Ministry of Defence
Defence R&D Organisation

STEC PAMPHLET - 6

REGULATIONS ON FIGHTING FIRES IN GOVERNMENT EXPLOSIVE ESTABLISHMENTS

2025

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PREFACE

Regulations on fighting fires in Government explosives establishments were drawn up and issued by the Storage & Transport of Explosives Committee in 1962 and were revised in 1971 incorporating the various amendments made by the STEC from time to time.

Consequent on the adoption of United Nations system of classification of explosives by most of the countries of the world, it was recommended by the STEC that in order to promote standardization, and thereby achieving harmonization, the fire-fighting pamphlet should also be revised. Thus keeping in view the International practices and recent developments in this field, the present regulations on 'Fighting Fires in Government Explosive Establishments have been drawn up for use of different Services/Organizations under the Raksha Mantralaya.

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.

]SECTION – I

GENERAL

Introduction

1. Explosives are chemical substances or combination of chemical substances, which by nature are liable to be initiated by spark, friction and percussion. Once these are involved in a fire, they create sudden and intense pressure on its surroundings, usually characterised by the evolution of large quantity of heat, sound and flash. Consequently any fire involving explosives/ammunition might very well lead to disastrous consequences as a result of mass fire/explosion unless dealt with speedily and effectively. As such manufacture, processing and storage of explosives in any building is always associated with serious fire and explosion hazard. Unlike other combustible or flammable substances/liquids, the explosives once involved in a fire do not give any time for making a 'sizeup' of the situation and any action needed to avoid catastrophe must be preplanned and embodied in well laid-down procedures. It may, however, be noted that all the explosives in use are not of similar characteristics and behaviour. As such with a view to dealing with fires involving explosives very effectively, knowledge of the behaviour /characteristics of the different explosives/ammunition, when involved in a fire, is very much essential. Besides the knowledge on the behaviour of explosives, knowledge on the application of proper fire-fighting measures in accordance with the behaviour of the explosives, when involved in a fire, is also very much essential.

2. An outbreak of fire in the vicinity of explosives, or amongst the explosives themselves, isa potential source of very great and immediate danger to life and property. The head of an explosives establishment must, therefore, regard as of the greatest importance his responsibility for ensuring that the fire prevention and protection measures, specified in the relevant explosives regulations and fresh orders issued from time to time, are taken and that the organization is such that if a fire occurs it is tackled immediately and energetically with all available resource. For the purpose of fire-fighting the term, 'explosive establishment means any building, open air site or underground site where explosives are held.

Responsibilities

3. The responsibilities of those persons present at such a fire are defined as follows:
   (a) The Head of an explosives establishment shall mean the senior-most officer-in-charge of the establishment belonging to Defence Services in which explosives are stored, processed, manufactured, rectified/modified and/or handled.

(b) The Head of the establishment is responsible for the general administrative arrangements and for the proper coordination of all the various emergency services arrangements like communication, medical, etc. He is responsible at any incident in giving advice to the Officer-in-Charge, Fire Services relative to the explosives safety aspects of fire-fighting. He would decide in any particular instance whether the fire-fighting services are to tackle the building or stack on fire and/or to prevent the fire affecting adjacent buildings or stacks. He would determine the risk involved in any given line of action, and direct the Officer-in-Charge, Fire Services accordingly.

(c) The Officer-in-Charge, Fire Services is responsible for the actual fire-fighting operations, including the direction of all fire-fighting personnel and equipment on the objectives selected by the Head of the establishment, and for the implementation of any advice which he may give.

Planning

4. The Head of the establishment will prepare a plan for fire prevention and fire fighting, to include efficient arrangements relative to the following:

(a) Initiation of the fire alarm.
(b) Safe evacuation of personnel NOT required for fire-fighting.
(c) Fire-fighting measures.
(d) Rescue of trapped persons to a place of safety and first-aid to the injured, if any.
(e) Adequate identification of all buildings.
(f) Liaison with and assistance from the local fire service authority and civil police.

