



**NAVAL
ORDNANCE
SAFETY &
SECURITY
ACTIVITY**

Navy Energetic Qualification and Final Type Qualification Procedures.

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NAVAL SEA SYSTEMS COMMAND
Ordnance Safety & Security Activity

DEFINITIONS

BEFEFITS of QUALIFICATION

1. Qualification improves the availability of products with required characteristics (quality, reliability, performance, safety)
2. Qualification shortens the procurement process by completing evaluations and tests prior to award of contract (or introduction of materials into the fleet)
3. Qualification can reduce cost by eliminating repetitive surveillance tasks

EXPLOSIVE QUALIFICATION POLICY

- NAVSEA is assigned Navy-wide responsibility for explosive materials, energetic materials, and Insensitive Munitions (OPNAVINST 8010.13C)
- Only Qualified explosives shall be used in munition development or product improvement programs.
- Only Final Type Qualified explosives shall be used in munitions and explosive devices intended for operational or training use.
- No approval will be granted for Qualification or Final Type Qualification without full disclosure of the composition including ingredients and percentages plus tolerances and particle sizes if applicable.

EXPLOSIVE QUALIFICATION POLICY - exceptions

- Explosives that are not qualified are only allowed at Navy R&D and pilot plant facilities for research purposes. Testing aboard Navy vehicles is specifically prohibited.
- Use of unqualified explosives in existing non-developmental items may be allowed only after written requests submitted to NOSSA N85 (documenting the need for use and the special precautions that will be taken to offset the risk of use) are reviewed and justified.

QUALIFICATION REQUIREMENTS

- Sufficient supporting data to show explosive safety and suitability
- Requirements include:
 - Mandatory Test Data
 - Justification Statement
 - Technical Report
 - Material Specification
 - Safety Data Sheet
 - Technical Recommendation
 - Preliminary Environmental Analysis
 - Hazard Classification (Substance)
 - Producibility Statement

MANDATORY QUALIFICATION TESTS

Tests	Primary	Booster	Main Charge	Solid Propellant	Pyrotechnic
Impact Sensitivity	X	X	X	X	X
Friction Sensitivity	X	X	X	X	X
Electrostatic Sensitivity	X	X	X	X	X
Vacuum Stability	X	X	X	X	X
Ignition Temperature	X	X	X	X	X
Self-Heating		X	X	X	
Thermal Stability		X	X	X	X
Small Scale Burn		X	X	X	X
Shock Sensitivity		X	X	X	
Cap		X	X	X	
Detonation Velocity		X	X	X ^{1/}	
Critical Diameter		X	X	X ^{1/}	
Mechanical Properties		X ^{2/}	X ^{2/}	X	
Stabilizer or Anti-Oxidant Level		X	X	X	
Growth		X ^{3/}	X ^{3/}		
Exudation		X ^{4/}	X ^{4/}	X ^{4/}	
Burn Rate				X	
Toxicity	X	X	X	X	X
Compatibility	X	X	X	X	X

NOTES:

- ^{1/} Required if the propellant is detonable.
- ^{2/} Required for Plastic Bonded Explosive (PBX)-type explosives.
- ^{3/} Required for melt-cast explosives.
- ^{4/} Required for melt-cast explosives and explosives containing energetic binders or plasticizers.

MANDATORY QUALIFICATION TESTS

<u>Tests</u>	<u>Primary</u>	<u>Booster</u>	<u>Main Charge</u>	<u>Solid Propellant</u>	<u>Pyrotechnic</u>
Impact Sensitivity	X	X	X	X	X
Friction Sensitivity	X	X	X	X	X
Electrostatic Sensitivity	X	X	X	X	X
Vacuum Stability	X	X	X	X	X
Ignition Temperature	X	X	X	X	X
Self-Heating		X	X	X	
Thermal Stability		X	X	X	X
Small Scale Burn		X	X	X	X
Shock Sensitivity		X	X	X	
Cap		X	X	X	
Detonation Velocity		X	X	X 1/	
Critical Diameter		X	X	X 1/	
Mechanical Properties		X 2/	X 2/	X	
Stabilizer or Anti-Oxidant Level		X	X	X	
Growth		X 3/	X 3/		
Exudation		X 4/	X 4/	X 4/	
Burn Rate				X	
Toxicity	X	X	X	X	X
Compatibility	X	X	X	X	X

