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Handwritten: 1/2/6
20/5/60

Handwritten: 23 June

JAPANESE AMMUNITION

C.I. AMM. TECHNICAL REPORT

No. 38

TYPICAL METHODS OF FILLING OF H. E. NOSE-FUZED SHELL

TYPICAL METHODS OF FILLING
OF
H.E. NOSE-FUZED SHELL

G E N E R A L

As the result of examination of a large number of various natures of gun ammunition at Kirkee it is now possible to summarise the methods of filling employed in the more common types of Japanese shell up to and including 75-mm. calibre. Complete data is not yet available for calibres above 75-mm. but from a small number of 105-mm. and 150-mm. shell examined it is safe to assume that the methods of filling for these follow generally those for the 75-mm. calibres. In these larger calibres T.N.T. appears to be used exclusively.

2. The more common methods of filling are shown in Plates A to E at the end of this Report. Those items marked with a 'V' have been verified here and the details given are definitely correct. All chemical analysis of actual explosive fillings was carried out in the Military Explosives Inspectorate at Kirkee. Details given of other items are based on reports which have been carefully cross-checked for correctness.

3. Useful details such as nature of shell filling, typical wall thickness of shell, and shape of head have also been included in the Plates. It should be noticed, contrary to British and American practice, that the Japanese do not use base plates or other methods to prevent ingress of flash to the shell filling in the case of a defective base. This is a useful point for identification.

4. Some types of shell have a slight taper at the base. This has nothing to do with ballistic performance but is intended to facilitate assembly during fitting of the shell in the cartridge case.

5. So far no instances of smoke boxes have been found in shell of any calibre. They do not appear to be used even in A.A. shell and none was found in any rounds for the 75-mm. Type '88 Field A.A. gun examined here.

6. Item 7 on Plate C is of particular interest. The metal of this shell is a close grained low phosphorus haematite cast iron, and the green bands indicate this.

Exploding

7. It will be seen from the Plates that Japanese methods of shell filling are well standardized, the same system generally being

used in the large shell as well as the small. For shell above 40-mm. the fuze hole is standardized at 24-mm. to take the '88 Type fuze (C.I.Amm. Technical Report No.34). This small fuze hole (just under 1" in diameter) presents difficulty in filling the shell and without exception a nose adapter is used, below which the exploder container is screwed into the nose of the shell.

8. The exploder container is usually made of steel (one exception has been found i.e. item 9 on Plate D which was found made of brass) and usually contains pressed pellets of picric acid wrapped in paper. The top pellet is recessed to take the fuze gaine. The use of picric acid ensures maximum "pick up" from the fuze and is consistent with the care taken throughout by the Japanese with all types of H.E. fillings to ensure maximum detonation.

9. It has been found, however, in certain shell, which have a filling of R.D.X. and inorganic salts, that the exploder pellets may be of pressed R.D.X./wax 98/2; their shape and make-up being the same as before.

10. The mouth of the exploder container is closed by a metal cup the flange of which is secured by the screwing down of the adapter on to the exploder container. This loose cup has the same function as the fuze-well cup commonly used in American H.E. shell; it may be made of aluminium or copper. The Plates show the material found in actual shell examined. With this system of exploder container and well cup both the exploder and main fillings are well protected from moisture, etc.

The Japanese system of exploding and filling appears very elaborate but this it is considered is well justified in the longer life of the shell and its greater efficiency. The use of felt discs in the bottom of the exploder container to cushion the exploder pellets on set-back should be noticed. This will mean that there is a small air gap below the gaine of the fuze on firing but the margin for efficient initiation is probably still more than adequate owing to the gaine surround. The nose of the shell is closed usually by a "push in" type plug similar to that used in certain American 75-mm. shell. In some cases, however, plastic or metal plugs are used. The Plates show the types of plugs which were found in shell actually examined.

Main Fillings

11. The nature of filling, and the method of filling used, is very similar to British practice and may, for convenience of reference, be classified as:-

- (a) Block fillings. The filled explosive is precast or pressed to shape and wrapped in waxed paper. When press capacity is available, this method has distinct advantages. It requires considerable care, however, particularly in the case of small shell to ensure good detonation of the filling. That this care has been taken will be clear from the methods of filling shown in Plate A. Usually a composite block of two explosives is used, a somewhat sensitive pressed picric acid pellet recessed to take the fuze gaine below which is a T.N.T. block forming the main filling. This picric acid pellet acts as an exploder and the gaine cavity is lined with paper, the whole assembly being wrapped in a waxed paper container.

