Reference Number: **SMS-3517-L1A, Rev 0** **Date:** **November 7, 2014**

Owen Oil Tools LP
12001 County Road 1000
Godley, Texas 76044

Attention: Ben Potter

Subject: **Shipping Classification Recommendation for the OOT-APRV-064 Clip-Type Electric Detonator Family**

Reference: (1) "Test and Examination Report for UN Series 4 and 6 Testing on the OOT-APRV-064 Clip-Type Electric Detonator Family", SMS-3313-R1, Rev 0, Safety Management Services, Inc., December 11, 2013.

Dear Mr. Potter:

A request was made by Owen Oil Tools LP to provide a recommendation for classification of OOT-APRV-064 Clip-Type Electric Detonator Family via analogy. SMS performed previous testing on OOT-APRV-064 Clip-Type Electric Detonator Family and issued a classification recommendation (Reference 1). A new composition, that includes $BKNO_3$ as a substitute for black powder, has been added to the OOT-APRV-064 Clip-Type Electric Detonator Family which requires a new classification recommendation. Based on previous testing results of OOT G-21B (P/N DET-3050-321) as detailed in the test and examination report SMS-3313-R1, Rev 0 (Reference 1) and the test results found in the supporting data section of this recommendation, SMS makes the following recommendation in accordance with 49 CFR § 172.101 and 49 CFR § 173.56 - § 173.58.

Product Names/Description:
OOT-APRV-064 Clip-Type Electric Detonator Family with a body or housing of phenolic resin or polymer material containing not more than 0.75 ±0.05 grams of black powder or $BKNO_3$, lead azide, and RDX as depicted in drawing OOT-APRV-064 Rev 02

Recommended Product Shipping Description:
UN0456, Detonators, electric, 1.4S, Packing Group II

This recommendation IS packaging specific based on the results of the UN Series 6 tests.

- Packaging per 49 CFR § 173.62(c), Table of Packing Methods, Packing Instruction 131 using one of the following packing instructions:

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Packing Instruction 1

Inner:	Boxes, chipboard, each containing one (1) detonator prewrapped in a plastic bag
Intermediate:	Dividers within the outer packaging, corrugated fiberboard, three or more layers, separating inner packagings from each other and to fill void spaces
Outer:	Box, fiberboard (4G) containing up to ten inner packagings

Packing Instruction 2

Inner:	Packing Instruction 1 outer packaging
Intermediate:	Not necessary
Outer:	Box, fiberboard (4G) containing up to five inner packagings

- Marking per 49 CFR Part 172 Subpart D (§ 172.300 - § 172.338), including § 172.320.
- Labeling per 49 CFR Part 172 Subpart E (§ 172.400 - § 172.450), including § 172.411.

To complete the approval process for this material and location:
Provide a cover letter requesting classification in accordance with 49 CFR § 107.705.

Submit this recommendation letter and the enclosed report with attachments together with all pertinent drawings and chemical composition data using the PHMSA *On-Line Special Permit & Approval Application Process* located at:

https://hazmatonline.phmsa.dot.gov/Online%20Approvals/pages/welcome.aspx

Or submit in hard copy to:

Associate Administrator for Hazardous Materials Safety
PHMSA
U.S. DOT
Attention: PHH-32
1200 New Jersey Avenue
SE East Building, 2nd Floor
Washington, DC 20590

Important: An approval must be received from the Department of Transportation before any explosive may be offered for shipment.

I hereby certify that this classification recommendation report, and all evaluation, examination, and testing carried out by Safety Management Services in preparation of this report are in full compliance with the applicable requirements of the HMR and Approval CA1999080005 (First Revision). If you have any questions concerning this recommendation or require further assistance, please call SMS at 801-567-0456 or fax SMS at 801-567-0457.

Thank you,

Troy A. Gardner, PE, CSP
Testing & Classifications Manager
Safety Management Services, Inc.

Kirt N. Sasser, PE
Director of Engineering & Testing
Safety Management Services, Inc.

SMS REVIEW, SUPPORTING DATA

Analogy Support Data:

The OOT-APRV-064 Clip-Type Electric Detonator Family is manufactured by Owen Oil Tools at its Godley, Texas facility. For this family of detonators, SMS previously tested OOT G-21B detonator (P/N DET-3050-321), which represented the maximum load authorized for the detonator family. Testing was performed in accordance with "Recommendations on the Transport of Dangerous Goods, Model Regulations," Volume I, Seventeenth Revised Edition, ST/SG/AC.10/Rev.17 (Vol. I), 2011. Since testing, the OOT-APRV-064 Clip-Type Electric Detonator Family has been updated to include a detonator that utilizes $BKNO_3$ as a substitute for black powder in the explosive composition. The design, dimensions, powder quantities, and packaging designs have remained the same. Previously, the article passed all test criteria to be recommended for Division 1.4, compatibility group S. As such, SMS is using the previous test data to provide a recommendation via analogy for the article described herein. The following report details the testing and analysis performed in support of an updated shipping division classification recommendation to include the new explosive composition.