5. Information which may be necessary or desirable to have immediately available in the event of a fire emergency, must be prepared and kept up-to-date. In particular, consideration must be given to the following:-

(a) Line drawings of all complex buildings and those presenting definite fire risks, ensuring that copies are immediately available for the use of the fire service. These drawings should include the following:-

i. Location of exits
ii. Main control switches or valves for ventilation plant, gases, water and electricity
iii. Stair ways
iv. Fire-stop doors
v. Specialized fixed fire-fighting equipment
vi. Emergency lighting

vii. Any other information which might be reasonably required in an emergency

(b) A site plan of the establishment showing the location and identity of each building of explosives in each fire division, and the layout of the principal service mains, including water, gas, electricity and telephone services. Copies of this plan are to be kept at strategic points in the establishment i.e. fire station, security office etc. For security reasons the plan should contain only the minimum information necessary for effective fire-fighting and in this regard the Official Secret Act and current security regulations must be observed.

Fire-fighting Measures

6. Fire-fighting measures within an explosives establishment call for close attention to detail and coordinate all available means to ensure that an out-break of fire is tackled immediately and efficiently and brought under control as quickly as possible.

7. These measures may conveniently be sub-divided into following:-

(a) Fire-fighting 'first-aid' measures.
(b) Establishment measures.
(c) Mutual aid scheme.
(d) Local/ civil authority measures.

These measures are discussed in detail as follows:-

(a) **Fire-fighting 'first-aid' measures**

i. These are adequate provisions within a building containing explosives or in the vicinity of an explosives stack in the open, or underground site containing explosives, of fire-fighting appliances and local fire alarms for operation by those on the spot. The prompt use of these appliances may be the means of preventing a more serious incident and all concerned must be trained to be fire conscious and capable of operating the equipment efficiently.

ii. Guidelines on the provisions of fire protection facilities to explosive buildings are given in STEC pamphlet No-15. A reference can be made to the same for provision of first-aid fire appliances, their maintenance and testing, training of personnel, location of static water tanks, hydrant-installation etc.

iii. In case of air-conditioned explosive buildings, special fire prevention and fire protection measures are required. The air-conditioned ducts should be provided with dampers of fusible link type (metallic or plastic) actuating at a predetermined temperature.

iv. Thermocol, being a flammable material, should not be used for false ceiling in air-conditioned explosive buildings. Materials like glass wool, gypsum board, glass fiber reinforced, fire rated gypsum boards etc. can be used in lieu.

v. In case of explosive vans/ GS vehicles used for transportation of explosives and ammunition, the fire extinguishers to be used in normal and sub-zero conditions in both crew and cargo compartments are :

   a. 1x9 litre AFFF based mechanical foam extinguisher
   b. 2x 2 kg Clean Agent (Halon alternative) extinguisher

vi. Fire-fighting equipment for use at high altitude areas and sub-zero climatic conditions are referred to STEC pamphlet No.15, Para 12.

(b) Establishment measures

i. Establishment measures comprise the provision of fire-fighting media and equipment including adequate supply of water from static tanks and/or pressure mains, fixed fire-fighting installations, hydrants, hose, mobile fire appliances, adequate supply of foam wherever necessary i.e. fire engines and trailer pumps, fire extinguishers, self-contained breathing apparatus, an efficient general fire alarm system, means of communication, protective equipment and clothing and trained fire-fighting personnel.

ii. All appliances and equipment are to be maintained in an efficient condition. Practices designed to test arrangements should be made at frequent intervals (at least once in a month). Special attention must be paid to dealing with out-breaks of fire during non-working hours. The fire-fighting drills should also include reciting of various fire-fighting actions by the fire-fighting crew.

iii. Capacity of static water tanks for explosives storage areas should be 225 kl and be positioned at a distance not less than 100 m and not more than 200 m from the storage magazines. In case of process areas in the explosives factories and laboratories under different service organizations, capacity of static water tank could be 110 kl to 220 kl depending on local requirements conditions. For bomb-dumps of Air Force, tank should be of 110 kl capacity.

iv. Hydrants for fire-fighting purpose may be provided where adequate pressure and output is assured. Hydrants may be installed on 150 mm diameter main, branched off to 100 mm in cases where it is meant to feed a single hydrant. For explosives areas water discharge of 1150 liter per minute at 5.25 kg/cm^2 pressure should be available from each hydrant when two hydrants are operated simultaneously. In case of units engaged in non-explosive activities the requirement of 3.5 kg/cm^{2}pressure. The

location of the fire hydrants should be decided in consultation with the CFEES at the time of planning/siting of the facilities.