In items 1 and 3 on Plate A, the precast block of T.N.T.

and pressed block of picric acid are each wrapped separately in waxed paper and then both together with a felt disc in between are wrapped in a waxed paper container. The container is usually stencilled in Japanese characters with the nature of filling and the shell for which it is intended.

In the case of item 11 on Plate E the hollow charge filling is precast to shape and wrapped in a waxed rolled paper container. Full details are given in C.I.Amm. Technical Report No.30.

- (b) Poured fillings. Poured fillings have been found only in shell of 70-mm. calibre and above, T.N.T. being the only poured filling so far encountered. According to reports, 40-mm. and 57-mm. have also poured fillings of T.N.T. but none of these shell has yet been examined at Kirkee. A poured filling in a small calibre like 40-mm. is generally contrary to Japanese practice; block fillings being invariably used. This 40-mm. equipment is of British origin and ammunition may have had to be made for it at short notice when a poured filling would be the quickest to produce.
- (c) Stemmed fillings. The only stemmed fillings encountered have been R.D.X. with inorganic salts, and these have not been very common.

Stemmed fillings were found in:-

Item 5 on Plate B

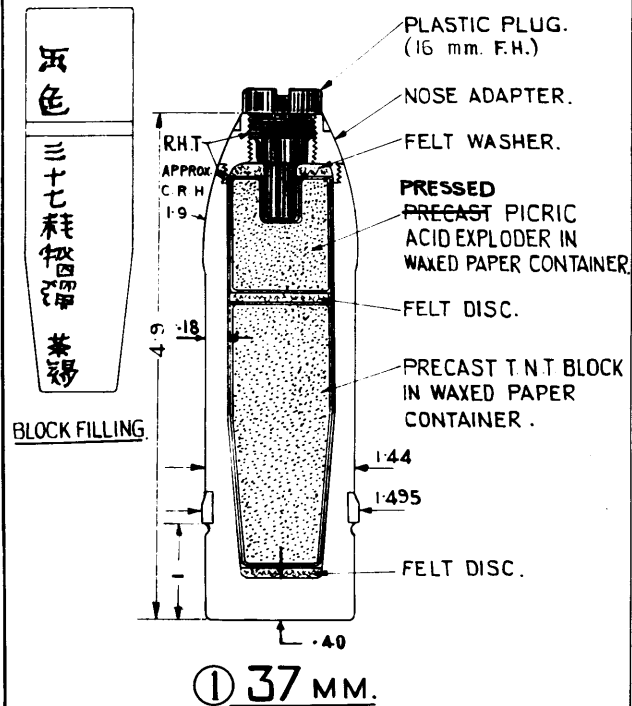
R.D.X. 14%; Ammonium Nitrate 86% with traces of wax.

Item 6 on Plate C

R.D.X. 15.5%; Potassium Nitrate 43% and Ammonium Nitrate 41.5%.

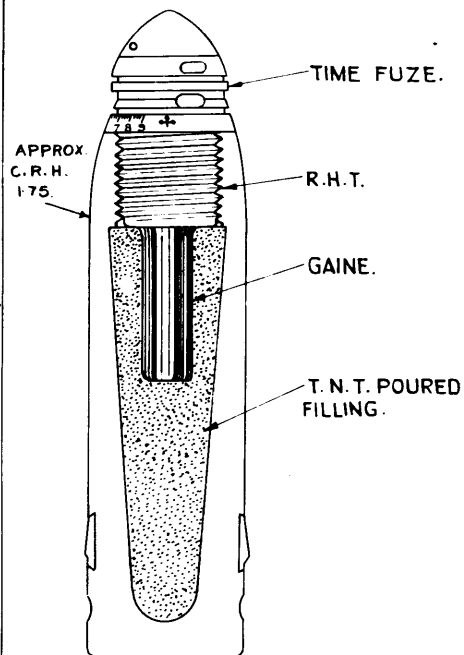
In such cases the exploding may be R.D.X. 98% and wax 2% graphite coated or the usual picric acid pellets.

