

StimTube Assembly® Deployment Guide

MAN-STIM-004 (R01)

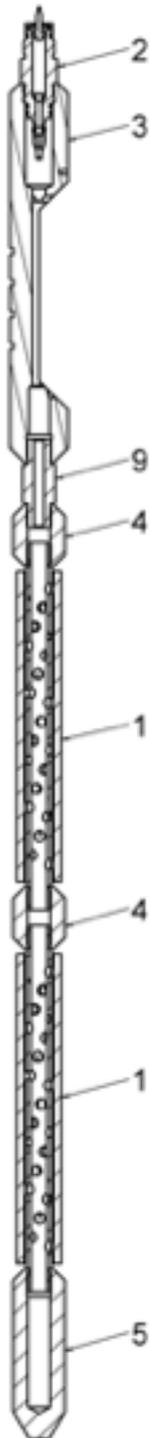
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Item	Description
1	SlimTube Tool
2	GO Style Teardrop Sub
3	Owen Top Sub
4	Collar
5	Bull nose
6	Detonating Cord
7	Grommet
8	Detonator
9	Adapter, Collar to Top Sub (optional)

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All users of the product must first develop their own instruction manual based on their company specific safety policies, procedures, and best practices. All users must also develop their own set of operational procedures for each specific well stimulation.

StimTube Assembly® is a registered trademark of Core Lab/Owen Oil Tools.



Warning: *Explosives are destructive by nature! Do not attempt to disassemble or alter explosive products in any manner! Do not crush, hammer, pinch, impact, pull wires or abuse any explosive product!*



Warning: *Be sure to follow safe operating practices as found in API RP-67 in accordance with governmental regulations, company policies and manufacturer's recommendations!*



Warning: *If you are not properly trained in the handling or use of explosive devices, DO NOT attempt the assembly of any explosive system or firing device. Always comply with the American Petroleum Institute's Recommended Practice for Oilfield Explosive Safety (API RP-67), and your individual company policies and procedure for explosive safety!*

1.0 Description of Service

1.1 The StimTube Assembly® (StimTool) consists mainly of a molded cylinder of propellant- like oxidizing material surrounding a steel support tube. The StimTube Tool provides efficient, cost effective remediation to existing perforated or open-hole intervals. The StimTube Tool is available in a variety of sizes including 1-1/2", 1-11/16", 2", 2-1/2" and 3" OD's: and in 1', 2' and 3' lengths. The StimTube Tool is run into the wellbore, typically on wireline and positioned across existing perforations. Conventional detonating cord is then initiated causing the tube to ignite. The StimTube Tool proprietary oxidizer burns quickly and produces a burst of high-pressure gas. This high-pressure gas enters existing perforations and creates fractures past damaged zones, etc., and creates an improved flow path from the formation to the wellbore.

2.0 Safety Considerations

2.1 With any explosive device one should always follow the guidelines contained in the American Petroleum Institute's Recommended Practice for Oilfield Explosive Safety (API RP-67), and your individual company safety policies and procedures. Following API RP-67 will ensure that the StimTube Assembly will be handled safely. The StimTube Tool should be handled with the same care given any oilfield explosive device.

- 2.2 StimTube Tool is not typically run in a protective steel carrier (as is the WST tool, It is exposed directly to the wellbore. Therefore, care must be used when handling and running the assembly so as to prevent impacts. NEVER secure lifting lines, etc. to the tube or allow the assembly to swing and strike the rig structure as this can cause damage to the tube. Also, NEVER place wrenches on the sleeve sections. When running in the wellbore - slow down.



Warning: *All subs - firing, tandem, and bullnose MUST have the same or larger OD than the StimTube Tool. NEVER run even one smaller OD sub in the assembly.*

- 2.3 The StimTube requires three conditions to ignite: confinement, pressure, and high temperature. The StimTube is basically inert on the surface because these three conditions do not commonly exist. There is a chance of a localized ignition - if the StimTube is impacted, say with a hammer.
- 2.4 In the wellbore, the StimTube is confined in the casing, there is pressure from the wellbore hydrostatic, and sufficient temperature created by the detonation of the detonating cord enabling the rapid burn of the propellant.



Warning: *REMEMBER - the StimTube tool is impact sensitive even at surface.*

3.0 Operational Notes

- 3.1 The StimTube Tool is rated to 400°F for 10 hours.
- 3.2 The StimTube Tool should be lowered into the well at less than 200 ft/min. You must slow to less than 50 ft/min. when passing through the fluid level. Impacting the fluid level at high speed may cause the tool to ignite and burn (low pressure / long time duration).
- 3.3 The wireline should be re-herded before each trip into the well with the StimTube Tool. This will minimize tool loss during tool initiation.