AGING PROTOCOLS for QUAL

Explosive Type	Booster / Main Charge / Solid Propellant		Primary	Pyro
	Compositions NOT Containing Nitrate Esters or Other Energetic Binders or Plasticizers	Compositions Containing Nitrate Esters or Other Energetic Binders or Plasticizers		
Aging Conditions ^{1/} _	60 °C for 8 months 70 °C for 6 months	50 °C for 12 months 60 °C for 8 months	70 °C for 12 months	70 °C for 12 months
Impact Sensitivity	60 °C at 1, 2, 4, 6, & 8 months 70 °C at 1, 2, 4, & 6 months	50 °C at 1, 3, 6, 9, & 12 months 60 °C at 1, 2, 4, 6, & 8 months	at 6 & 12 months	at 6 & 12 months
Friction Sensitivity	60 °C at 1, 2, 4, 6, & 8 months 70 °C at 1, 2, 4, & 6 months	50 °C at 1, 3, 6, 9, & 12 months 60 °C at 1, 2, 4, 6, & 8 months	at 6 & 12 months	at 6 & 12 months
Ignition Temperature	60 °C at 1, 2, 4, 6, & 8 months 70 °C at 1, 2, 4, & 6 months	50 °C at 1, 3, 6, 9, & 12 months 60 °C at 1, 2, 4, 6, & 8 months	at 6 & 12 months	at 6 & 12 months
Shock Sensitivity ^{2/} _	60 °C at 8 months 70 °C at 6 months	50 °C at 12 months 60 °C at 8 months		
Mechanical Properties ^{3/} _	60 °C at 1, 2, 4, 6, & 8 months 70 °C at 1, 2, 4, & 6 months	50 °C at 1, 3, 6, 9, & 12 months 60 °C at 1, 2, 4, 6, & 8 months		
Stabilizer or Anti- Oxidant Level ^{4/} _	60 °C at 1, 2, 4, 6, & 8 months 70 °C at 1, 2, 4, & 6 months	50 °C at 1, 3, 6, 9, & 12 months 60 °C at 1, 2, 4, 6, & 8 months		
Growth or Exudation		50 °C at 12 months 60 °C at 8 months		
Burn Rate ^{5/} _	60 °C at 8 months 70 °C at 6 months	50 °C at 12 months 60 °C at 8 months		
Cube Cracking ^{6/}		60 °C at 1 month		
Hot Wire Initiability			at 6 & 12 months	

POLICY

- Explosives that are not qualified are only allowed at Navy R&D and pilot plant facilities for research purposes. Testing aboard Navy vehicles is specifically prohibited.
- Final (Type) Qualification must be performed in the same configuration as will be used in the intended role
- Use of unqualified explosives in existing non-developmental items may be allowed only after written requests submitted to NOSSA N85, documenting the need for use and the special precautions that will be taken to offset the risk of use, are reviewed and justified.

FINAL (TYPE)

QUALIFICATION REQUIREMENTS

- Sufficient supporting data to show explosive safety and suitability
- Requirements include:
 - Mandatory Test Data (based on the type of explosive material)
 - Data formatted IAW template or format provided in NAVSEAINST 8020.5D
 - Compliance Statement
 - Supporting documentation (specifications, STANAG, etc.)
 - Approved and finalized Navy Munitions Document
 - Statements on processing and safe handling characteristics (SDS)
 - Final draft of a comprehensive technical report
 - Recommendation for FTQ signed by an authorized representative

MANDATORY FINAL (TYPE) QUALIFICATION TESTS

Tests	Primary	Booster	MC	Prop	Pyro
Temp/Humid	X	X	X	X	X
Vibration	X	X	X	X	X
40-Foot Drop	X	X	X	X	X
5-Foot Drop	X	-	-	-	-
Fast Cook-Off	X	X	X	X	X
Slow Cook-Off	X	X	X	X	X
Bullet Impact	X	X	X	X	X
Fragment Impact	X	X	X	X	X
Sympathetic Detonation	X	X	X	X	X
Shaped Charge Jet	X	X	X	X	X
Jolt	X	X	-	-	X
Jumble	X	X	-	-	X
Compatibility	X	X	X	X	X
Temp/Humid Aging	-	X	X	X	-