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STEC PAMPHLET - 18

DISPOSAL OF WASTE EXPLOSIVES AND AMMUNITION BY BURNING/DEMOLITION

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C O N T E N T S

PREFACE

The object of this pamphlet is to furnish technical information to personnel engaged in disposal of waste explosives. The disposal of waste explosives is a potentially dangerous operation and therefore personnel engaged in this job should be made aware about the inherent dangers and safety precautions to be observed.

In this pamphlet, practical aspects like the quantity of waste explosives to be disposed off at a time and safe distances to be observed have been stipulated. Stipulations for Destructor Unit and Blast Containment Structure up to 8 Kg NEC HD 1.1 has been incorporated.

By strict adherence to the procedures and precautions stipulated herein, it is expected that the safety of personnel and property in the vicinity will be ensured to a large extent. It is recommended that Ammunition Maintenance Instructions (AMI) Manual OP/4 series should be consulted for detailed method of disposal of individual explosives and ammunition stores.

It is hoped that users will find this revised STEC Pamphlet 2025 simpler, easier to understand and implement, thereby promoting the safe storage and transportation of military explosive. This publication supersedes STEC Pamphlet, 2017 on the subject.

DISPOSAL OF WASTE EXPLOSIVES AND AMMUNITION BY BURNING/DEMOLITION

INTRODUCTION

1. Disposal of waste explosives and ammunition is normally carried out by:

   i) Burning on a burning platform,
   ii) Burning in a destructor unit,
   iii) Chemical treatment,
   iv) Demolition.

   High explosives, propellants, pyrotechnics and large quantities of initiatories are generally destroyed by burning. Rejected caps, pressed stars, detonators, fuzes, etc. are destroyed in a destructor. Initiatories in small quantities are destroyed by chemical methods. Rejected ammunition stores are generally destroyed by demolition.

2. The disposal of the waste explosives requires great care in every detail and therefore should not be attempted by inexperienced or untrained personnel. Moreover site selection for disposal of waste explosives, fixation of minimum quantity for disposal at a time and safer distances to be observed, require full consideration. Procedures for disposal of waste explosives should be strictly followed. The personnel involved should be aware about their specific duties in connection with the disposal work. During disposal of waste explosives due consideration is to be given to weather conditions viz. direction of wind, rain, lightning and thunderstorms etc. This pamphlet deals with specific technical stipulations, which being mandatory are to be strictly followed in connection with disposal of waste explosives.

3. **GENERAL**

   a) Waste explosives and ammunition will be disposed off by burning or by detonation only in locations designated for the purpose. Disposal must not be accomplished by burying or by dumping in sea, pits, wells, marshes and inland water ways.
   b) These stipulations prescribe measures and procedures for minimizing the risks in disposing of unwanted ammunition and explosives. They do not deal with the details of normal operational measures required for the safe conduct of disposal processes. A reference should be made to AMI Pamphlet OP/4 for the same.

4. **SITE SELECTION**

   a) Site selected for disposal of waste explosives and ammunition should be located at the maximum practicable distance from all other utilities. If disposal is by burning and involve only non-mass detonating ammunition/explosives, this distance should not be less than the applicable inhabited building distance for the quantity and type

of material involved. If disposal is by detonation, or if HD 1.1 explosives are being disposed off, the minimum distances laid down should be observed.

b) An ideal disposal area is one with deep soil, free from loose rocks, where trenches and pits can be dug easily and in which the risk of fire is negligible. In selecting a permanent disposal area, the following should be **avoided**:

i) Locations near high energy electromagnetic transmitters.
ii) Locations along established air traffic routes.
iii) Area with high water table, shallow subsurface, rock strata, and saturated clay soil.

5. EXPLOSIVES LIMITS FOR DISPOSAL AREAS

Explosive limits for disposal areas will vary according to local conditions. While determining these limits, considerations shall be given to:

a) The maximum radius of missile hazards and fire brands.
b) The maximum radius of blast effects.
c) Shock transmission through the particular ground strata (viz high water tables or rock formations)
d) The effects of overcast weather conditions.
e) The effects of winds etc.

6. METHOD OF DISPOSAL

a) To decide which method of disposal is appropriate, consideration should be given to the nature and quantity of the explosives and also to the potential hazard associated with each method of disposal.
b) Any method of disposal which introduces an environmental hazard, incompatible with statutory requirements, will not be adopted.