OOT-APRV-064 Clip-Type Electric Detonator Family

Detonators in the OOT-APRV-064 Clip-Type Electric Detonator Family are designed to be loaded into oil & gas well downhole tools such as perforating guns. The tool into which the detonator is loaded provides a barrier between fluids present in the well and detonator (hence the designation "non-exposed"), thereby ensuring that the detonator remains dry and useable. Each electric detonator may contain one or more of the following non-explosive components:

a. Body or housing – The body or housing is a tube or block of phenolic resin or polymer material. The body houses the explosive and other components of the detonator and provides protection from outside initiation stimuli.
b. Electrical leads – Utilized to provide a means of introducing electrical energy to the detonator to cause it to initiate. In most instances, electrical leads are in the form of lead wires of varying lengths and gauges. In all instances, when the detonator is in its shipping container, the electrical leads are shunted to prevent flow of electrical energy into the detonator and accidental detonation thereof.
c. Electrical initiators – Devices used to apply the electrical energy to the electrically sensitive charges within the detonator. Proper application of this electrical energy through the electrical leads and into the electrical initiators will cause the detonator to detonate. Currently, the detonator utilizes resistors for this purpose; however, other means (for example, bridgewires, semiconductor bridges, etc.) may also be used in the future.
d. Clip – A device made of steel, aluminum, brass, copper, other metal, phenolic resin, or other material that is attached to the detonator body or housing to provide a means of connecting the detonator to the detonating cord. Clip design and placement may vary.

Photo 1: P/N DET-3050-321 Test Sample

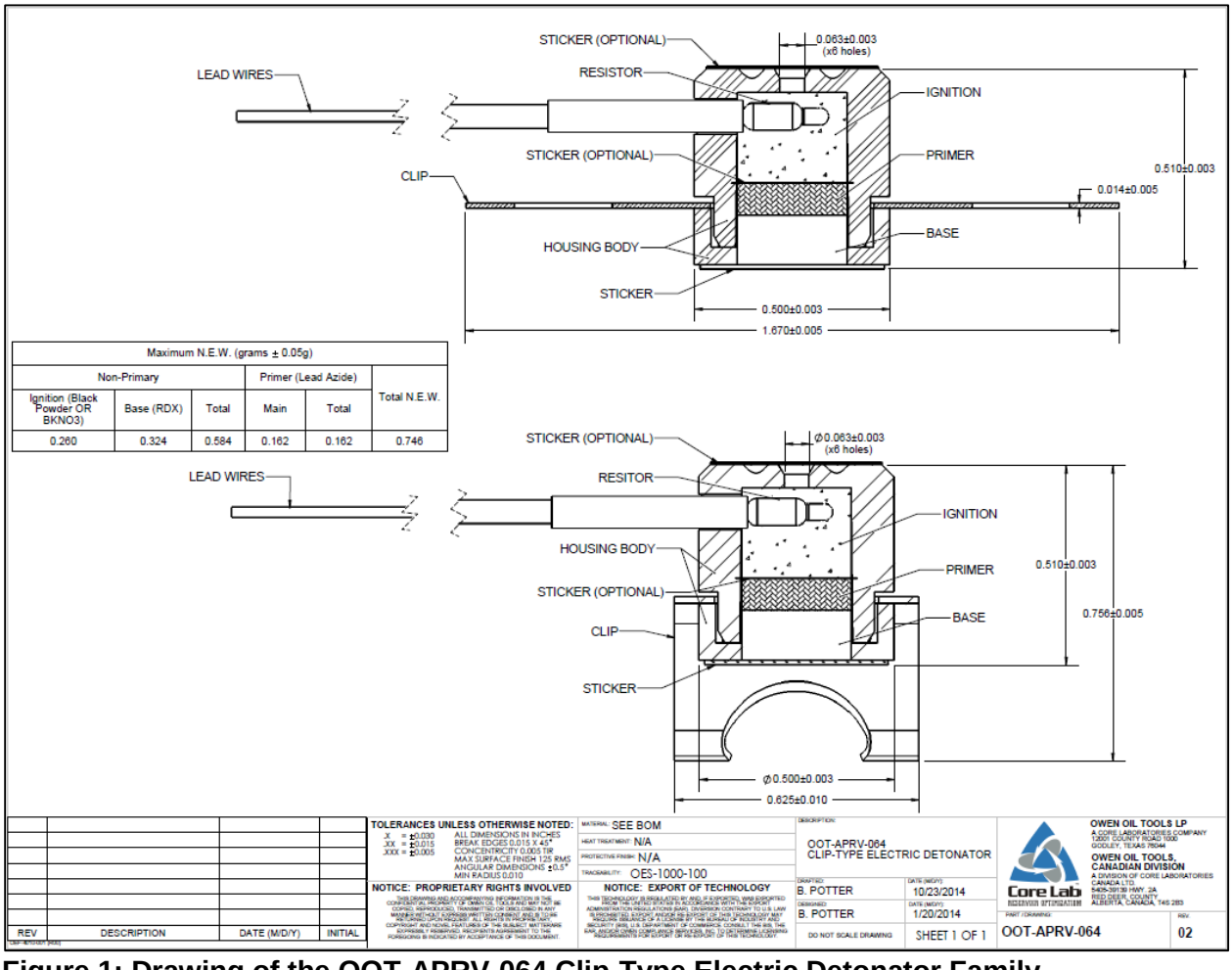

Figure 1: Drawing of the OOT-APRV-064 Clip-Type Electric Detonator Family

Each detonator in the OOT-APRV-064 Clip-Type Electric Detonator Family has a net explosive weight (N.E.W.) of up to 750 mg as outlined in Table 1.