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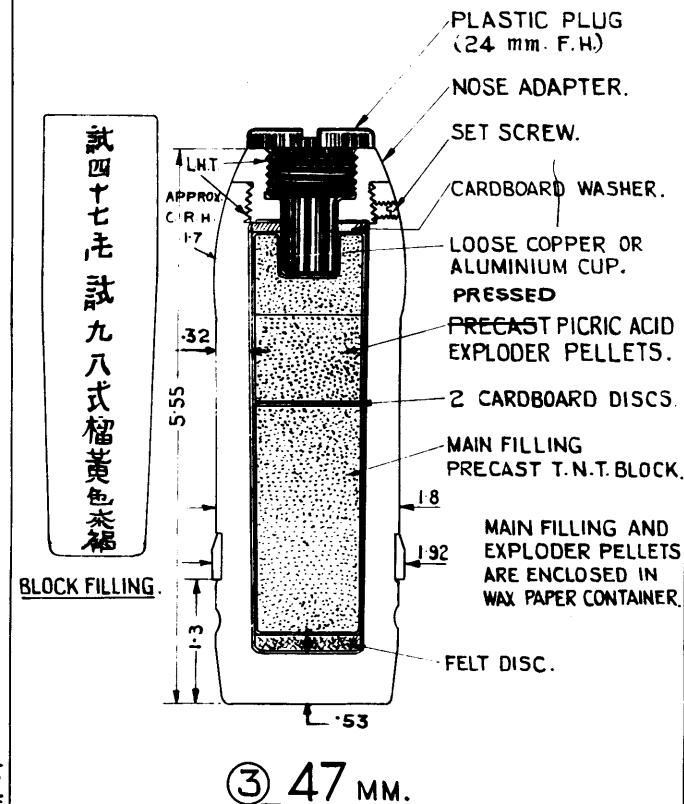


TAKING SMALL H.E., 16 MM. NOSE FUZE.
(i) ONE WHITE BAND, ONE YELLOW BAND.
OR (ii) ONE YELLOW BAND ONLY.

"V"



(2 PR BRITISH NAVAL A.A.)
(i) ONE GREEN BAND AND
SHELL PAINTED MAROON COLOUR.



TAKING TYPE 88 H.E., 24 MM. NOSE FUZE.
(i) ONE YELLOW BAND.

"V"

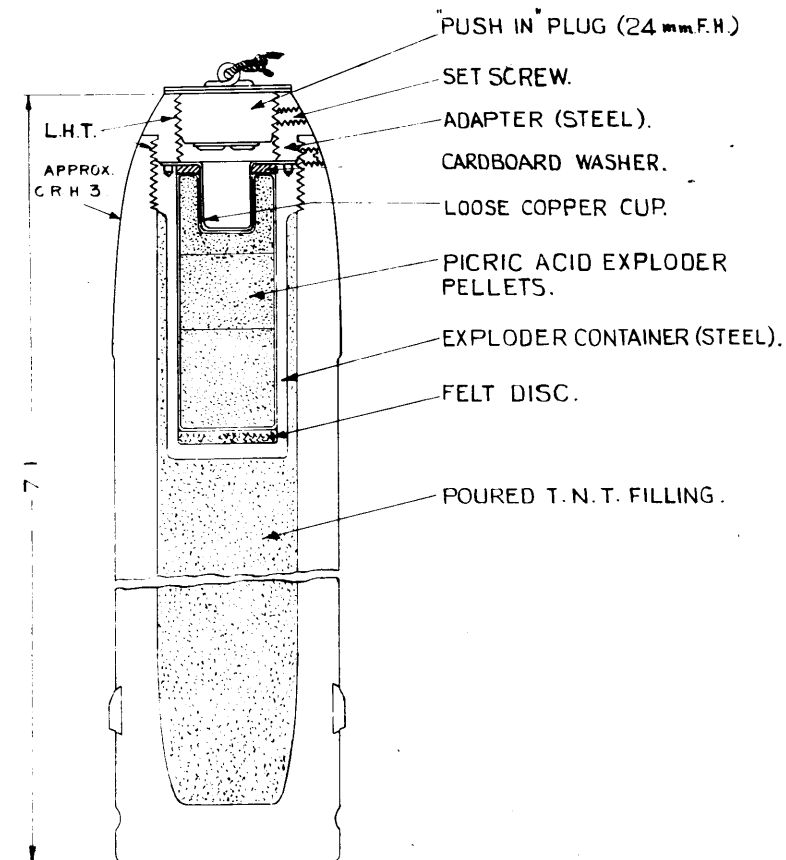
DIMENSIONS IN INCHES.

