

Technical Specifications
For the
Electronic PROXIMITY Fuze with SD Mechanism for Shell
155MM
(Without Booster Pellet)

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1. Technical Specifications of Fuze

This document establishes the performance, design and acceptance requirements for the Electronic Proximity Fuze for Shell 155MM (Without Booster Pellet) with Self Destruction Mechanism.

1.1 Description of the Product

It is the Proximity Fuze used to obtain Air burst at desired distance/height (10 ± 6 meters) with Explosive (HE) Projectiles 155mm Ammunition. The outer dimensions of the Fuze are as per Annexure-I. Fuze should be supplied with required electrical initiators and other components. The explosive part that is required to initiate the main charge i.e. Booster Pellet will be in the scope of OFDR.

1.2 Function Mode

The FUZE should have two modes of operation i.e. Proximity Mode (with Impact as Backup) and Point Detonation Mode (PDSQ). FUZE Functioning can be selected between two modes with the help of an Inductive Setter. Gate Time Setting for Proximity functioning can be done from 3 seconds to 199.9 second with an increment of 0.1 second.

- ❖ **Proximity Mode:** Function at desired distance/height, 10 ± 6 meters from Target.
- ❖ **Point Detonating:** When set to PD Mode, the fuze functions instantly on impact.
- ❖ **Self-Destruction (SD):** The FUZE should incorporate self-destruction feature to initiate munitions in case the FUZE fails to function in the primary mode. Self-destruction should be in the range of 190 to 210 Sec and it should be programmable as per customer requirement.
- ❖ **Explosive Ordnance Discharge (EOD):** Fuze should have the features incorporated for safe handling in case of total failure.

1.3 Safety Mechanism

- ❖ **Safety & Arming :** Fuze should have Safe & Arm Device (SAD) preventing unintended arming and should get armed only after achieving setback & spin forces.
- ❖ **Battery Activation :** Battery should always be in inactive mode and should be activated only in the launch environment i.e. on receipt of the setback force & Spin.
- ❖ **Electronic Arming Safety :** Fuze should have electronic programmable safety feature incorporated so that it should not function in case of round struck in the barrel.

1.4 Technical Data

- Overall length: 150.64 mm (Max)
- Intrusion Thread: 2"-12UNS-1A
- Intrusion Depth: 56.1mm(max)
- Cross Section Diameter: 61.20/ 60.80 mm
- Power supply: Reserve Battery
- Temperature range of use: -30°C to + 55°C
- Temperature range of storage: -40°C to + 70°C
- Shelf life: 10 years minimum
- Fuze should comply MIL-STD-331 & MIL-STD-1316

1.5 Critical Subassemblies:

- Battery
- Electric Initiator
- Firing Control Circuit & Proximity Sensor
- Safety & Arming Device

- 1.6 Packaging: FUZE to be packed individually in hermetically sealed plastic containers. 20 such containers will be packed in metal boxes that have Styrofoam inner trays or participating firm can suggest as per their design.

2. Technical Specifications of Inductive Fuze Setter

- 2.1 It should be the Inductive Fuze Setter compatible with all the Electronic Artillery Fuzes and should set functional modes and required timings for Electronic Proximity Fuzes.
- 2.2 It should be easy to handle for reading and setting of Fuzes.
- 2.3 It should be capable of Fuze Setting time from 3 Seconds to 199.9 Seconds with minimum increment of 0.1 second.
- 2.4 It should be capable of reading the Fuze status through display including mode, time etc before and after setting of Fuze.
- 2.5 The Fuze settings over display should be readable during day & night also.
- 2.6 It should be capable for repeated changes in fuze settings.
- 2.7 It should be operated using easily replaceable batteries.

3. Manufacturer Levels Tests and Qualification

3.1 Environmental Test (At firm's premises):

The following environmental tests have to be conducted during the design qualification phase at firm's premises in presence of OFDR rep. The Fuze must not be initiated and must be safe to handle after the following testing in accordance with MIL-STD-331.