(c) **Mutual aid scheme**

When there are more than one Defence units in a station, the Station Commander, who is responsible for security against fire in all the Defence units of the station shall formulate a scheme of mutual aid by which all fire brigades maintained by the various Defence units in the station may be brought together for fighting a fire, on an alarm being raised by any Defence installation on the outbreak of a fire. The heads of the different Defence installations must fully co-operate and assist the Station Commander in the successful working of the scheme.

(d) **Local/civil authority measures**

These measures are those taken by the local fire authority by providing all normal fire equipment and appliances in use by them together with trained fire-fighting personnel.

Coordination of Measures

8. The close and efficient coordination of the first three elements (a), (b) and (c) as listed in Para 7 above, is absolutely essential. With regard to the element above, the local/civil authority measures, it is left to the discretion of the Station Commander and the Head of an establishment, who may seek the cooperation and assistance of the local civil authorities, if considered necessary and feasible. In the event of such cooperation the following instructions will be observed by the Head of an establishment:

(a) The Head of the explosives establishment shall inform the nearest Fire Officer of the local civil authority of the presence of explosives. He shall be given particulars of the nature of fire which he and his party shall be required to fight in case of an emergency. The Head of the establishment and the Fire Officer of the local civil authority, in consultation, shall prepare an agreed plan of fire-fighting in consultation with the Station Commander who shall coordinate the plan on a station basis. Agreement shall be reached between the two officers on their respective contribution in equipment and personnel towards the overall fire-fighting plan and combined exercises arranged where possible.

(b) Agreement shall be reached on the conditions under which civil authority measures would be called upon.

(c) To minimize delay, there should be permanent telephone communication between the Head of the establishment and the Fire Officer of the local civil authority, by direct line where possible, particularly at large establishments.

(d) The control of the fire-fighting operations within an enclosed explosives area, when both the Govt. establishments and civilian fire services are operating, shall necessarily be exercised by the Head of the establishment.

Public safety

9. To ensure public safety, the Head of the establishment shall arrange with the local police the action to be taken by the latter when an outbreak of fire occurs. The police shall also be kept informed of any changes necessitating modification of pre-determined arrangements.

SECTION - II

FIRE DIVISION SYMBOLS

Symbols and their Display

10. To facilitate fire-fighting, explosives and ammunition have been divided into four fire divisions according to their behavior when involved in a fire (see Section III) and the action to be taken in dealing with such fire has been defined (see Section IV and V). The description of different fire symbols is given below:

(a) Each of the four fire divisions is indicated by distinctive symbols (see Fig.1) in order to be recognized by fire-fighting personnel approaching a scene of fire. For the purpose of identifying these symbols from long range, the symbols differ in shape as follows;

	Shape	**Fire Division**
1.	Octagon	1
2.	Cross	2
3.	Inverted Triangle	3
4.	Diamond	4

(b) The color of all four symbols is orange in accordance with the colour of UN and IMCO labels for Class 1 (Explosives). Numbers are to be painted in black. Shape and size of the four fire division symbols are shown in Fig. 1 and Specification for fire division symbols is given at Appendix 'A'

Supplementary Symbols

11 (a) Toxic and pyrotechnic ammunition storage requires supplementary symbols in addition to the fire division symbols. The supplementary symbols are used to indicate the precautions to be taken against the additional hazards proceeding from the chemical agents of that ammunition (see Fig.2.). The supplementary symbols indicate the following precautions:

i. Wear full protective clothing (white on blue circular background): This requires the wearing of personal clothing comprising of a coat, gloves, and hood worn over the usual fire-fighting uniform, rubber boots (not leather), over trousers, tunic and helmet. This is to provide protection from corrosive fumes or acid splashes.

ii. Wear breathing apparatus (white on blue circular background): This is respiratory protection comprising of self-contained breathing apparatus together with impervious gloves, because of the presence of irrespirable atmosphere.

iii. Apply no water: This illustrates water from a bucket being emptied on to a fire (white background) negated by red diagonal band which also encircles the back plate.

iv. Trefoil symbol (see Section VIII): This symbol is associated with radiological hazards.

