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STEC PAMPHLET - 20

REGULATIONS ON THE USE OF FREIGHT CONTAINERS FOR TRANSPORTATION OF MILITARY EXPLOSIVES

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PREFACE

Explosives and ammunitions are generally transported by rail and road. However, rail transport is normally resorted to due to serious limitations in road transport. Non –availability of railway wagons at times lead to accumulation of explosives and ammunition. To overcome this problem STEC has finalized regulations on the use of Freight Containers for transportation of explosives and ammunition both by rail and road. These regulations are intended for use of different services and organizations under the Ministry of Defence.

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.

REGULATIONS ON THE USE OF FREIGHT CONTAINERS FOR TRANSPORTATION OF MILITARY EXPLOSIVES

APPICABILITY

1. The provisions contained in these regulations shall apply to the transportation of military explosives in freight containers by rail and road.

2. Military Explosives hereinafter referred to as 'Explosives', shall mean any class 1 article, substance, combination thereof or unit load which is held under the control of Service Headquarters/Departments/Organizations under the Ministry of Defence.

DEFINITIONS

3. Definitions of general terms used in these regulations are described below:

Freight Containers: For the purposes of these regulations a freight container is defined as an article of transport, which has the under mentioned characteristics. It should be noted however that in the restricted context of the carriage of explosives, this definition applies only to 20ft solid sided metal ISO Containers. Domestic freight containers 4A, 6.4t to BIS 7159 (1974, Part 1& 2) with NEC 2t can also be used for transportation of explosives.

(a) Is of a permanent character and accordingly strong enough to be suitable for repeated use;
(b) Is specifically designed to facilitate the transport of goods, by one or more modes of transport, without intermediate reloading;
(c) Is designed to be secured to its carrying vehicle and to have fittings for these purposes;
(d) Is neither vehicle nor packaging.

Hazard Division: Explosives as presented for transport are categorized by six Hazard Divisions (HD) depending on the hazard presented in the event of accidental initiation of the explosive. HDs are determined on the basis of tests specified in the UN Recommendations on the Transport of Dangerous Goods (The Orange Book).

Compatibility Groups (CG): Compatibility Groups (CG) are exclusive to Class 1 Dangerous Goods. They relate to the characteristics of articles and substances and their interaction when activated with other articles and substances in the Class and provide the basis for determining the mixing rules that indicate which CG may be carried together in transit.

Net Explosive Quantity (NEQ): The NEQ of a single munition is the total explosives content of the munitions. NEQ is expressed in Kilograms and for groups of identical munitions it is aggregated as the sum of each NEQ

Gross Weight: This term refers to the total lifting weight of a unit of cargo including its contents, packaging and securing equipment.

Packing: In the context of this regulation packing refers to the placing of items in primary and secondary packs within a container so that they remain in a rigid configuration in transit. This process is also known as stuffing.

Placard: This is an external label, which indicates the contents of a container in terms of the risks involved when handling and in the event of emergencies.

Authorized Representative: An individual authorized by the Head of Establishment to supervise the receipt and dispatch of consignments of ammunition and explosives on his behalf. The individual concerned should have received formal training in the handling of explosives at an approved training establishment.

GENERAL CONDITIONS

4. All explosives, unless otherwise stated in the regulations may be transported in freight containers by rail and road.

5. Only 20ft ISO Containers meeting the ISO specification or domestic container 4A, 6.4t to BIS 15: 7195 (Part I-II) are to be used for the carriage of ammunition. 40 ft ISO Container can be used subject to the restriction in quantity of explosive to be transported by as per STEC pamphlet No. 9 & 10 respectively.

6. A freight container used to carry explosives should be designed, constructed and equipped so that the explosives are protected from external hazards, the weather and from unauthorized access.

7. Vehicles and rail wagons carrying freight containers are to be fitted with adequate and appropriately positioned twist locks all of which are to be engaged when the vehicle is in motion.