#	Test Description & quantity	Test Parameters	Acceptance Criteria
1	Jolt – 3 Nos (As per MIL-STD-331 A1)	i) No of Jolts : 1750 impacts ii) Jolt drop height : 102 ± 5 mm iii) Pulse rate: 35 ± 5 impacts/minute iv) Fuze : Bare Fuze with all explosive components (Booster pellet will be supplied by OFDR)	No explosive component should be initiated.
2	Jumble – 3 Nos (As per MIL-STD-331 A2.1)	i) Pulse Rate: 30 ± 2 revolutions per min for a total 3600 ± 10 revolutions ii) Duration: 02 hours iii) Fuze: Bare fuze with all explosive components (Booster pellet will be supplied by OFDR)	No explosive component should be initiated.
3	Drop Safety (1.5 Mtr) – 5 Nos (As per MIL-STD-331 A4.1)	i) Height of Drop : 1.5m ii) Drop Surface: Mild Steel Plate of 75 mm thick iii) Fuze: Bare & unpacked Fuze with all explosive components except Booster Pellet	No explosive component should be initiated.
4	Vibration – 3 Nos (As per MIL-STD-331-B1)	i) Fuze: Packed fuzes (03 live & 17 Dummy Fuzes to be packed in Service Package & placed diagonally). (Booster Pellet to be replaced with inert pellet) ii) Swept logarithmically from 05 Hz to 500 Hz to 05 Hz in 15 minutes for 8 sweeps per axis. Displacement and acceleration level 5g acceleration peak.	No explosive component should be initiated.

3.1.2 Dynamic Firing of Environmentally Tested Fuzes (at CPE, Itarsi, PXE, Balasore or any nominated proof range)

a) Fuzes after being exposed to the above environmental tests mentioned in para 3.1, will be conditioned at specified temperature as per below table for 6 hrs and then subjected to Dynamic firing test. In dynamic firing fuze should not be prematurely functioned.

#	Test	Qty	Conditioning	Fuze Marking
(a)	Jolt	03	Ambient	1P to 3P
(b)	Jumble	03	Ambient	4P to 6P
(c)	Transport Vibration	01	Ambient	7P
		01	-30°C	8P
		01	+ 55°C	9P
(d)	Drop	05	Ambient	10P to 14P

Radiographic Examination to be conducted before and after environmental tests. There should not be any evidence of explosive initiation or unsafe condition for handling.

3.2 Fuze Qualification in Manufacturing Lots

3.2.1 Visual Inspection: Features for Visual Examination and Acceptance

Sl. No	Description	Sample Size	Acceptance Criteria
1	Cracks in Fuze Body	100%	Not Allowed
2	Wrench Slots	100%	Should be Present
3	Fuze Surface Finish	100%	Free from Local patches/peel off
4	Lot Marking	100%	Clear traceability marking

3.2.2. Dimensional Inspection

a) Critical Dimensions: NA

b) Major Dimensions:

Sl.No	Dimension/Feature	Inspection Method
1	Maximum Length	General Engg. Method
2	Intrusion Length	-do-
3	Maximum Dia	-do-
4	Thread 2"12UNS 1A	Go & No-Go Gauges (To be provided by the firm)

c) Minor Dimensions: NA

3.2.3 Controlled Dynamic firing (at firm's premises) - Test up to first initiator level to be conducted as per details given below:

Qty: Minimum 08 Nos (IS:2500-Part-I, Special Inspection Level-II) of Electronic Module with Battery, Safe Arming Device & first initiator shall be randomly selected from the each manufacturing batch duly cleared by the firms QA. These components shall be assembled to suit controlled dynamic trial and shall be subjected for Environmental Tests as mentioned below followed by firing using field simulated conditions i.e. at minimum setback & minimum spin. Modules should function in SD mode/spin decay mode.

- Low Temperature: -30 °C for 4 hours
- High Temperature Test: + 55°C for 4 hours
- Random Vibration: 20Hz-100Hz at 6dB/octave so as to reach 0.04g² /Hz at 100Hz, 0.04g² /Hz constant from 100 Hz to 2000 Hz. Duration 30sec in all 3 axes.

Environment tests followed by controlled dynamic trial schedule chart for Qty. 08 Nos. are as follows. Functioning of assembled modules shall be verified in self-destruction mode only.

Environmental Test to be carried out	No. of modules under test	No. of Modules withdrawn	Controlled Dynamic trial
High Temperature	8	2	2
Low Temperature	6	2	2
Random Vibration	4	2	2
Drop 1.5 m on 75mm thick steel plate on all three axis	2	2	2

Observation: Modules should function in the spin decay mode/ specified SD time.

3.2.4 Proximity Firing Test (at firm's premises) - Test up to first initiator level to be conducted to ascertain performance of Proximity Sensor as per details given below:

Qty: Minimum 08 Nos (IS:2500-Part-I, Special Inspection Level-II) of Electronic Module & first initiator shall be randomly selected from the each manufacturing batch duly cleared by the firms QA. Components shall be assembled to suit the test and shall be subjected for Environmental Tests as mentioned below followed by firing using appropriate method.

- Low Temperature: -30 °C for 4 hours
- High Temperature Test: + 55°C for 4 hours
- Random Vibration: 20Hz-100Hz at 6dB/octave so as to reach $0.04g^2$ /Hz at 100Hz, $0.04g^2$ /Hz constant from 100 Hz to 2000 Hz. Duration 30sec in all 3 axes.