(b) All the four supplementary symbol are circular in shape. The supplementary symbol, their meanings and their sizes are shown in Fig.2.

(c) The supplementary symbols prohibiting the use of water in fire-fighting (symbol No. 4 of Fig. 2) may be placed together with one of the other supplementary symbols, if required.

(d) The supplementary symbols indicating the requirement to wear full protective clothing should also indicate the type of full protective clothing to be worn, as the different kinds of chemical agents demand different protective measures.

(e) The following sets of full protective clothing are recommended:

Set 1: Protective clothing against casualty agents, consisting of protective gas mask, impermeable suit, impermeable hood, impermeable boots, undergarments, coveralls, protective footwear and impermeable gloves.

Set 2: Protective clothing against harassing agents, consisting of protective mask, coveralls and protective gloves.

Set 3: Protective clothing against white phosphorous (WP) smoke, consisting of flameproof coveralls, flameproof gloves and chemical safety goggles.

(f) The chemical agents mostly used in ammunition, the Compatibility Groups of that ammunition and the supplementary symbols required in storage are specified in Table 1.

12. To facilitate the work of the fire-fighting services, the Head of the establishment must ensure that each building containing 2 kg or more explosives and every open stack has been provided with boards/plates bearing a symbol to denote the fire division to which they belong. In the case of mixed stocks the highest risk symbol should usually be displayed.

13. The symbol for road and rail transport is orange coloured and diamond shaped having numerals denoting the fire division (Fig. 4).

14. The appropriate fire-fighting symbol is to be displayed, either on plates or labels, on each side of every rail wagon containing explosives. The height and location of symbols should provide for them being easily seen, unobstructed by doors in the open position, and out of reach of unauthorized persons.

15. The fire division symbol will be used in addition to any label normally used by railway authority. Where a load consists of explosives in more than one fire division, the symbol

Appropriate to the greatest hazard is to be used. Supplementary symbol should also be displayed as necessary.

16. For road vehicles carrying 2 kg or more of explosives, the appropriate fire division symbol is to be displayed either on plates or labels on each side of cab.

17. The boards/plates carrying the fire class symbols must be double sided and positioned on the direct approach routes to the building or stack, though sufficiently clear of them to avoid being damaged or displaced and in such a place as to be visible from a distance of 200 meters in daylight and in headlights of road vehicles during the night. They may conveniently be fixed on traverses about 1.5 meters from ground level.

18. The symbols shall carry NO explanatory legend as it is not intended that a person should approach the building close enough to read such legends in the event of a fire, even at the outset.

19. In explanation of the symbol provided on different explosives buildings and to serve as a guide to the fire-fighting personnel, boards or plates of approx. 3 x 2 m carrying all fire divisions symbols together with their respective legends in English and local language indicating action to be taken in case of fire in a building, shall be provided at all prominent places like Gate Office, Entrances to Storage Areas, Depot Muster in Ground, Depot Canteen, Group / Area Mustering Ground, Fire Station, Guard Room, etc. This shall enable the personnel to read the instructions frequently at their leisure hours and get conversant with them.

20. In addition to display of boards/plates, printed posters depicting the symbols and Fire Actions for all the different fire division shall be displayed at Fire Stations, Guard Rooms, Entrances to Storage Areas and other prominent places of the establishment including

mustering in and out sites. In case of posters displayed in Fire Stations and Entrances to Storage Areas, they shall also indicate the building numbers pertaining to each fire division.

21. A complete set of Unit Fire Orders (both in English and Vernacular languages) together with symbols shall be displayed in the Central Fire Station and fire-fighting personnel made fully acquainted with these and with the fire risk of each building/stack/plinth. Similar information with due regard to the security requirements shall be given to the local fire-fighting authority if their assistance has been arranged, vide Para 8 above.

22. Where more than one supplementary symbol is appropriate, they should be displayed vertically in decreasing order of importance.