JAPANESE GUN AMMUNITION.
TYPICAL METHODS OF FILLING FOR H.E. NOSE FUZED SHELL.
37, 40 AND 47 MM.

C.I. AMM.S/ 1076
KIRKEE APRIL 1945

PLATE A

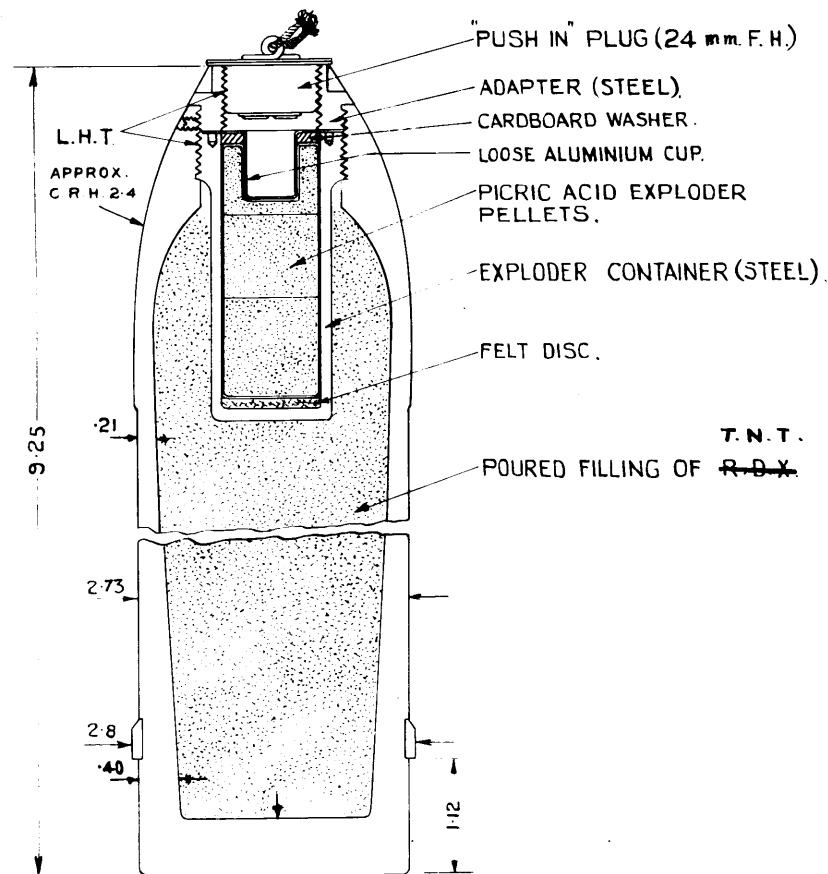
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④ 57 MM.

TAKING TYPE 88 H.E. 24 MM. NOSE FUZE.

(1) ONE YELLOW BAND.



⑤ 70 MM.

TAKING TYPE 88 H.E. 24 MM. NOSE FUZE.

THIN WALL GENERAL PURPOSE.