Warning: *Keep personnel away from the wellhead area / wireline unit while running in the hole, and during tool ignition.*

- 3.4 The threaded connections of the StimTube Tool assembly should be coated with Loctite or similar brand thread retaining compound / sealant. Commonly used products: Loctite 565 (300°F) or 567 (400°F) - depending on the temperature requirements for your particular operation. This will minimize the possibility of the connections loosening and separating downhole.



Note: Only 40 grain slim or round detonating cord with a sufficient temperature rating is recommended to be used with the StimTube Tool. Use of higher explosive weight detonating cord could result in tool loss downhole.

- 3.5 Always confirm that a particular well has a sufficient amount of fluid present. Typically, 1000 feet is required. The fluid must be non-gasified and compatible with the formation.

4.0 StimGun Selection

- 4.1 A number of mechanical and formation parameters govern the selection of the correct StimTube Tool for a particular scenario. Each licensee of the StimTube Tool has access to a sophisticated computer model. This software is used to evaluate these parameters and plan each specific stimulation. PulsFrac® is strongly recommended to help with a successful job.

5.0 Assembly Instructions

- 5.1 Once the OD and length of StimTube Tool for your actual operation has been determined, you can refer to the Owen Oil Tools' drawings and bills of material for the proper items to complete the StimTube Tool.



Note: These instructions are for informational purposes only. They have been provided to assist you in preparing your instruction manual.



Warning: Never deviate from API RP-67 or your individual company policies and procedures!

5.2 Shop Procedures

5.2.1 Ensure that the proper amount of tubes, to subs, collars, bull plugs, detonating cord, thread sealant, detonators, seizing cord, tapes, and Teflon grommet (40gr to 80gr adapter, or the duckbills if using 40gr flat) are loaded out. Check that the tubes, collars, and subs will screw together. Confirm that the OD of ALL subs is the same as or larger than the OD of the StimTube Tool. Re-package in the original shipping tubes.



Warning: *The StimTube Tool oxidizer typically has multiple fractures running perpendicular to the tool length. This is a result of the different thermal expansion and contraction rates of the steel support compared to the epoxy based oxidizer during the high temperature oven curing process. These fractures or cracks do not affect tool strength, integrity, or burn rate.*

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5.3 Transportation of Product to Wellsite



Note: *The StimTube Tool sleeve is classified as a Dangerous Goods (1.4S). Therefore, whenever the product is transported, it must be in the original PGI packaging. Follow all governmental regulations for the secure transportation and storage of this product.*

5.4 Wellsite Procedures

5.4.1. Arrange the StimTube Tool sections to be run on racks taking care not to damage the tube material.



Note: *Each section of tube is shipped with a 15/16" 12 P-2G male thread protruding from each end. The bull plug will attach directly to the bottom of the lowest section of tube and the top sub will attach directly to the top of the uppermost section in later steps.*

5.4.2 Attach a tandem sub / collar (STS-XXX-005), to the top end of each tube section other than the top tube section. If only one tube section is to be used there will be no collar used.

5.4.3 Thread the tube sections together. Tighten each connection securely. DO NOT place wrenches on the tube sections or steel support tubes. Place wrenches ONLY on collars and subs.

5.4.4 Connect the top sub to the upper end of the StimTube Tool. Tighten securely. DO NOT place wrenches on the tube sections.

5.4.5 Feed a sufficient length of 40 grain detonating cord through the top sub and tube sections and have it extend approximately 12 inches past both the top and bottom ends. A thread tape, fishing line helper, and other tools may be used to guide the detonating cord through assembled lengths.



Note: *It may be necessary to thread the detonating cord through each StimTube Tool section before tightening together. If this is the method selected, ensure that the detonating cord is not crimped / pinched / damaged when tightening the assembly. One person must constantly ensure that the cord freely moves during entire tightening operation. This is absolutely necessary to prevent damaging the cord. Cord damage could result in a fluid leak / “wet” cord and a termination of cord detonation. Or, possibly, a low order detonation at surface.*

5.4.6. Slip a Teflon grommet (DET-0100-018), over the bottom end of the detonating cord. Ensure that the grommet is not covering the explosive. Crimp a detonating cord seal on the bottom end of the detonating cord. This detonating cord seal will be exposed to well fluid. FIG. 1 shows a recommended method for taping detonators/boosters/end seals, etc. to prevent leaking. Keep the outside diameter of the tape job small enough so that the detonating cord can move inside the tube if shrinkage occurs.

