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this standard.

6.3 Associated Data Item Descriptions (DIDs). This standard has been assigned an Acquisition Management Systems Control (ASMC) number authorizing it as the source document for the following DIDs. When it is necessary to obtain the data, the applicable DIDs must be listed on the Contract Data Requirements List (DD Form 1423).

DID Number	DID Title
DI-NUOR-80156	Nuclear Survivability Program Plan
DI-NUOR-80926	Nuclear Survivability Assurance Plan
DI-NUOR-80927	Nuclear Survivability Design Parameters Report
DI-NUOR-80928	Nuclear Survivability Test Plan
DI-NUOR-80929	Nuclear Survivability Test Report
DI-NUOR-81405	Aircraft Nuclear Safety Analysis Report (NSAR)
DI-NUOR-81407	Aircraft Mechanical Interface Control Drawing (MICD)
DI-NUOR-81408	Aircraft Monitor and Control (AMAC) Preliminary Design Report (PDR) and Final Design Approval Report (FDAR)
DI-NUOR-81409	Certification Requirements Plan (CRP)
DI-NUOR-81410	Aircraft Electrical Interface Control Drawing (EICD)
DI-NUOR-81411	Engineering Evaluation Report (EER)
DI-NUOR-81413	Aircraft Nuclear Weapon System Definition Document (NWSDD)
DI-NUOR-81888	

The above DIDs were current as of the date of this standard. The ASSIST database should be researched at <https://assist.dla.mil/quicksearch/> to ensure only current and approved DIDs are cited on the DD Form 1423.

6.4 Subject term (key word) listing.

- Ground Launched Missile systems

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- Support Equipment
- Missile systems
- Safety

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of changes.

CONCLUDING MATERIAL

Custodians:

Air Force - 27

Preparing Activity:

Air Force - 27
(Project 11GP-2016-002)

Review Activities:

Air Force - 11

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>