(1) ONE YELLOW BAND. (11) ONE WHITE AND ONE YELLOW BAND

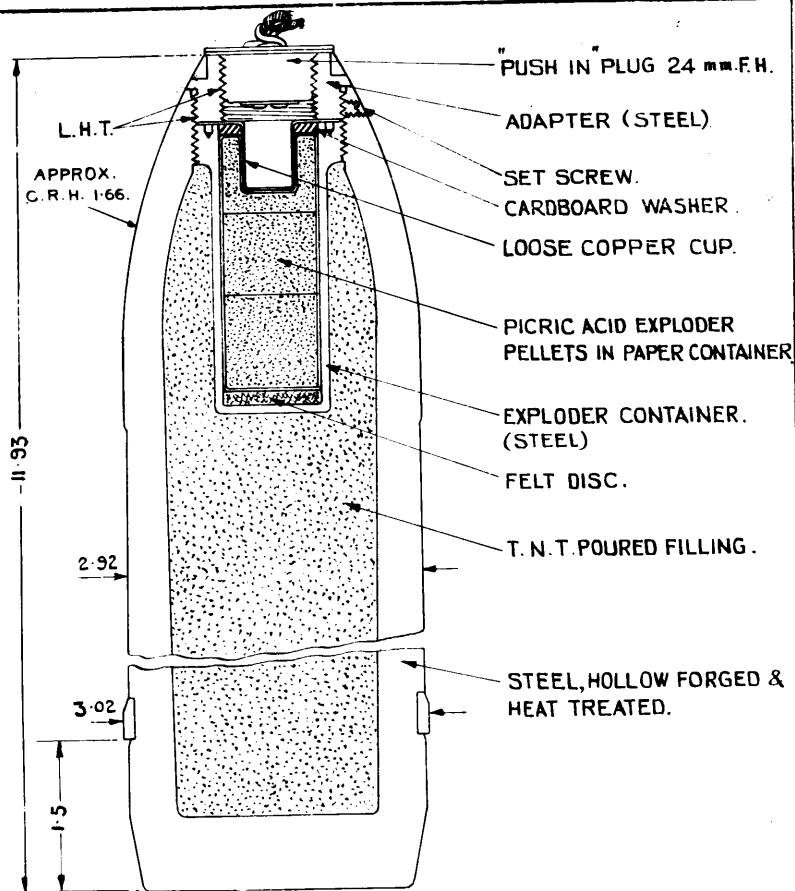
DIMENSIONS IN INCHES.

JAPANESE GUN AMMUNITION.
TYPICAL METHODS OF FILLING FOR H.E. NOSE FUZED SHELL.
57 & 70 MM.

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PLATE B

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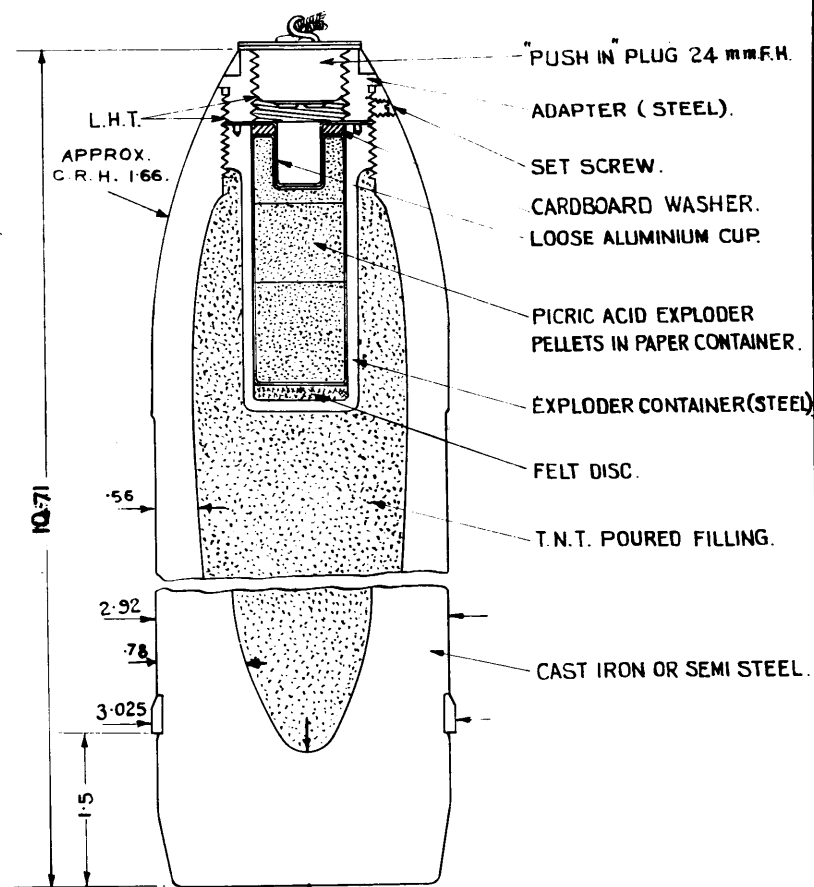


⑥ 75 MM.