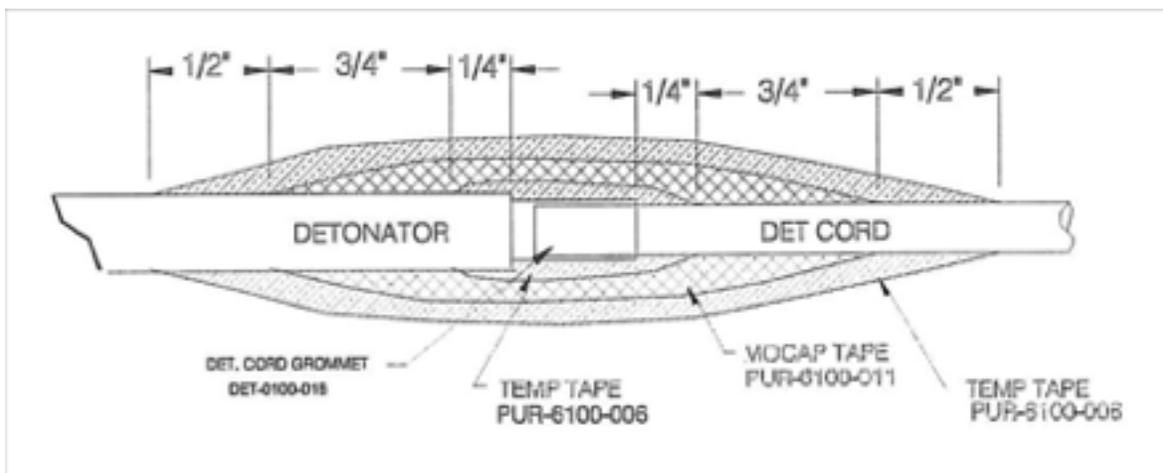


FIG. 1

5.4.7 Pull the detonating cord from the top sub until 5” of detonating cord extends below the bottom tube. Trim the detonating cord to extend approximately 6” beyond the top of the uppermost tube.

5.4.8. Attach the bull plug on the bottom tube, taking care not to damage the detonating cord. Tighten securely. DO NOT place wrenches on the tube sections.

5.5 ARMING



Note: *The top sub of the StimTube Tool is configured to accept a “GO” teardrop sub. The wireline hardware (cablehead, sinker bars, ccls, etc.) should be prepared to run in the hole with a teardrop and should have a Teflon coated lead wire attached and insulated. This connection will be exposed to wellbore fluid.*

5.5.1. Position the bottom of the wireline hardware and the top of the StimTube Tool to be attached. Feed the lead wire from the teardrop sub through the top of the StimTube Tool top sub and screw the two subs together and tighten securely.



Warning: *Always follow API RP-67 and your individual company policies and procedures when arming explosive devices.*

5.5.2. Place the detonator to be used in a blast shield.

5.5.3. Connect one wire from the detonator to the lead wire from the teardrop sub.

5.5.4. Connect the remaining wire from the detonator to one of the 10-32 thd. screws on the top sub and secure.

5.5.5. Once the electrical connection is complete, trim the detonating cord to the correct length, slip a detonating cord grommet over the top end of the detonating cord and ensure that the grommet is not covering the explosive. Crimp the detonator onto the cord.

5.5.6. Insulate the detonator/detonating cord interface according to the diagram shown in FIG. 1 earlier.

5.5.7. Secure the detonator bundle to the top sub by lacing seizing cord between the 10-32 screws provided with the top sub.



Warning: *Pick up the StimTube Tool and run in hole. Take necessary procedures to not bind or bend the tube sections and DO NOT allow the tube sections to strike the rig or surrounding structures as this would damage the tubes. Tool impact or excessive tool compression from bending could possibly result in a localized tool ignition.*

5.6 FIRING

5.6.1. After the StimTube Tool is properly positioned across the perforating interval, apply electrical current to the wireline as with a conventional perforating gun to initiate the assembly. Follow API RP-67 and your individual company procedures for firing explosive devices. The tube will ignite and will be consumed in less than 100 milliseconds.

6.0 Disassembly and Cleaning

- 6.1** The StimTube Tool can be raised to the surface after firing. The top sub and bull plug may be reused after cleaning. The remainder of the assembly will be discarded.
- 6.2** If the assembly is brought back to the surface unfired, all of the components of the StimTube Tool may be cleaned with fresh water and stored for re-use. This of course assumes that no damage is noted.
- 6.1** The explosive components should be properly disposed of. They should not be run again.