Table 1: Composition of the O-321 Detonator (P/N DET-3050-321)

Maximum Dimensions L x W x H (in)	Maximum Net Explosive Weight (grams ± 0.05 g)			
	Ignition	Primer	Base	Total N.E.W.
	Black Powder or $BKNO_3$	Lead azide	RDX	
1.63 x 0.76 x 0.797	0.26	0.16	0.33	0.75

Previously tested

The O-321 detonator (P/N DET-3050-321) was used as the representative detonator for the classification by analogy. The O-321 detonator (P/N DET-3050-321) contains 0.26 grams of $BKNO_3$, 0.16 grams of lead azide, and 0.33 grams of RDX (0.75 grams total N.E.W.).

The detonator is functioned by application of an external electrical charge through the electrical leads. The P/N DET-3050-321 detonator is resistorized and meets the following minimal electrical requirements:

- Resistance: ≥ 51 Ω
- No-fire current: ≤ 0.2 amps
- All-fire current: ≥ 0.8 amps
- Static Resistivity 25,000V discharged from 500 picofarad capacitor through 500 Ohm resistor

The O-321 detonator is essentially identical to the articles previously tested with respect to the explosive loads and configurations, except for the substitution of $BKNO_3$ for black powder. The units have an identical NEW (0.75-g) and outer housing.

Packaging

This recommendation IS packaging specific based on the results of the UN Series 6 tests.

- Packaging per 49 CFR § 173.62(c), Table of Packing Methods, Packing Instruction 131 using one of the following packing instructions:

  Packing Instruction 1
  Inner: Boxes, chipboard, each containing one (1) detonator prewrapped in a plastic bag
  Intermediate: Dividers within the outer packaging, corrugated fiberboard, three or more layers, separating inner packagings from each other and to fill void spaces
  Outer: Box, fiberboard (4G) containing up to ten inner packagings

  Packing Instruction 2
  Inner: Packing Instruction 1 outer packaging
  Intermediate: Not necessary
  Outer: Box, fiberboard (4G) containing up to five inner packagings

Photo 2: Packing Instruction 1 Outer Packaging (4G Fiberboard Box)

Photo 3: Packing Instruction 1 Intermediate Packaging (Fiberboard Dividers)

Photo 4: Packing Instruction 1 Inner Packaging (Chipboard Box)

Previous Testing (with black powder as ignition charge)

Testing was conducted on the OOT G-21B detonator (P/N DET-3050-321) as documented in Reference 1 with black powder as the ignition charge. A summary of test results previously acquired is given in Table 2.

Table 2: Summary of UN Series Testing on OOT-APRV-064 Clip-Type Electric Detonator Family sample detonator (P/N DET-3050-321)

Test	Conditions and Results	Pass/Fail
UN Test 4 (a) Thermal stability	Packaged articles did not experience a temperature rise exceeding 3°C above the oven temperature, and no evidence of thermal instability (explosion, ignition, damage to the case, exudation). No weight loss.	Pass (not forbidden)
UN Test 4 (b) (ii) 12-meter drop	Three trials resulted in minimal external damage to packaging and no initiations.	Pass (not forbidden)
UN Test 6 (a) Single package (confined)	Three trials resulted in no mass detonation and no damage to the witness plate. Propagation to one adjacent article in one confined trial; only the donor article functioned in the other trials. Limited damage to fiberboard dividers. No damage to the outer packages.	Pass (no mass explosion)
UN Test 6 (b) Stack test	Waived based on Single package test results.	Waived
UN Test 6 (c) External fire (bonfire)	Initiation of articles occurred over approximately a 10 minute period with single ignitions noted. No mass explosions. Fiery projections observed, landing 2-5 meters from center of fire. No dents in the witness screens occurred.	Pass (behavior consistent with Division 1.4S criteria)
UN Test 6 (d) Unconfined package	Three trials resulted in no mass detonation and no damage to the witness plate; only the donor article functioned (no propagation). Limited damage to fiberboard dividers. No damage to the outer packages. No visible flash or flame. No hazardous effects were observed outside of the package.	Pass (behavior consistent with Division 1.4S criteria)

Based on these test results, SMS recommended that the OOT-APRV-064 Clip-Type Electric Detonator Family be classed into Division 1 as UN0456, Detonators, electric, 1.4S, Packing Group II (Reference 1). Due to the similarities in the previously tested articles and the articles under review, it is anticipated the same results would occur and would therefore meet the requirements to be classified in the same division.

Additional Testing (with $BKNO_3$ as ignition charge)

Three (3) UN Test 6 (d) Unconfined package trials were performed on O-321 (P/N DET-3050-321) with the new explosive composition in the packaging described. The articles are provided with their own means of initiation. A centrally-located article was initiated as designed.