7. DISPOSAL AREA MAINTENANCE

a) Fire breaks shall be maintained around and within destruction areas as required.
b) All trees, dry grass and undergrowth within a radius of 50 meters from the disposal point shall be removed.
c) Fences shall be erected as required by local conditions.

8. DISPOSAL OF EXPLOSIVES BY BURNING

After each burning, the area shall be inspected for the unburnt explosives and if found, the same shall be disposed off with due precautions.

a) Normally the burning ground (burning platform, pit and incinerator) should be located in the demolition ground. If, however, a separate burning site is desired. It can be located as follows:

i. Burning ground for disposal of bulk explosives (up to 100 kg) by burning can be sited at PIQD distance subject to minimum of 275 from magazine/ESH

ii. Burning pit for disposal of small arms ammunition by burning can be sited at PIQD distance subject to a minimum of 275 m from the magazine/ESH

b) A second burning operation will not be attempted on the same platform on the same day. If, however, a second burning is required, a second burning site at least 10 metres away from the one utilized for the previous burning will be used after thoroughly quenching the first site with water and clearing/removal of the debris if any.

c) The quantity of explosives to be disposed of by burning and the quantity distances required shall be as stipulated in the enclosed **Table-1**.

d) A traverse must be provided if cased items are to be disposed of by burning or "proved". Protection accorded by natural contours of the land can be used where practicable.

e) The normal method of disposing small quantities of caps and detonators is by burning in a suitable furnace. The equipment used should be such that no fragment or self propelled item can cause injury either to the operator or to passer-by. Any hazard to hearing from excessive noise and also toxic hazards from heavy metals such as lead or mercury should be eliminated.

f) Explosives should be removed from their packaging or wrappings before burning. Packaging/wrappings should be destroyed at a different site.

g) Before undertaking disposal of waste explosives, care should be taken to ensure that explosives are mixed with lubricating oil, lumps should be broken to the specified size, and their heaping should be avoided by spreading uniformly within the specified critical height. On the burning ground, different explosives will be kept apart and only one type will be burnt at a time except where otherwise authorized. Experience has shown that some explosives which are difficult to burn can be more readily destroyed by burning them together with other more flammable explosives without increasing the hazard. It is permissible, for example, to add TNT to amatol or minol to facilitate burning.

h) Remotely operated electrical methods of ignition will always be used for burning of explosives unless another method is specifically authorized by the Head of Establishment.

9. REQUIREMENTS / STIPULATIONS FOR BURNING PLATFORM

Disposal by burning is normally carried out on a burning platform. The dimensions of burning platform may vary according to requirements of the factory/establishment. The burning platform should have smooth surface free from any crevices, cracks etc. The surface of the platform should be made of fire bricks and fire resistant material of good quality which will withstand the extreme conditions of operation. A sketch of a typical burning platform and also layout of a burning ground with two burning platforms are given as appendices 1 and 2.

10. SAFETY PRECAUTIONS

(a) Each type of explosives should be burnt separately.
(b) Waste explosives should not be sent for destruction in lumps exceeding 2.5 cm diameter roughly.
(c) Explosives must be thoroughly wetted with water before carrying to the burning ground. Excess water should be drained off and waste oil/lubricating oil/kerosene will be sprinkled on explosives after the explosives are positioned on the burning platform.
(d) For TNT, CE, RDX, and PETN the explosives should be spread so as to be not more than 30 cm wide and 2.5 cm high.
(e) Marking system should be provided on the burning ground.
(f) Widely different shapes and sizes of propellants should be burnt separately.

11. REQUIREMENTS/ STIPULATIONS FOR DESTRUCTOR UNIT AND BLAST CONTAINMENT STRUCTURE UP TO 8 kg NEC HD 1.1

a) Destructor unit
The destructor units normally consist of protected fire place made from steel sheet lined inside with fire bricks. They are heated by burning coal or firewood. The destructors are provided with feeding hoppers through which the items to be destroyed are fed inside and the items fall inside into an iron pot. The destructors are also provided with chimneys and fire doors. Sketch of the destructor is given at Appendix-3 of this pamphlet.