8. When vehicles are loaded with more than one freight container the aggregated explosive limit for the vehicle or group of rail wagons is not to be exceeded. (Please refer to Rules 630,631 and 632 of Military Tariff).

9. For the purposes of this regulation a combination of a goods vehicle and trailer is treated as one vehicle as long as they are attached to each other.

10. Once loaded and sealed it should be exceptional for containers to undergo intermediate or partial loading/unloading and should this be necessary, all such operations are to be supervised by authorized representative.

FREE-FLOWING POWDERY SUBSTANCES

11. Freight container used to carry free-flowing powder explosives classified 1.1C, 1.1D, 1.1G, 1.3C or 1.3G or to carry pyrotechnics classified 1.1G, 1.2G or 1.3G should have a closed-boarded or continuous floor with a nonmetallic surface or covering. This surface of the side walls, closed end wall and floor presented to the explosives load should be free from protrusions. The non-metallic surface should be as integral part of the container structure or a separate lining not less than 6mm thick and spaced away from the container walls to minimize condensation. This spacing should be at least 25mm, or where there are corrugations over 25mm deep, at least the depth of the corrugations.

LIMITS OF EXPLOSIVES QUANTITIES TRANSPORTED

12. In order that a freight container may be carried by all modes of surface transport, the NEQ of explosive contained in any one approved container (subject to gross weight restrictions) shall not exceed 8 tonnes by rail and 4 tonnes by road in accordance with relevant regulations.

COMPATIBILITY GROUPS MIXING

13. Explosives belonging to different Compatibility Groups (CG) are not to be carried together in the same freight container unless such carriage is permitted as under:

(a) Explosives articles belong to CGs C, D & E may be transported together;
(b) Fuzzed articles belong to CG F must be carried separately only;
(c) Explosive substances in CGs, C, D & G must be carried separately;
(d) Fuses in CG B may be carried with articles of CG D, E or F of which they are component parts.
(e) CG S may be carried with CGs B, C, D, E, F or G.

FOR THE PURPOSE OF PLACARDING:

14. (a) When explosives in different CGs are carried together, they shall all be deemed to be in the Group amongst them which falls highest in the following list, that is, Group B (highest), F,G,C,D, and E (lowest).

(b) When explosives in different hazard divisions are carried together then, all explosives (with the exception of those in HD 1.4) shall be deemed to be in the HD amongst them which comes highest in the following list, that is, HD 1.1 (highest), HD 1.2 and HD 1.3.

INSTRUCTIONS FOR PACKING EXPLOSIVES IN FREIGHT CONTAINERS

15. The lifting of freight containers loaded with explosives packed under the provisions of this regulation is to be undertaken in compliance with the conditions specified at Annexure-1.

ANNEXURE-1

INSTRUCTIONS FOR PACKING EXPLOSIVES IN FREIGHT CONTAINERS

INTRODUCTION

1. While the use of freight containers substantially reduces the physical hazards to which goods are exposed, improper or careless packing of goods into them or lack of proper blocking, bracing and securing, may be the cause of personnel injury when they are handled or transported. The person who packs and secures a container may be the last person to look inside until it is opened by the consignee at its final destination. The importance of these responsibilities is signified by the requirement to include a Container Packing Certificate details of which are provided at Paragraph 34.

SUPERVISION DURING LOADING AND UNLOADING

2. A MOD Authorized Explosives Representative (AR) who is familiar with the risks involved and appropriate emergency measures to be taken is to be constantly in attendance during the packing and unpacking of a freight container. He is to carry out the mandatory checks, supervise the loading operation and prepare the freight container for movement strictly in accordance with the instructions contained in this Annex. Suitable measures to prevent fire should be taken including the prohibition of smoking in the vicinity of explosives.

VISUAL INSPECTIONS PRIOR TO PACKING

3. A Container should be inspected inside and outside before it is packed with explosive. The following guidance covers the basic requirements for exterior and interior inspections.