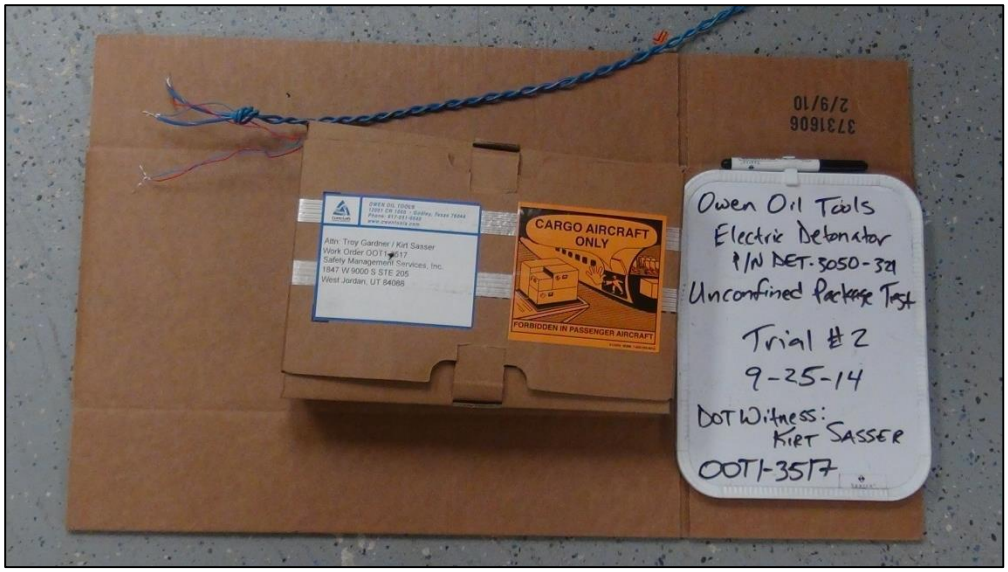

Photo 5: Representative Unconfined Single Package Test Setup

No mass explosion occurred in any of the trials. The inner package containing the donor was severely damaged, with limited damage to the surrounding fiberboard dividers. No damage occurred to the outer packaging. No propagation to adjacent articles occurred. No hazardous effects were observed outside of the package. The test results are shown in the photos below.

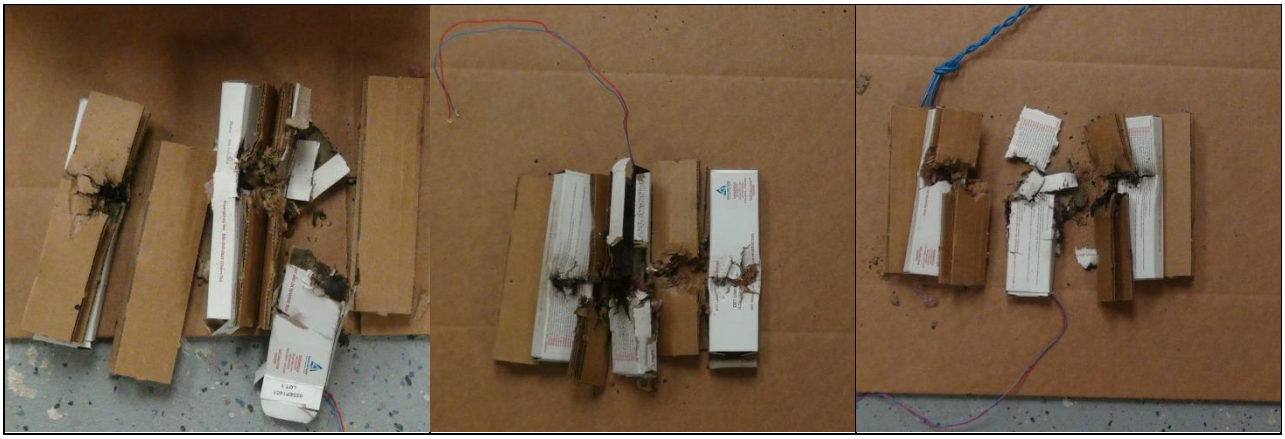

Photo 6: Unconfined Single Package Test Results – Trial 1 (left), Trial 2 (middle), Trial 3 (right)

Comparison

Based on the following, the behavior of the O-321 Detonator (P/N DET-3050-321) is anticipated to be no greater hazard than that of the previously tested articles:

- The net explosive weight is equal to that previously tested.
- The Detonator Header Subassemblies and Loaded Cases as tested are of exact design for the article under review.
- The test results from the UN Series 4 and 6 testing show that the tested OOT G-21B detonator (P/N DET-3050-321) is a candidate for Division 1.4, compatibility group S with both black powder and $BKNO_3$ as the ignition charge.

Conclusions and Recommendation:

In accordance with 49 CFR Section 172.101 and 173.56 - § 173.58, SMS recommends that detonators in the OOT-APRV-064 Clip-Type Electric Detonator Family that use $BKNO_3$ be included in the shipping classification for the OOT-APRV-064 Clip-Type Electric Detonator Family and be classified as Division 1.4, compatibility group S.

This recommendation IS packaging specific based on the results of the UN Series 6 tests.