TAKING TYPE 88 H.E. 24 MM. NOSE FUZE.

THIN WALL GENERAL PURPOSE.

- (I) ONE YELLOW BAND.
OR (II) ONE YELLOW AND ONE WHITE BAND.



⑦ 75 MM.

TAKING TYPE 88 H.E. 24 MM. NOSE FUZE.

THICK WALL HIGH FRAGMENTATION.

- (I) ONE GREEN BAND. YELLOW
(II) ONE GREEN AND ONE WHITE BAND.
(III) TWO GREEN BANDS AND ONE YELLOW BAND.

DIMENSIONS IN INCHES.

JAPANESE GUN AMMUNITION.

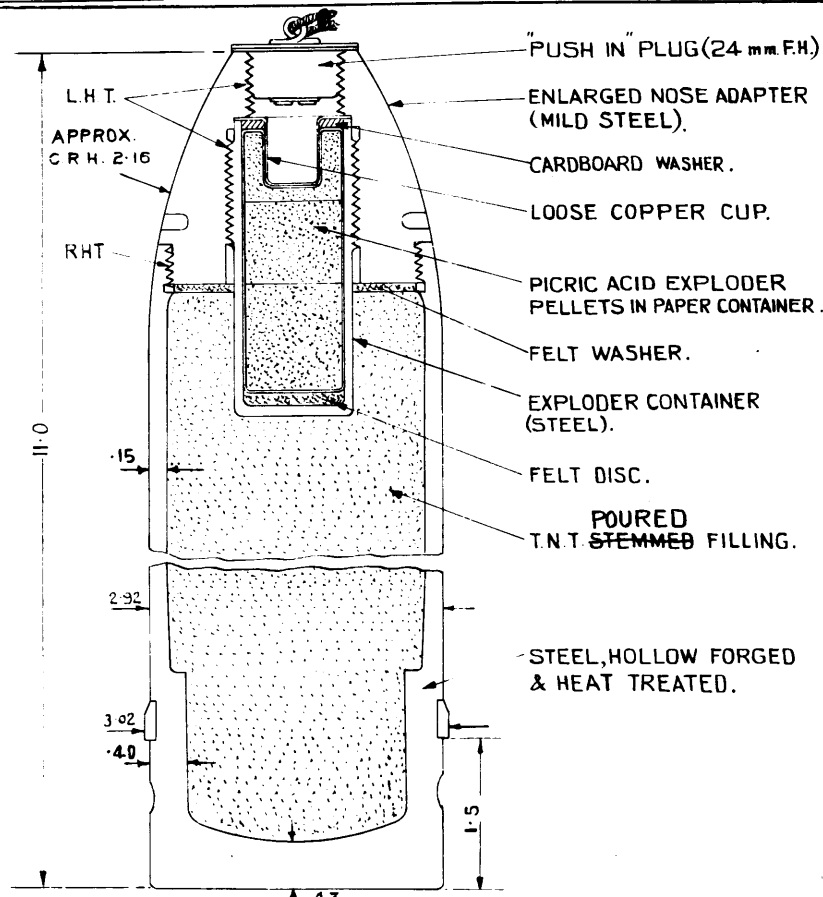
TYPICAL METHODS OF FILLING FOR H.E. NOSE FUZED SHELL.

75 MM. (FIELD ARTILLERY)

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PLATE C

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⑧ 75 MM.