EXTERIOR

4. The structural strength of a container depends to a great extent on the integrity of its main framework comprising the corner posts, corner fittings, main longitudinal and the top and bottom end traverse members which form the end frame. If there is evidence that the container is weakened, it should not be used.

5. Walls, floor and roof should be in good condition, and not significantly distorted.

6. Doors should work properly and be capable of being securely locked and sealed in the closed position, and properly secured in the open position. Door gaskets and weather strips should be in good condition.

7. Irrelevant labels, marks or placards should be removed or masked.

INTERIOR

8. A container should be weather proof unless it is so constructed that this is obviously not feasible. Previous patches or repairs should be carefully checked for possible leakage. Potential points of leakage may be detected by observing if any light enters a closed container.

9. A container should be free from major damage, with no broken flooring or protrusions such as nails, bolts, special fittings, etc. which could cause injury to persons or damage to the explosives.

10. Cargo tie-down cleats or rings where provided should be countersunk, in good condition and well anchored.

11. A container should be clean, dry and free from residue and persistent odours from previous cargoes.

STOWAGE PLANNING, PACKING AND SECURING OF AMMUNITION AND EXPLOSIVES

12. The following Paragraphs detail the minimum requirements for ensuring that the container and its contents is rigidly packed and secured to withstand the most extreme conditions of transit and handling.

BEFORE PACKING

13. A container to be packed should rest on level and firm ground or on a rail wagon or trailer. In the latter case, care should be taken to ensure the trailer cannot tip while being packed especially if a fork lift truck is being used. If necessary the trailer should be propped. Brakes should be securely applied and the wheels chocked.

14. The packing sequence and configuration should be planned in advance. This should make it possible to produce a tightly packed or well braced content in which the compatibility of all items or explosives and their nature i.e. type, strength and how packaged, are taken into account.

WEIGHT FACTORS

15. The planned load should not weigh more than the capacity of the container which is marked upon it. This ensures that the permitted maximum gross weight of the container will never be exceeded. The measures to prevent overloading are given at paragraph 38.

16. Any weight limitation which may be dictated by regulations or other circumstances (such as lifting and handling equipment), should be strictly observed. Such a limit may be considerably less than the permitted gross weight already referred to.

WEIGHT DISTRIBUTION

17. Load planning should take account of the fact that container design generally assumes the load to be evenly distributed over the entire floor area. Where substantial deviations from uniform packing could occur, specialist advice should be sought.

18. When a heavy indivisible load is to be shipped in a container, due regard should be given to the localized weight bearing capacity of the container. If necessary, the weight should be spread over a larger area than the actual bearing surface of the load, for example by use of bulks of timber.

19. In such a case the method of securing the load should be planned before packing occurs and any necessary preparations made.

20. When planning the packing of a container, consideration should be given to potential problems, which may be created for those who will unpack it.

SECURE PACKING REQUIEMENTS

21. It is essential to secure the cargo in a container against any reasonably foreseeable movement. At the same time the method of restraining the cargo should not itself cause damage or deterioration either to the explosives or the container.

22. Where goods of regular shape and size are concerned, a tight pack from wall to wall should be sought. However, in many instances some spacing will occur, spaces are acceptable provided the rigidity of the load is maintained by adjacent packages. If there is sufficient rigidity or if the spaces between the packages are too large, then the pack structures should be reinforced by using dunnage.

CARGO EQUILIBRIUM

23. The cargo weight should be evenly distributed over the floor of a container. Where cargo items of a varying weight are to be packed into a container or where a container will not be full (either because of insufficient cargo or because the maximum weight allowed will be reached before the container is full) the configuration should be so arranged and secured so that the approximate center of the weight of the cargo is close to the mid-length of the container. In no case should more than 60% of the load be concentrated in less than half of the length of a container measured from one end.

24. Heavy items should not be placed on top of lighter goods. The center of gravity should be below the half-height of a container.

CARGO PROTECTION

25. In order to avoid cargo damage from moisture, wet dunnage, pallets or packaging should not be used.

26. Permanent securing equipment incorporated in the design of a container should be used wherever necessary to prevent cargo movement.