- Packaging per 49 CFR § 173.62(c), Table of Packing Methods, Packing Instruction 131 using one of the following packing instructions:

  Packing Instruction 1
  Inner: Boxes, chipboard, each containing one (1) detonator prewrapped in a plastic bag
  Intermediate: Dividers within the outer packaging, corrugated fiberboard, three or more layers, separating inner packagings from each other and to fill void spaces
  Outer: Box, fiberboard (4G) containing up to ten inner packagings

  Packing Instruction 2
  Inner: Packing Instruction 1 outer packaging
  Intermediate: Not necessary
  Outer: Box, fiberboard (4G) containing up to five inner packagings

- Marking per 49 CFR Part 172 Subpart D (§ 172.300 - § 172.338), including § 172.320.
- Labeling per 49 CFR Part 172 Subpart E (§ 172.400 - § 172.450), including § 172.411.

Reference Number: **SMS-3313-R1, Rev 0** **Date:** **December 11, 2013**

Manufacturer: Owen Oil Tools LP
12001 County Road 1000
Godley, Texas 76044

Subject: **Test and Examination Report for UN Series 4 and 6 Testing on the OOT-APRV-064 Clip-Type Electric Detonator Family**

Reference: (1) Drawing No. OOT-APRV-064 Rev 00, "OOT-APRV-064 Clip-Type Electric Detonator"

TEST AND/OR ANALYSIS REPORT

The OOT-APRV-064 Clip-Type Electric Detonator Family is manufactured by Owen Oil Tools at its Godley, Texas facility. The following report details the testing and analysis performed in support of a shipping division classification recommendation.

A. OOT-APRV-064 Clip-Type Electric Detonator Family

Detonators in the OOT-APRV-064 Clip-Type Electric Detonator Family are designed to be loaded into oil & gas well downhole tools such as perforating guns. The tool into which the detonator is loaded provides a barrier between fluids present in the well and detonator (hence the designation "non-exposed"), thereby ensuring that the detonator remains dry and useable. Each electric detonator may contain one or more of the following non-explosive components:

a. Body or housing – The body or housing is a tube or block of phenolic resin or polymer material. The body houses the explosive and other components of the detonator and provides protection from outside initiation stimuli.
b. Electrical leads – Utilized to provide a means of introducing electrical energy to the detonator to cause it to initiate. In most instances, electrical leads are in the form of lead wires of varying lengths and gauges. In all instances, when the detonator is in its shipping container, the electrical leads are shunted to prevent flow of electrical energy into the detonator and accidental detonation thereof.
c. Electrical initiators – Devices used to apply the electrical energy to the electrically sensitive charges within the detonator. Proper application of this electrical energy through the electrical leads and into the electrical initiators will cause the detonator to detonate. Currently, the detonator utilizes resistors for this purpose; however, other means (for example, bridgewires, semiconductor bridges, etc.) may also be used in the future.
d. Clip – A device made of steel, aluminum, brass, copper, other metal, phenolic resin, or other material that is attached to the detonator body or housing to provide a means of connecting the detonator to the detonating cord. Clip design and placement may vary.

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Photo 1: P/N DET-3050-321 Test Sample

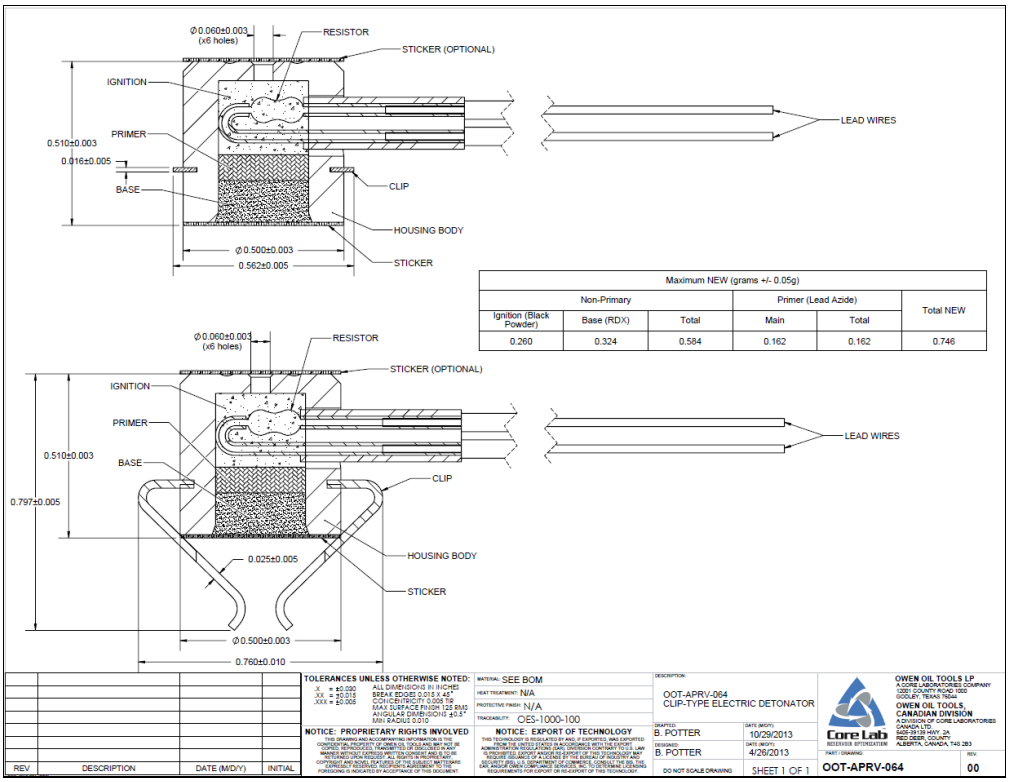


Figure 1: Drawing of the OOT-APRV-064 Clip-Type Electric Detonator Family

Each detonator in the OOT-APRV-064 Clip-Type Electric Detonator Family has a net explosive weight (N.E.W.) of up to 750 mg as outlined in Table 1.