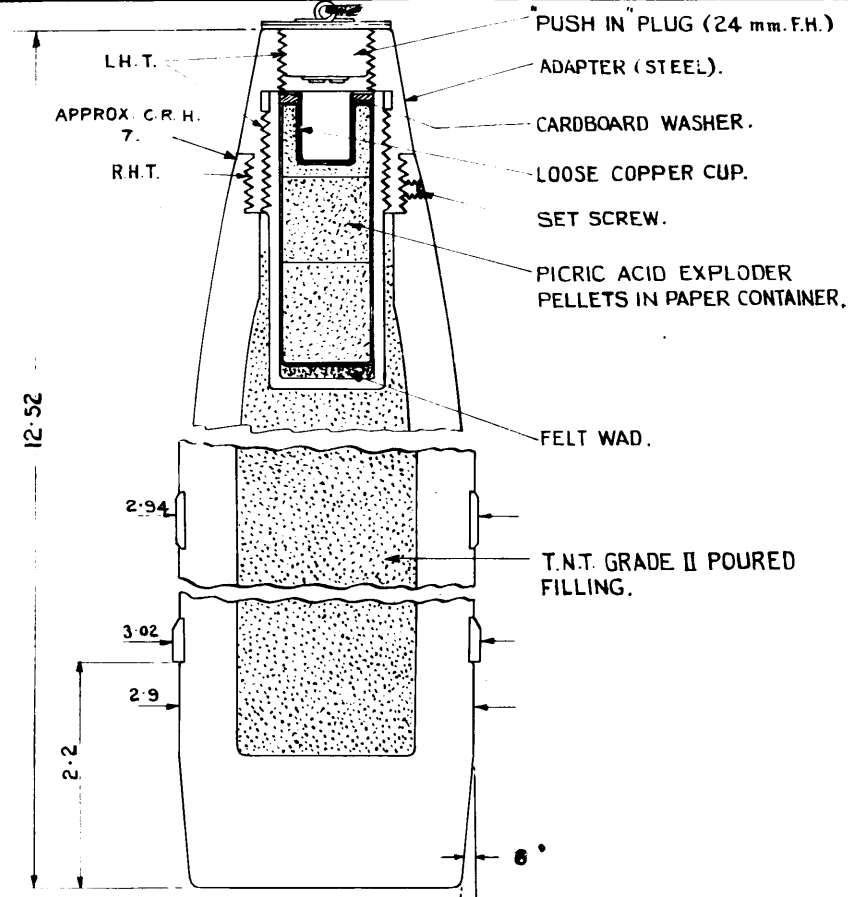
TAKING TYPE 88 H.E. 24 mm. NOSE FUZE.

THIN WALL GENERAL PURPOSE.

SHRAPNEL SHELL BODY ADAPTED FOR H.E. FILLING.

(1) ONE WHITE BAND ONE YELLOW BAND.

ENLARGED NOSE ADAPTER PAINTED WHITE



⑨ 75 MM. LONG POINTED SHELL.

TAKING TYPE 88 H.E. 24 mm. NOSE FUZE.

THICK WALL HIGH FRAGMENTATION.

(1) ONE YELLOW BAND ONE WHITE BAND.

DIMENSIONS IN INCHES.

JAPANESE GUN AMMUNITION.

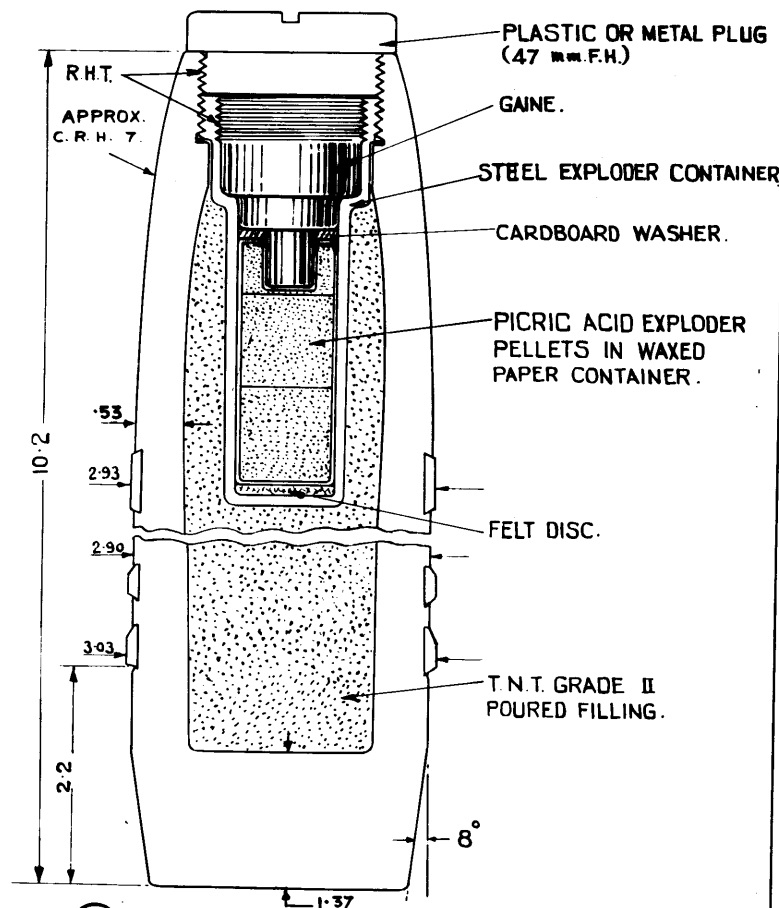
TYPICAL METHODS OF FILLING FOR H.E. NOSE FUZED SHELL.