b) Blast Containment Structure for demolition of Ammunition up to 8 kg HD 1.1 NEC
The disposal of unserviceable and life expired ammunition has always been a matter for a great concern with the armed forces. With the induction of more quantum of explosives, the quantum of unserviceable/life expired ammunition has also increased. In order to dispose of such ammunition, local demolition grounds are developed in depots which require large safety distances for safe operations and prevention of any collateral damage to existing infrastructure. The conventional approach for disposal of ammunition involves open detonation/demolition that requires large safety distances, with a minimum of being 275 m (radial). Sandbags are placed over the round to reduce the blast pressure and capture fragment munitions which is a cumbersome job that requires a lot of logistics still has associated risk of severe injury or fatalities. The containment structure is fully enclosed container type structure which is capable to

withstand repeated explosions with predefined quantity of explosives for safe & secure disposal. The design of blast containment structure can repeatedly contain blast and fragmentation effect of ammunition having Net Explosive Content of 8 kg HD 1.1. The structure has RCC inner wall and outer wall to withstand internal pressure loading of 3 bars. Sand layers as blast mitigating material for reducing the transmitted blast/shock loads on the structure. The super structure has been covered with the sacrificial layer of aluminium sheet to protect the structure from fragment impact damage. The structure consists of blast door to withstand load due to internal explosion and ventilation system for exhaust of sand dust post explosion. The structure consists of automated sand filtration system to pump out the sand and pump it back after separation from debris present. Construction of the structures should be as per drawing no's CSTR/19/01 dt 03 Oct 2019 for 01 kg and CSTR/23/01 dt 14 Feb 2023 for 8 kg containment chambers and drawing no CFEES-UGVS-40T-Door (2m X2.25m) –(01 to 02) dt 02 Sep 2023 for blast door.

The quantity distances required from this containment structure will be zero and PIQD will be required from other explosive buildings to containment structure..

12. DISPOSAL BY DEMOLITION

a) The site should be in a remote part and precautions for the safety of personnel and buildings from air blast, fragments and debris will be observed.

b) Demolition will normally be carried by electric means. Instructions for all electrical firings of explosives in process of demolition will include drills to cover such eventualities as mis-fires or partial ignitions.

c) When it is impracticable to use electric detonators for demolition, the operations will be carried out by means of a non-electric detonator with a safety fuze of sufficient length to enable the person lighting it to get under cover before the explosion occurs.

d) Subsequent to each demolition, a search will be made for unexploded explosives or other dangerous materials before the area is declared safe.

e) The quantity of explosives to be demolished at a time and quantity distances required are given in the enclosed **Table 1.**

13 LOCAL DEMOLITION GROUND

Local demolition ground limited to demolition of 7 kg NEC explosive, at a time, can be sited at PIQD distance, subject to a minimum distance of 275 m from magazine / ESH provided the following stipulations are adhered to:

(a) Local demolition ground should be barricaded with traverse.
(b) RCC shelter for working personnel should be provided in demolition ground outside the traverse
(c) Man limit :
    i. During preparation : 10 persons
    ii. During disposal : 4 persons

14. OFFICER-IN-CHARGE OF DISPOSAL OF EXPLOSIVES AND HIS SAFETY DUTIES.

A responsible officer will be appointed to be in charge of explosives disposal site. By instruction, inspection and supervision, he will ensure that disposal of explosives is carried out in a safe and efficient manner. He will also depute a suitable person on the site during disposal of explosives to:

a) Ensure that only authorized persons are present on site.
b) Ensure that before disposal operations begin, warning signs and road blocks are posted to restrict entry into area. All communication lines should be in working condition.
c) Check before work commences that plants and premises, if any, are in safe working order.
d) Ensure that only authorized disposal is performed.
e) Ensure that in the event of an accident or an unusual occurrence such steps are taken as necessary to alleviate distress and to make the site safe and secure from unauthorized persons and report at once to the officer-in-charge.
f) The site searched after completion of operations and cleared up so as to ensure that it is left in a safe condition.

15. PLANNING DISPOSAL TECHNIQUES

No explosives disposal operations will be permitted until an approved technique has been developed which will include a mis-fire drill. A set of instructions for the safe conduct of operations will be drawn up in conjunction with the Establishment safety officer and operatives will be trained and practiced in these methods of working before they are employed to dispose items. During explosives disposal operations, adequate facilities should be available to deal with fire and accidents. Personnel will be trained in emergency procedures.

16. EXPLOSIVES AWAITING DISPOSAL

Explosives awaiting disposal will be segregated from other explosives and will be regularly examined to ensure that deterioration does not become as excessive as to prevent their eventual safe disposal.

17. COVER FOR OPERATORS

A splinter proof shelter for operators/firing crew shall be sited at a minimum distance of 275 m for destruction of ammunition by demolition and 100 m for disposal of explosives by burning. It should have 30 cm RCC walls and 15 cm RCC roof. A shatter proof glass viewing window can be provided for observation purposes.