Table 1: Composition of the OOT-APRV-064 Clip-Type Electric Detonator Family

Maximum Dimensions L x W x H (in)	Maximum Net Explosive Weight (grams ± 0.05 g)			
	Ignition	Primer	Base	Total N.E.W.
	Black powder	Lead azide	RDX	
1.63 x 0.76 x 0.797	0.26	0.16	0.33	0.75

For this family of detonators, a detonator representing the maximum load authorized for the family was selected for testing. The selected detonator was the OOT G-21B detonator (P/N DET-3050-321) that contains 0.26 grams of black powder, 0.16 grams of lead azide, and 0.33 grams of RDX (0.75 grams total N.E.W.).

The detonator is functioned by application of an external electrical charge through the electrical leads. The P/N DET-3050-321 detonator is resistorized and meets the following minimal electrical requirements:

- Resistance: ≥ 51 Ω
- No-fire current: ≤ 0.2 amps
- All-fire current: ≥ 0.8 amps
- Static Resistivity 25,000V discharged from 500 picofarad capacitor through 500 Ohm resistor

B. Packaging

The article will be transported in non-bulk packaging compliant to 49 CFR § 173.62(c), Table of Packing Methods, Packing Instruction 131 using one of the following packing instructions:

Packing Instruction 1

Inner: Boxes, chipboard, each containing one (1) detonator prewrapped in a plastic bag

Intermediate: Dividers within the outer packaging, corrugated fiberboard, three or more layers, separating inner packagings from each other and to fill void spaces

Outer: Box, fiberboard (4G) containing up to ten inner packagings

Packing Instruction 2

Inner: Packing Instruction 1 outer packaging

Intermediate: Not necessary

Outer: Box, fiberboard (4G) containing up to five inner packagings

Each Packing Instruction 2 outer packaging is approximately 0.033 m^3 (17 in x 13 in x 9 in). The packaging of P/N DET-3050-321 is shown in the photos below.

Photo 2: Packing Instruction 2 Outer Packaging (4G Fiberboard Box)

Photo 3: Packing Instruction 1 Outer Packaging (4G Fiberboard Box)

Photo 4: Packing Instruction 1 Intermediate Packaging (Fiberboard Dividers)

Photo 5: Packing Instruction 1 Inner Packaging (Chipboard Box)

C. Testing

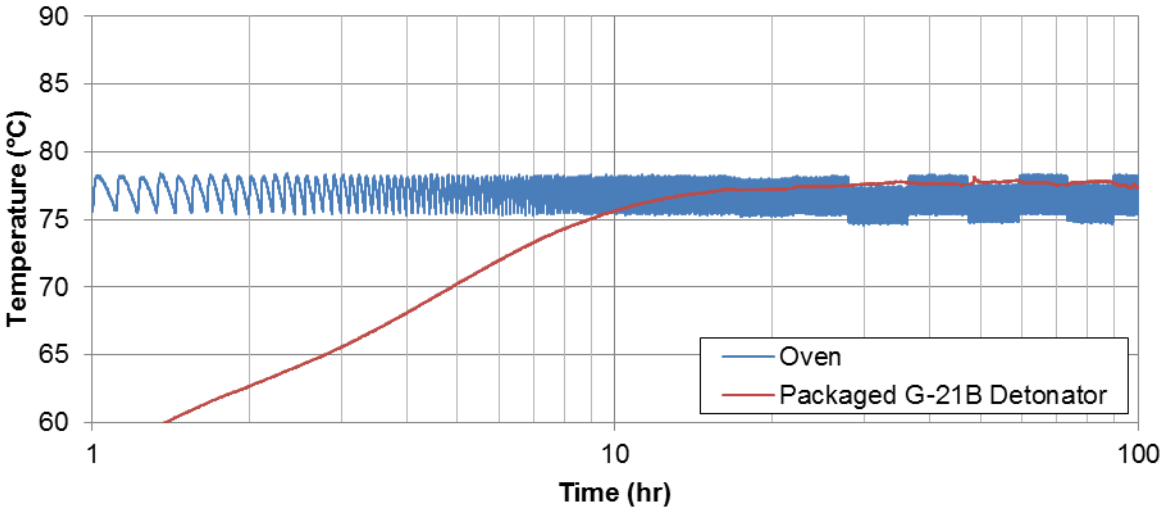
Testing consisted of UN Test Series 4 and 6 on P/N DET-3050-321 as packaged for shipment at SMS's test site in Tooele, Utah. Tests were witnessed by Troy Gardner and Kirt Sasser, and performed in accordance with the United Nations (UN) Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Fifth revised edition (2009). A summary of test results is provided in Table 2.