27. Special care should be taken during handling to avoid damage to packages. However, if a package is damaged during handling the immediate area should be evacuated until the hazard potential can be assessed. The damaged package should not be shipped. It should be moved to a safe place in accordance with instructions given by an Authorized Representative who is familiar with the risks involved and knows which emergency measures should be taken.

MIXING WITH CONVENTIONAL STORES

28. Other than articles in Compatibility Group S, explosives are not to be packed in the same container with other dangerous goods.

ON COMPLETION OF PACKING

29. During the final stages of packing a container, care should be taken in so far, as is practicable, to build a secure face of the cargo so as to prevent 'fall out' when the doors are opened. Where there is any doubt as to the security of the cargo, further steps should be taken to ensure security by placing timber between the rear posts. Two factors should be borne in mind:

(a) a container on a trailer usually inclines towards the doors; and

(b) Cargo may move against the doors due to jolts, etc. during transit.

30. After closing the doors, ensure that all closures are properly engaged and secure. In addition to Seals, padlocks and/or 'U' bolts are to be applied. Care should be taken that sealing procedures are carried out properly.

CARGO WITH SECURITY RESTRICTIONS

31. The transport of some types of security sensitive ammunition and explosives may require the container doors to be padlocked. In such cases the keys should be readily available to the operator responsible for the carriage of the ammunition.

PLACARDING

32. UN Placards of minimum size 250 mm x 250 mm per side and if applicable subsidiary risk labels of minimum size 250 mm per side, should be affixed to all 4 vertical surfaces of the container.

33. Placards for the sides of the container should be affixed in such a position that they are not obscured when the container doors are opened.

CERTIFICATION – CONTAINER PACKING CERTIFICATE

34. The Authorized Representative responsible for the packing of ammunition and explosives into a container should provide a "Container Packing Certificate" certifying that this has been properly carried out and stating that:

(a) The freight container was clean, dry and apparently fit to receive the goods.
(b) The freight container is visually structurally serviceable in accordance with Paragraphs 4-11 of this Annex.
(c) Only permitted CGs have been loaded into the freight container.
(d) All packages have been externally inspected for damage, and only sound packages have been loaded.
(e) The cargo has been evenly distributed.
(f) All packages have been properly loaded into the freight container and secured.
(g) The freight container and the packages therein are properly marked, labeled and placarded.

ADVICE ON RECEIPT OF CONTAINERS

35. Persons opening a container should be aware of the risk of cargo falling out. Doors, when opened, should be secured in the fully-opened position.

36. If there is a particular reason to suspect danger, e.g., because of damage to packages expert advice should be sought before unpacking of the container commences.

37. After a container with explosives has been unpacked, particular care should be taken to ensure that no hazard remains. When the container or vehicle offers no further hazard, the UN placard marks should be removed, masked or otherwise obliterated.

MEASURES TO PREVENT OVERLOADING OF CONTAINERS

38. Occupational safety hazards are caused by overloaded containers and these hazards include risks to container handlers and plant operators, particularly fork lift truck drivers whose vehicles may be damaged or may become unstable. A number of steps can be taken to prevent the loading of containers; these include taking proper measures to ensure that:

(a) the cargo in the container has been properly packed, blocked, braced and secured
(b) the distribution of cargo within the container has been arranged so that the center of gravity is reasonably central with regard to length and breadth and height of the container
(c) the maximum gross weight of the container has not been exceeded
(d) where possible, a weight declaration or weigh bridge certificate should be included in or with the container documentation; and
(e) Where practicable, load detection devices should be fitted to container handling equipment, in particular to fork lift trucks and side loaders used to transport container.