23. The method used to display symbol should provide for their easy removal or replacement as the need arises.

SECTION - III

FIRE CLASSIFICATION OF EXPLOSIVES

Classification

24. For fire-fighting purposes, explosives are divided into 4 fire divisions in accordance with their behavior when involved in a fire. The fire division for each type of explosives is shown in the classified list of Military Explosives (STEC Pamphlet No.2) to which reference should be made. This list is held by the Head of the establishment. The fire division shown is that for explosives contained in their approved Service packages and applies in all situations where the explosives are so contained.

25. The explosives and filling factories where explosives and ammunition may be in an exposed state in the course of manufacture or when filled components may be temporarily stored in a manner more vulnerable to a fire than when in their Service packages, a higher degree of fire division than that given in the list referred to in Para 24 above, may be necessary. The Head of an explosive or filling factory, will be responsible for deciding the classification of each building of the factory for the purpose of fire-fighting.

26. Specification for fire division symbols including supplementary symbols and symbols for use in posters for road and rail transports is given in Appendix 'A'

Fire Divisions- Description

27. The divisions into which explosives and ammunition are divided are:

(a) ***Fire Division 1*** –These explosives are susceptible to explosion en masse. The explosion may result in severe structural damage, the severity and range being determined by the amount of high explosives involved. There may be a risk from heavy debris propelled from the structure in which the explosion occurs. Possibility of major hazard to the nearby surrounding area is there due to the blast, flame and high speed fragments.

(b) ***Fire Division 2*** –These explosives do not explode en masse, but have projection hazard and minor explosion effects. These may be exposed to fire for some time before exploding. Though the risk of mass explosion is not involved but small sporadic explosions may occur with increasing frequency as the fire takes hold. These burn and explode progressively, a few at a time. There is fragment hazard. A considerable number of small and large hot fragments, fire brands, unexploded and self-propelled

items may be projected; some of these may explode on impact and propagate fire or explosion. Blast effects are limited. These explosions may give rise to toxic and corrosive hazard.

(a) ***Fire division 3*** –These explosives, when under fire, pose serious and mass fire hazard with minor explosion or no explosion. These would not explode en masse. These are readily ignited and burn fiercely emitting intense heat and thermal radiation over a wide area but necessarily does not explode. These may give rise to dense smoke with, in some instances, toxic effects during burning. These are entirely free from explosions.These items do not form dangerous fragments. Fire brands and burning containers may be thrown around. These are low explosives i.e. solid and liquid propellants.

(b) ***Fire division 4***–These explosives present no significant hazard. These have moderate fire hazard. The effects of fire are usually confined within the package. An external fire would not cause the mass explosion of a package of such items. There may be the risk of toxic substances in them and may evolve toxic fumes when they burn (Explosives belonging to UN Compatibility Group K).

SECTION - IV

FIGHTING FIRES IN ABOVE GROUND SITES

Definition

28. For the purpose of fire prevention and fire-fighting, above ground sites are those where the explosives are above ground level, but also include those where part of the explosives may be below ground.

Special Considerations

29. Success in fighting fires involving explosives is largely dependent on action being taken before the fire can develop. When fire occurs at an open storage site, all non-fire resistant items like tarpaulins shall be removed from all other items in the vicinity which are considered to be within the range of spark or projected burning debris or fragments. Availability of copious water supply is a must at an explosive storage. Where items like petrol are stored, availability of foam supply is a must instead of water. For fires involving incendiary ammunition with magnesium bodies and metallic powders (MP class) appropriate extinguish ants like dry sand, dry chemical powder extinguisher must be available.

Fire Division 1 –Actions

30. (a) A fire involving items of fire division 1 is fought during incipient stage with all available means and without awaiting specific instructions. In general, ammunition without its means of initiation and ignition can be exposed to a fire for several minutes before it explodes. Initiator, igniters, propelling charges and rocket motors are extremely sensitive to fire. A fully developed fire is not fought unless it is known:-

i. What types of ammunition or explosives are stored at the scene of fire?
ii. How long the ammunition or explosives may be exposed to a fire before they explode; and
iii. How long the ammunition or explosives have been exposed to fire.

(b) If fire is detected before the explosives are involved, prompt action with first-aid fire-fighting equipment should be taken to prevent development of a serious fire and mass explosion. If drenchers are provided, they are to be operated immediately.