Table 2: Summary of UN Series Testing on OOT-APRV-064 Clip-Type Electric Detonator Family sample detonator (P/N DET-3050-321)

Test	Conditions and Results	Pass/Fail
UN Test 4 (a) Thermal stability	Packaged articles did not experience a temperature rise exceeding 3°C above the oven temperature, and no evidence of thermal instability (explosion, ignition, damage to the case, exudation). No weight loss.	Pass (not forbidden)
UN Test 4 (b) (ii) 12-meter drop	Three trials resulted in minimal external damage to packaging and no initiations.	Pass (not forbidden)
UN Test 6 (a) Single package (confined)	Three trials resulted in no mass detonation and no damage to the witness plate. Propagation to one adjacent article in one confined trial; only the donor article functioned in the other trials. Limited damage to fiberboard dividers. No damage to the outer packages.	Pass (no mass explosion)
UN Test 6 (b) Stack test	Waived based on Single package test results.	Waived
UN Test 6 (c) External fire (bonfire)	Initiation of articles occurred over approximately a 10 minute period with single ignitions noted. No mass explosions. Fiery projections observed, landing 2-5 meters from center of fire. No dents in the witness screens occurred.	Pass (behavior consistent with Division 1.4S criteria)
UN Test 6 (d) Unconfined package	Three trials resulted in no mass detonation and no damage to the witness plate; only the donor article functioned (no propagation). Limited damage to fiberboard dividers. No damage to the outer packages. No visible flash or flame. No hazardous effects were observed outside of the package.	Pass (behavior consistent with Division 1.4S criteria)

UN Test 4 (a) Thermal stability test on packaged articles was conducted on one box of P/N DET-3050-321 as packaged for shipment. Figure 2 contains a plot of the oven and packaged article temperatures for the test duration. The article reached 75°C after 9 hours and was maintained at that temperature for a minimum of 48 hours. The packaged article did not experience a temperature rise exceeding 3°C above the oven temperature. No visual signs of reaction (explosion, ignition, damage to the case, exudation) were observed on the post-test articles, and no weight loss.

Figure 2: Temperature Plot for the UN Test 4 (a) Thermal Stability Test



UN Test 4 (b) (ii) 12-meter drop test was conducted on P/N DET-3050-321 as packaged for shipment. Three drops in three different orientations (flat bottom, on a side, and on a corner) were performed on the packaged articles. No fire or explosion occurred in any of the three trials. There was some minor damage to the outer packaging but no spilling or scattering of contents occurred.

Photo 6: Representative 12-meter Drop Test Results

UN Test 6 (a) Single package test and UN Test 6 (d) Unconfined package tests were performed on P/N DET-3050-321 in the packaging described (three trials each). The articles are provided with their own means of initiation. A centrally-located article was initiated as designed. Loose sand was used to confine the package with a minimum thickness of confinement in every direction of 0.5 meters.

Photo 7: Single Package Test Setup, Confined (left) and Unconfined (right)

No mass explosion occurred in any of the trials (no crater or scattering of sand) and no damage to the witness plate. The inner package containing the donor was severely damaged, with limited damage to the surrounding fiberboard dividers. No damage occurred to the outer packaging. Propagation from the donor to one adjacent article occurred in one of the confined package trials. No hazardous effects were observed outside of the package.

Photo 8: Single Package Test Results, Donor Only (left) and Limited Propagation (right)

The UN 6 (b) Stack test was waived based on the results of the UN Test 6 (a) Single package and UN Test 6 (d) Unconfined package tests (exterior of the intermediate and outer packages undamaged by internal detonation).

UN Test 6 (c) External fire (bonfire) test was performed on P/N DET-3050-321 in the packaging described. Five outer packages, containing 50 articles each, were placed on the fire producing a total package volume of 0.16 m^3 (0.033 m^3 × 5). Several wood pallets were used as the fuel source. Diesel was used as an accelerant for ignition of the wood. Witness screens were used to define any fragment reaction behavior. The environmental conditions at time of the test were as follows:

- Wind: 12 mph
- Temp: 40°F
- RH: 70%

Photo 9: External Fire Test Setup

Fire engulfed the boxes approximately thirty seconds after the bag igniters were initiated. Initiation of articles began approximately three minutes after ignition of the fire and occurred over approximately a 10 minute period with single ignitions noted. No mass explosion occurred. Approximately 30 unreacted articles (6.4 grams each) were thrown 2 - 5 meters from the stack, with an energy less than 8 Joules when assessed using the Distance - Mass relation of the UN Manual of Tests and Criteria, Figure 16.6.1.1; approximately 30 inner packagings on fire (fiery projections) were also thrown 2 - 5 meters from the stack. Upon post-test inspection, there were no indentations in the witness screens.

Photo 10: External Fire Test Results

D. Conclusions and Recommendation

Behavior of the packaged P/N DET-3050-321 is consistent with a recommendation into Division 1.4, compatibility group S. UN Series 4 tests show the articles are not forbidden in their

packaging configuration. In the Unconfined and Single package tests, initiation was limited to the donor article with limited propagation in one trial. The External fire test resulted in no damage to the witness screens, no mass reaction, no hazardous fragments, and no fireball or jets. Based on the External fire and Unconfined package tests, P/N DET-3050-321 is a candidate for Division 1.4, compatibility group S.