SURVEYS AND CHECKS OF CONTAINER HANDLING FACILITIES BEFORE UTILISATION, AND BEFORE AND DURING HANDLING

INITIAL SURVEY PRIOR TO UTILISATION

39. (a) Prior to the decision to utilize a specific facility for handling containers stuffed with ammunition and explosives for road or rail transportation, a quality assurance type survey of the considered facilities should be made by a qualified person to verify their capacity to handle ammunition in safe conditions.,

(b) In particular it is necessary to make sure that:

i. responsibilities inside the organization in charge of the facilities are well defined as well as the distribution of the responsibilities between the representatives of different sections and the Authorized Representative,

ii. material handling equipment is operated by skilled personnel having knowledge of explosives safety,

iii. safety instructions for handling container stuffed with ammunition exist and are known by the personnel who have to apply them,

iv. all handling equipment is subject to prescribed inspections with written procedures which can be easily checked,

v. Fire-fighting equipment is sufficient, adequately/located and periodically inspected.

CHECK BEFORE AND DURING HANDLING OPERATIONS

40. The person in charge of the handling equipment must ensure that before starting any handling operations:

(a) the equipment is up-to-date with the prescribed inspections, that the mobile accessories are serviceable, and that hoisting capacity is adequate for the work to be done,

(b) Only suitable equipment is used for hoisting containers,

(c) local instructions for handling of containers are complied with,

(d) No damaged container is handled until a proper refit is made and an inspection carried out by a qualified person.

LIFTING FREIGHT CONTAINERS LOADED EXPLOSIVES

41. GENERAL

(a) Only approved freight containers may be lifted.
(b) A mobile crane may not travel with a suspended container.
(c) Other lifting appliances, when transporting containers, are not to exceed a speed of 10 Km per hour.
(d) A front top-lift container handler may travel only with a container in the minimum lift position.

TYPE OF LIFTING GEAR

42. Containers loaded with ammunition and explosives are to be lifted using only the following types of lifting equipment:

(a) A specialized container crane.
(b) A shipboard crane or derrick crane operated by one person.
(c) A gantry crane ashore or on board ship.
(d) A conventional dock crane.
(e) A floating crane.
(f) A straddle carrier, side loader container handling machine or front loading lift truck.
(g) Front top-lift container handler.
(h) Mobile crane or rail mounted crane with top-lift spreader frame.

43. The safe working load should exceed the declared gross weight of the container by 25% of that weight or by 5 tonnes, whichever figure is the lower.

44. A union purchase rig or a tandem lift should NOT be used.

45. Unless a specialized container crane is used the lifting of a freight container should be from the top corner castings by means of:

(a) a spreader frame fitted with four twist-locks, actuated by the crane or gantry operator or by pendant control whereby the twist-locks can be locked in the lifting position, or
(b) a spreader frame fitted with four twist-locks, each of which is engaged manually and has a collar which, when the twist-lock is entered and turned, drops into the corner aperture and locks the twist-lock in position, or
(c) a spreader fitted with shackles which are suitable for use with the container fittings.

INSPECTION OF THE LIFTING GEAR

46. The Authorized Person shall examine the records of the lifting machinery and gear to ensure that thorough examinations have been carried out.

47. Before lifting freight containers loaded with explosives, the Authorized Person shall carry out further checks to ensure that:

(a) All controls signal lights and indicators are operating correctly and the brakes are properly adjusted.
(b) All moving parts of the lifting gear such as sheaves and wire ropes are in good condition and running smoothly.
(c) All static parts of the system such as shackles, pins and anchorage points are in good condition and properly secured.
(d) Any spreader frame and the four twist-locks are in good condition and the interlocks are effective.

THE LIFTING OPERATION

48. The Authorized person shall ensure that all four twist-locks are fully engaged and/or all shackle attachments properly secured before the commencement of each lift.

49. The container shall be lifted to such a position as to enable the Authorized Person to check the base of the container and each corner fitting attachment. This check is not to be carried out from directly underneath the container.

50. The operation shall be carried out with the minimum acceleration or deceleration.

51. The Authorized Person shall ensure that the operation will not take place in adverse conditions, e.g. in poor visibility (unless adequate illumination is provided) or in high winds.