Environment tests followed by Proximity Firing test schedule chart for Qty. 08 Nos. are as follows. Functioning of assembled modules shall be verified in Proximity mode only.

Environmental Test to be carried out	No. of modules under test	No. of Modules withdrawn	Controlled Dynamic trial
High Temperature	8	2	2
Low Temperature	6	2	2
Random Vibration	4	2	2
Drop 1.5 m on 75mm thick steel plate	2	2	2

Observation: Modules should function at a height of 10 ± 6 meters from Target.

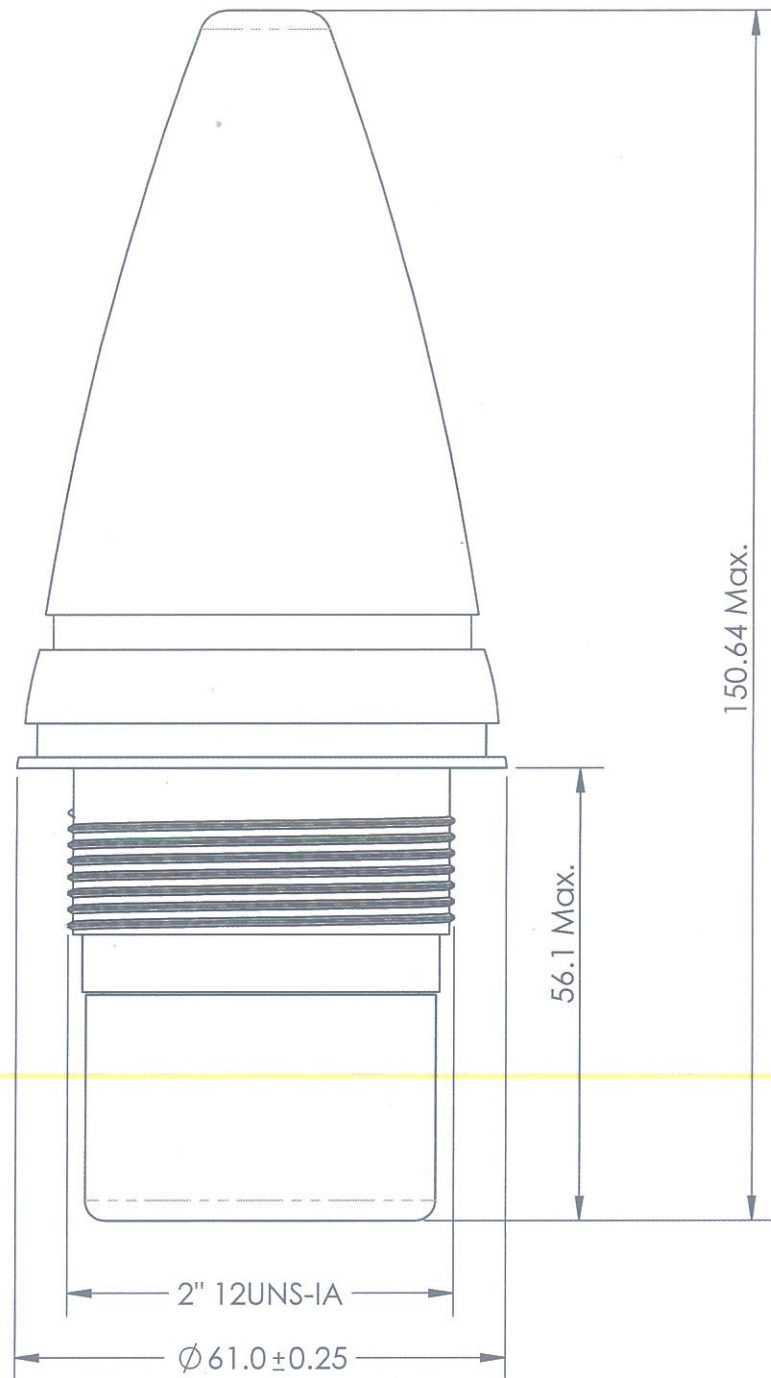
4. Dynamic Firing Tests: Dynamic proof firing involves the following tests(at CPE, Itarsi/PXE, Balasore or any other nominated proof range)

- (a) Environmental Test followed by Dynamic Proof
- (b) Non-Arming Proof/Safety Test.
- (c) Functional Test

Note: Dynamic firing details will be shared to only Bid winning firm after signing of Non-Disclosure Agreement (NDA). Conduct of dynamic trial including PSCs will be in the scope of OFDR.

5. Lot supplied by the firm will be cleared after qualifying all the tests as per above mentioned points and qualifying dynamic firing.

ELECTRONIC PROXIMITY FUZE FOR SHELL 155MM (Provisional Drawing)



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