Based on the results of the testing and in accordance with 49 CFR § 172.101 and 49 CFR § 173.56 - § 173.58, SMS recommends that the OOT-APRV-064 Clip-Type Electric Detonator Family, manufactured by Owen Oil Tools LP, be classed into Division 1 as UN0456, Detonators, electric, 1.4S, Packing Group II.

This recommendation IS packaging specific based on the results of the UN Series 6 tests.

- Packaging per 49 CFR § 173.62(c), Table of Packing Methods, Packing Instruction 131 using one of the following packing instructions:

  Packing Instruction 1
  Inner: Boxes, chipboard, each containing one (1) detonator prewrapped in a plastic bag
  Intermediate: Dividers within the outer packaging, corrugated fiberboard, three or more layers, separating inner packagings from each other and to fill void spaces
  Outer: Box, fiberboard (4G) containing up to ten inner packagings

  Packing Instruction 2
  Inner: Packing Instruction 1 outer packaging
  Intermediate: Not necessary
  Outer: Box, fiberboard (4G) containing up to five inner packagings

- Marking per 49 CFR Part 172 Subpart D (§ 172.300 - § 172.338), including § 172.320.
- Labeling per 49 CFR Part 172 Subpart E (§ 172.400 - § 172.450), including § 172.411.

I hereby certify that this classification recommendation report, and all evaluation, examination, and testing carried out by Safety Management Services in preparation of this report are in full compliance with the applicable requirements of the HMR and Approval CA1999080005 (First Revision). If you have any questions concerning this report or require further assistance, please call SMS at 801-567-0456 or fax SMS at 801-567-0457.

Thank you,

Troy A. Gardner, PE, CSP
Testing & Classifications Manager
Safety Management Services, Inc.

Kirt N. Sasser, PE
Director of Engineering & Testing
Safety Management Services, Inc.

Reference Number: **SMS-3313-L1, Rev 0** **Date:** **December 11, 2013**

Owen Oil Tools LP
12001 County Road 1000
Godley, Texas 76044

Attention: Ben Potter

Subject: **Shipping Classification Recommendation for the OOT-APRV-064 Clip-Type Electric Detonator Family**

Reference: (1) "Test and Examination Report for UN Series 4 and 6 Testing on the OOT-APRV-064 Clip-Type Electric Detonator Family", SMS-3313-R1, Rev 0, Safety Management Services, Inc., December 11, 2013.

Dear Mr. Potter:

The OOT-APRV-064 Clip-Type Electric Detonator Family was examined in the referenced report. Based on that examination, SMS makes the following recommendation in accordance with 49 CFR § 172.101 and 49 CFR § 173.56 - § 173.58.

Product Names/Description:
OOT-APRV-064 Clip-Type Electric Detonator Family with a body or housing of phenolic resin or polymer material containing not more than 0.75 ±0.05 grams of black powder, lead azide, and RDX as depicted in drawing OOT-APRV-064 Rev 00

Recommended Product Shipping Description:
UN0456, Detonators, electric, 1.4S, Packing Group II

This recommendation IS packaging specific based on the results of the UN Series 6 tests.

- Packaging per 49 CFR § 173.62(c), Table of Packing Methods, Packing Instruction 131 using one of the following packing instructions:

<u>Packing Instruction 1</u>

Inner:	Boxes, chipboard, each containing one (1) detonator prewrapped in a plastic bag
Intermediate:	Dividers within the outer packaging, corrugated fiberboard, three or more layers, separating inner packagings from each other and to fill void spaces
Outer:	Box, fiberboard (4G) containing up to ten inner packagings

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Packing Instruction 2
Inner: Packing Instruction 1 outer packaging
Intermediate: Not necessary
Outer: Box, fiberboard (4G) containing up to five inner packagings

- Marking per 49 CFR Part 172 Subpart D (§ 172.300 - § 172.338), including § 172.320.
- Labeling per 49 CFR Part 172 Subpart E (§ 172.400 - § 172.450), including § 172.411.

To complete the approval process for this material and location:
Provide a cover letter requesting classification in accordance with 49 CFR § 107.705.

Submit this recommendation letter and the enclosed report with attachments together with all pertinent drawings and chemical composition data using the PHMSA *On-Line Special Permit & Approval Application Process* located at:

https://hazmatonline.phmsa.dot.gov/Online%20Approvals/pages/welcome.aspx

Or submit in hard copy to:

Associate Administrator for Hazardous Materials Safety
PHMSA
U.S. DOT
Attention: PHH-32
1200 New Jersey Avenue
SE East Building, 2nd Floor
Washington, DC 20590

Important: An approval must be received from the Department of Transportation before any explosive may be offered for shipment.

I hereby certify that this classification recommendation report, and all evaluation, examination, and testing carried out by Safety Management Services in preparation of this report are in full compliance with the applicable requirements of the HMR and Approval CA1999080005 (First Revision).

If you have any questions concerning this recommendation or require further assistance, please call SMS at 801-567-0456 or fax SMS at 801-567-0457.

Thank you,

Troy A. Gardner, PE, CSP
Testing & Classifications Manager
Safety Management Services, Inc.

Kirt N. Sasser, PE
Director of Engineering & Testing
Safety Management Services, Inc.