(c) The fire alarm must be operated immediately and the fire brigade called. All non-essential personnel are to be evacuated from the scene of fire to a safe distance (inhabited building distance).

(d) On arrival of the fire-fighting service, action should be directed towards preventing the explosives from becoming involved. Once the fire reaches the explosives, then a mass explosion can be expected and the primary concern must be for the safety of personnel from blast, heavy debris and high speed fragments, and secondly, to avoid loss or damage to fire-fighting equipment where practicable.

(e) Fire-fighting operations must only be carried out from a sufficient distance (process building distance) and from behind substantial cover such as that afforded by traverses or mounds.

(f) Following a mass explosion, action should be confined to preventing the involvement of adjacent buildings or stacks by the application of cooling water sprays on them. When the adjacent buildings are well within the range of burning debris or sparks, the Head of the establishment is to decide whether explosives contained in these buildings or stacks are also to be sprayed. But if the number or size of hot fragments falling on such buildings is large, no time should be lost in doing this. If drenchers are fitted in those buildings, they should be operated directly as the risk of penetration by hot fragments is apparent.

(b) Use of automatic fire suppression system is not recommended in explosive magazine/store-houses.

Fire Division 2 – Actions

31. a) A fire involving items of fire division 2 is fought at once during the incipient stage with All available means and without awaiting specific instructions. Fire division 2 ammunition Does not explode immediately after fire reaches it. Usually explosion from these fires can be expected only after the ammunition has been heated for an extended period of time (10 to 40 minutes).

b) If detected before the explosives are involved, prompt action with first-aid fire-fighting equipment should be taken to prevent the development of a serious fire with a major fragment hazard. Drenchers, if provided, are to be operated immediately.

c) Fire alarm must be sounded immediately and the fire brigade called. All non-essential personnel are to be evacuated from the scene of the fire to a sufficiently safe distance (inhabited building distance).

d) The action of the fire-fighting services is to be directed towards preventing the explosives from becoming involved, but if this proves unsuccessful, then the fire-fighting operations must continue from behind suitable cover such as afforded by traverses/mounds or substantial buildings using copious supplies of water with spray nozzles. Water should be freely applied in order to cool those items which are not immediately involved and towards extinguishing secondary fires which may be started by hot fragments, fire-brands, lobbed items and self-propelled stores.

e) If drenchers are provided in adjacent buildings, they are to be operated immediately if any risk to the buildings is anticipated.

Fire Divisions 3 – Actions

32. a) A fire involving items of Fire Division 3 is fought at once during the incipient stage with all available means and without awaiting specific instructions. If, in the incipient stage,the fire cannot be controlled, the scene of fire is evacuated at once.

b) If fire is detected before explosives are involved, prompt action with 'first-aid' fire-fighting equipment should be taken to prevent the development of a more serious fire. If drenchers are provided they are to be operated immediately.

c) The fire alarm must immediately be sounded and fire brigade called. All non-essential personnel shall be evacuated from the scene of the fire to a sufficiently safe distance (inhabited building distance).

d) The action of the fire-fighting services is to be directed towards preventing the explosives from becoming involved, but if this proves unsuccessful then fire-fighting personnel should continue to concentrate on subduing the fire plus preventing its spread to adjacent buildings or stacks.

e) The fire-fighting staff can fight the fire before and after the explosives become involved as there is no great risk of explosion. The fire is likely to be fierce with the evolution of intense heat radiation. Fire-fighting staff must use protective clothing and self-contained breathing apparatus to stand the intense heat radiation and evolution of dense smoke which may have the risk of toxic effects. Copious water should be applied freely in spray form with spray nozzles fitted to hoses.

f) In process buildings, especially those where potentially hazardous operations pose an instantaneous mass fire propagation condition and the risk to personnel and vital plant machinery/equipment is grave, it is essential that an automatic fire-fighting device incorporating high speed 'ultra-violet' detectors be installed to actuate the water/foam spray/drenching system. Use of automatic fire detection and drenching devices is not recommended in explosive magazine/store-houses.