75 MM. (FIELD ARTILLERY).

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PLATE D.

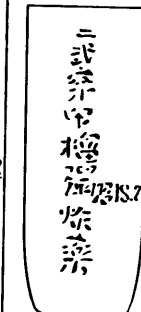
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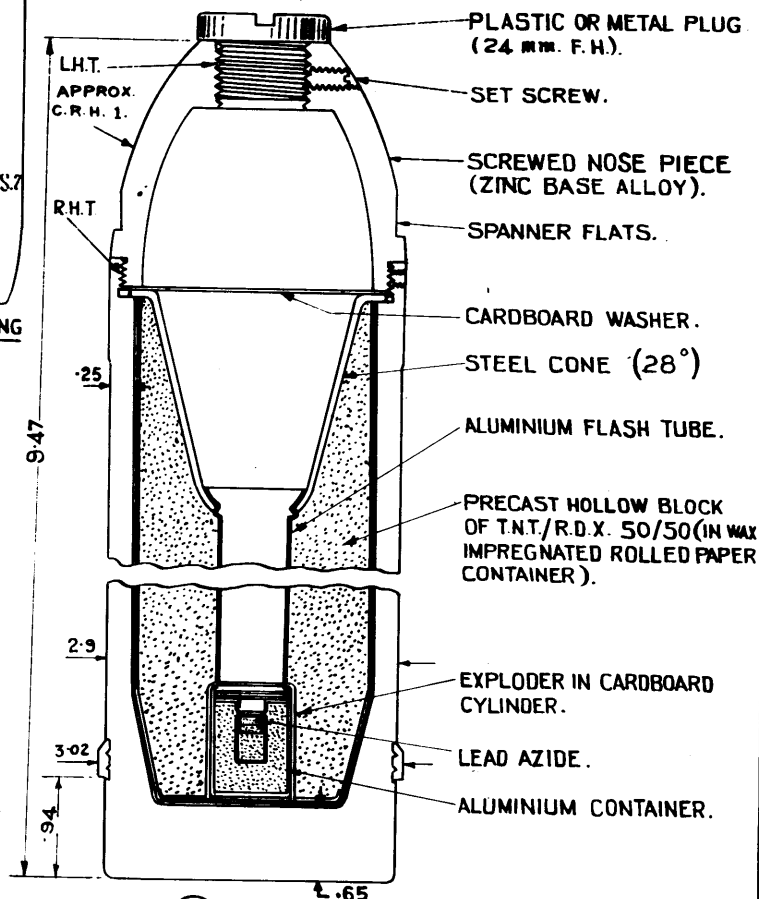
⑩ 75 MM. ANTI AIRCRAFT.

TAKING TYPE 89 COMBUSTION NOSE FUZE.

- (I) ONE WHITE BAND ONE YELLOW BAND,
OR (II) ONE YELLOW BAND ONLY



BLOCK FILLING
TYPE 2



⑪ 75 MM.

ANTI TANK HOLLOW CHARGE.

TAKING TYPE 88 H.E. 24 MM. NOSE FUZE.

- (I) ONE YELLOW BAND.

"V"

DIMENSIONS IN INCHES.

"V"

JAPANESE GUN AMMUNITION
TYPICAL METHODS OF FILLING FOR H.E. NOSE FUZED SHELL.
'75 MM. ANTI AIRCRAFT & FIELD ARTILLERY'

C.I. AMM S/1080
KIRKEE. APRIL 1945.

PLATE E.