18. MISFIRE DRILL

In case of misfire, the operator must wait for 30 minutes or at least 6 times the anticipated time of burning before approaching the point of burning. After the specified time has elapsed, the operator will make up a fresh ignition set and then proceed to the down wind end of propellant train, ensuring that there is no visible trace of smoldering or burning at the site. A fresh ignition set will be placed and initiated.

19. CLEARANCE OF BURNING GROUND

After each burning operation, all debris will be collected and disposed off and the ground or pit will be thoroughly watered.

20. EFFECT OF WEATHER

Before explosives are disposed off by burning, attention will be given to the direction and force of the wind and other relevant weather conditions. During thunderstorms, disposal of explosives either by burning or by demolition will be suspended.

TABLE-1

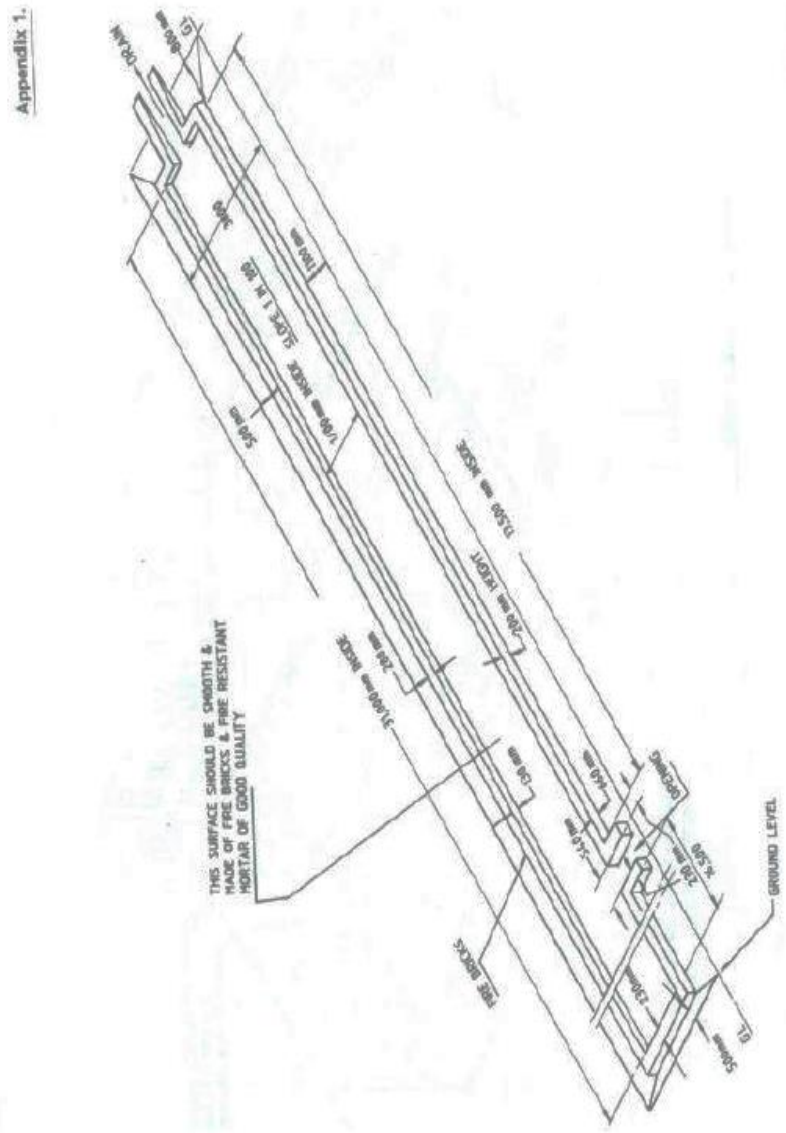
QUANTITY DISTANCES FOR DISPOSAL OF EXPLOSIVES

QUANTITY	ALL AROUND CLEARANCE (IN METERS)		
(Kg)	AMMUNITION	HE (TNT)	PROPELLANTS/ PYROTECHNICS
Upto 50	400	275	100
51-200	700	275	125
201-500	900	500	250
501-1000	1100	-	400