Fire Division 4 –Actions

33. a) Fires involving items of Fire division 4 are fought in all cases with all available Means.

b) If fire is detected in the- incipient stage prompt action with first-aid fire-fighting equipment, should be taken to prevent the fire developing. The fire alarm must be sounded immediately and the fire brigade called. All non-essential personnel are to be evacuated from the scene of the fire to a safe distance (inhabited building distance).

c) The action of the fire-fighting services is to be directed towards preventing the explosives from becoming involved, but if this proves unsuccessful fire-fighting personnel should continue to fight the fire taking advantage of any available shielding, e.g. buildings, adjacent stacks, brick walls, etc.

d) Copious water should be applied freely in a form which will provide for effective fire-fighting, consistent with the need for protection of fire-fighters. It may be possible to approach the fire at a range which will allow use of water spray.

Ammunition Requiring Supplementary Symbols

34. Ammunition containing explosives and toxic or pyrotechnic agents (see table 1) require special attention and precautions in fire-fighting. Such ammunition belongs to different fire divisions depending on the kind and quantity of explosives contained in the ammunition. Such fires are fought in accordance with the fire division(s) involved taking into account the precautions indicated by the supplementary symbols.

Liquid Propellants/Fuels

35. (a) Fire division symbol 3 should be displayed on the building where liquid propellants/ Fuels are handled and stored. Wherever necessary, supplementary symbol(s) would also be affixed at prominent places in those buildings.

(b) Liquid propellants/fuels due to their inherent hazardous properties like toxicity, corrosive fumes, inflammability, etc. require special attention while fighting fires. To effectively and safely combat fires involving these fuels, fire-fighters must have knowledge of their burning characteristics and the specific hazard which may be encountered. Since the smoke and fumes from such fires are generally toxic, fire should be approached and fought from the upwind side, fire-fighters should wear full protective clothing and self-contained breathing apparatus of approved type.

(c) Copious water in a fog form should be used for fighting fires. In case of propellants/fuels which are not miscible with water and would not respond to water spray, the automatic foam AFFF type sprinkler system must be used. For a very fast fire action response, it is recommended that ultra-violet or infra-red sensors should be incorporated in the automatic deluge system of water / foam spray.

Metallic Powders

36.(a) Metal powders like Magnesium, Aluminium, Zirconium etc. are increasingly being used in explosive compositions and hence stocks may be located in explosive and process areas. Some of these powders need very high temperature to ignite and others in mixture form or in coating processes etc. are liable to burn spontaneously. Small amounts of these burning metals cause only a minor concern unless they are agitated

and converted into dust which might create dust explosion type scenario. But when large quantities of these burning metal powders are involved, they constitute a special risk and need special extinguish ants and technique for successful fire control.

(b) A separate crescent symbol shown in Fig.3 should be displayed on the buildings where metallic powders are processed and stored along with 'APPLY NO WATER' supplementary symbol.

(c) Among the substances suitable for use on the majority of metal powder fires are powdered graphite, talc, soda ash, limestone and sand, all of which must be in a dry state. Suitable proprietary dry chemical powders may also be used. The extinguishing agent should be carefully spread on to the fire, starting from outside the burning area and working towards the center, using long-handled scoops or shovels. Alternatively, pre-packed thin plastic bags containing approximately half to one kg of the extinguishing powder can be placed on the fire, again working from the outer edge to the center. The utmost care is necessary to avoid disturbance of the burning metallic powder until it has cooled below its ignition temperature.

(d) Suitable chemical dry powders may also be used in bulk form, as above, or from portable extinguishers having low velocity, long reach discharge applicators, subject to the dry chemical being non-hygroscopic and not unduly toxic.

(e) The main feature of metal fires is high temperature; sometimes over 1000° C or more and most of conventional extinguishing materials get decomposed and generate explosive gases & further increase the hazard. Water & water releasing agents like foams, bicarbonates, i.e. ordinary dry chemical powders are unsuitable for such fires. Gaseous extinguish ants such as Clean Agents (Halon alternatives) and carbon dioxide are also found to be unsuitable for such fires. Therefore the reliance for fire extinguishments must be on:-

i. Withdrawal of oxygen (smothering).
ii. Cooling in some way, be its heat removal with a heat absorbing material in order to lower the temperature.
iii. Application of extinguishant should be as gentle as possible without agitation of the metal powder.