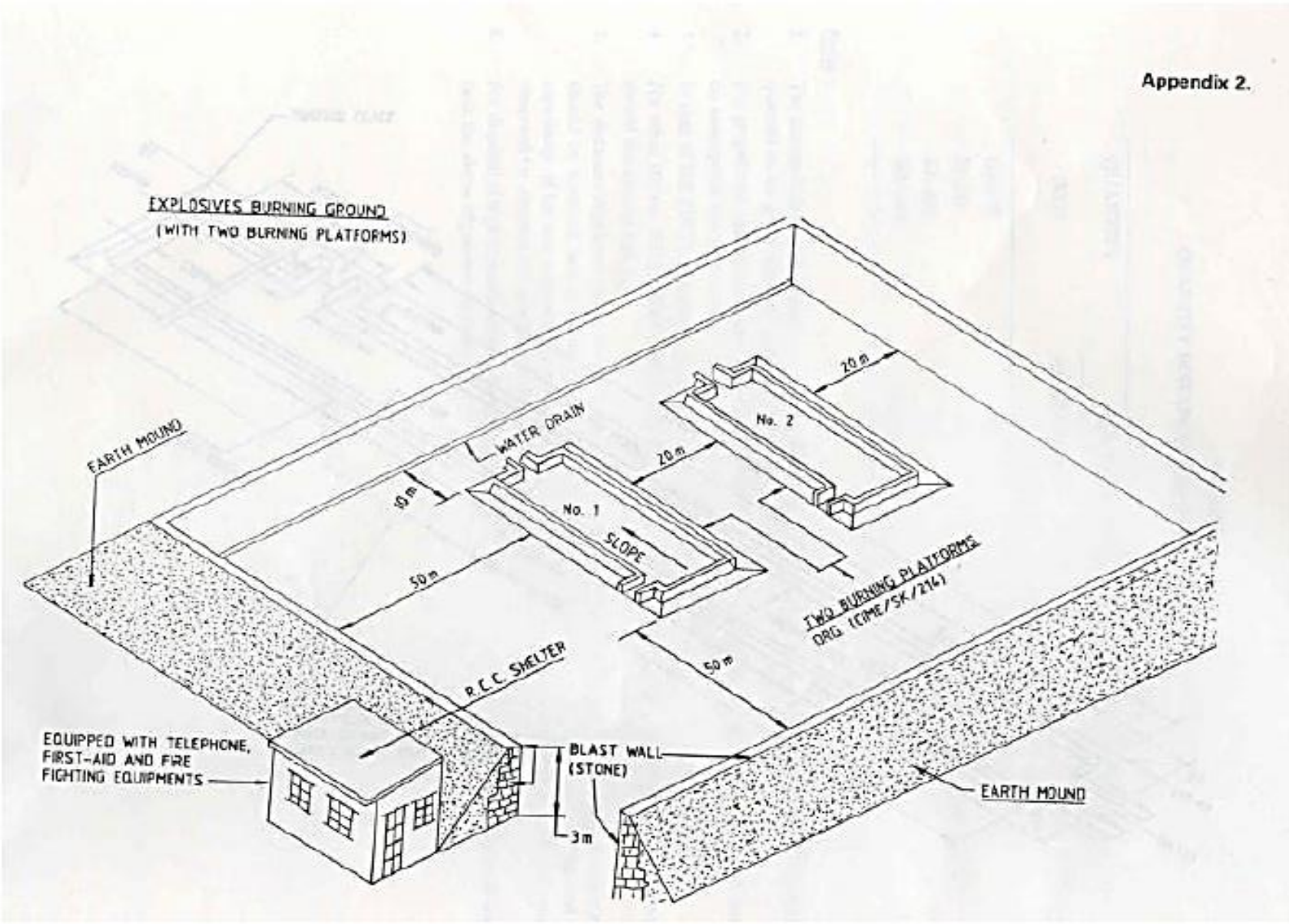
Notes:

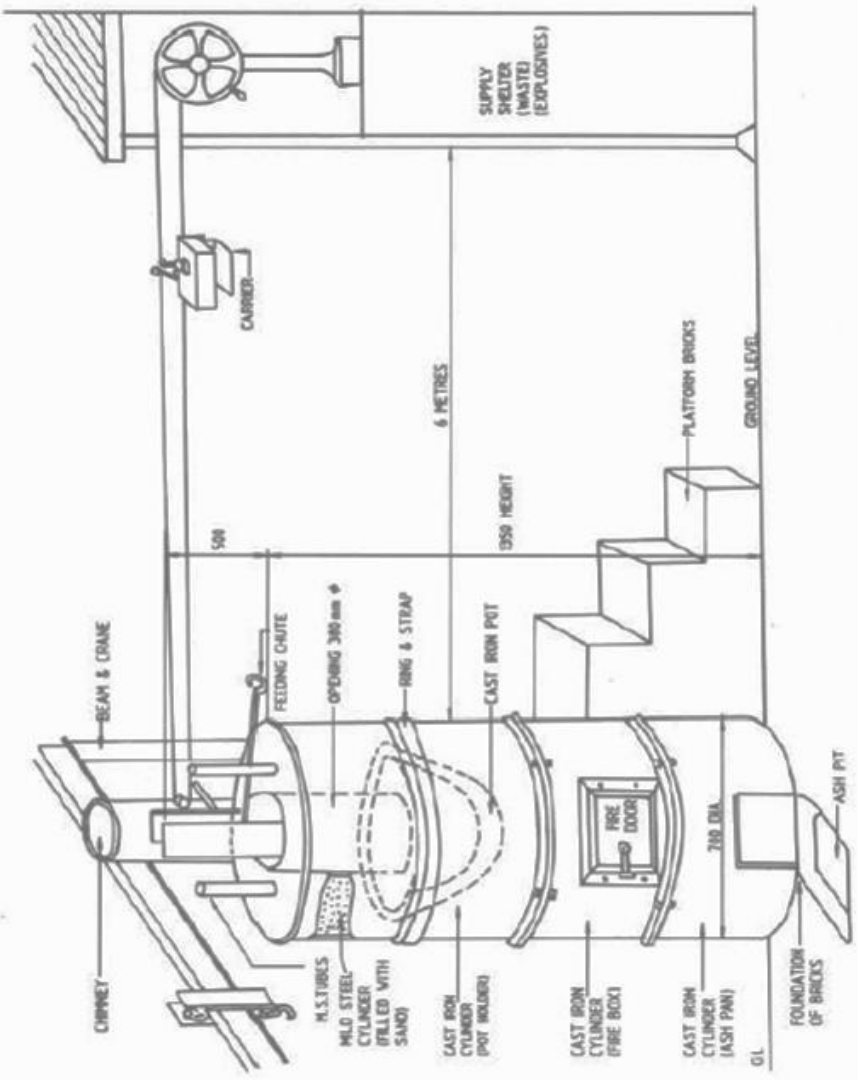
1. The ammunition disposal distances recommended are based on 20 RB clearance (Viz. 5 OQD) for the highest quantity in the given range of quantities to be demolished.
2. For propellants and pyrotechnics, the safe disposal distance recommended is equal to OQD. This is based on assumption that under worst conditions, burning may proceed to detonation.
3. In case of HE (TNT), maximum quantity to be disposed of at a time should not exceed 500 kg.
4. For other HE viz. RDX, HMX, PETN, CE, PEK-1 etc., the maximum quantity to be disposed off at a time should not exceed 100 kg.
5. The distances stipulated above are for bulk explosives. All metallic/laminated/polymeric casings/wrappings should be removed before undertaking the disposal. These casing and wrappings should be disposed off separately. If for any reason this is not possible, distances as prescribed for ammunition shall have to be observed for disposal of cased pyrotechnics and propellants.
6. For disposal of high capacity ammunition including missiles and rockets, it is recommended to observe greater than the above stipulated distances.

Explosive Burning Platform



Appendix 2.


EXPLOSIVES BURNING GROUND
(WITH TWO BURNING PLATFORMS)
EARTH MOUND
WATER DRAIN
10 m
No. 1
20 m
No. 2
20 m
SLOPE
50 m
50 m
TWO BURNING PLATFORMS
ORG (CIME/SK/216)
R.C.C. SHELTER
EQUIPPED WITH TELEPHONE,
FIRST-AID AND FIRE
FIGHTING EQUIPMENTS
BLAST WALL
(STONE)
3m
EARTH MOUND


SUPPLY SHELTER (WASTE) (EXPLOSIVES)
CARRIER
6 METRES
PLATFORM BRICKS
GROUND LEVEL
500
1350 HEIGHT
BEAM & CRANE
FEEDING CHUTE
OPENING 300 mm ϕ
RING & STRAP
CAST IRON POT
FIRE DOOR
700 DIA
ASH PIT
CHIMNEY
M.S.TUBES
MILD STEEL CYLINDER (FILLED WITH SAND)
CAST IRON CYLINDER (POT HOLDER)
CAST IRON CYLINDER (FIRE BOX)
CAST IRON CYLINDER (ASH PAN)
GL
FOUNDATION OF BRICKS