(f) Fire-fighting Technique

The following extinguishing agents have been developed and found effective to quench the metal fire:

i. Dry powder of Graphite, Chalk. Asbestos.
ii. Dry Soda Ash and Dry Sand.
iii. Dry powder specially formulated on Ternary Eutectic Mixture of chlorides of Sodium, Potassium & Barium are covered under IS 4308:2019.
iv. Dry chemical Powders (BC type and ABC type) commonly used as per IS 4308: 2019 are not suitable for such fires and should not be confused with

Dry powders (D type).

v. Dry powders can be applied by shovels, long handled scoops, placement of plastic filled flat bags.

vi. Dry powders based on Eutectic Chlorides as per IS 4308:2019 can be applied through portable and mobile extinguishers only if they are fitted with special type of powder applicators as per drawings and specification for Dry Powder extinguishers for metal fires.

vii. Gentle application of extinguish ant to burning metal fire is the key to success.

Actions-Summary

37. A summary of fire-fighting actions for different fire division symbols is given at Table 2 for the convenience/ready reference of the fire-fighting services. These actions may be displayed at prominent places like fire-fighting stations, security office, etc. along with the appropriate symbols.

SECTION –V

FIGHTING FIRES IN MULTI - STOREYED BUILDINGS

General

38. (a)The serious fire / explosion hazard associated with handling and processing Explosives and inflammable dangerous chemicals is manifold higher in case of a multi-storeyed. building (i.e. a building having more than one floor) as prompt action is essential in safe evacuation of personnel particularly from upper floors and protection of fire- fighters from falling debris.

(b) The fire-fighting measures for multi-storeyed buildings should depend upon the behaviour/characteristics of the chemical / explosives handled and process activities should preferably be so arranged that those involving the minimum fire risk are conducted on the top most storey and where the fire risk is highest, such activities are restricted to the ground floor region.

(c) Fire-fighting personnel of the establishment must be familiar with the fire-fighting arrangements in the multi-storeyed buildings used for processing and handling of explosives and inflammable dangerous chemicals.

Special Considerations

39. For all multi-storeyed buildings used for process activities involving explosives and other hazardous inflammable chemicals, the following safety provisions require specific attention and should be complied with as far as possible, in order of priority :

(a) Means of escape.
(b) Adequate structural fire protection.
(c) Effective automatic fire detection and alarm system.
(d) Effective fixed fire extinguishing system-manual and automatic.
(e) Provision of sufficient water supply for fire-fighting purpose by means of wet risers system.
(f) Proper drainage system.
(g) Instructions regarding location and installations of protected electrical fittings.

NOTE: For the above arrangements, the code on fire protection and fighting measures in the multi-storeyed buildings used for process activities involving explosives and other inflammable dangerous chemicals may be referred.

Fire-fighting Actions

40. The fire-fighting actions for the multi-storeyed process buildings follow the general pattern set out for the above ground sites (Section IV). However the specific actions to be taken are as follows:

(a) If immediate 'first-aid' fire-fighting measures prove ineffective, the personnel working in the building must be speedily evacuated through easy escape routes directly from each floor of the building. If drenchers are provided they are to be operated immediately. The fire alarm must be sounded and the fire brigade called.

(b) Even if the outbreak of fire may be on any one of the floors of the building, prompt action to drench the whole building as soon as the alarm is sounded should be taken, with a view to cooling down the entire building and checking the spread of fire.

(c) The other measures depend on the division to which ammunition/explosives belong and accordingly actions as enumerated in Section IV for different fire divisions should be followed.

SECTION --- VI

FIGHTING FIRES IN UNDERGROUND SITES

Definition

41. For the purposes of fire prevention and fire-fighting, underground sites are those where the whole of the storage space is below the natural ground level.

Special Considerations

42. Access, means of escape, provision of equipment: In view of the great quantity of explosives often held at such sites and the confined space, special attention must be given to fire prevention measures, pre-planning and the adequate provision and efficient maintenance of:

(a) Exit doors and unobstructed means of escape routes for occupants, plus access doors and passage ways for the fire-fighters

(b) Supplies of first-aid fire-fighting equipment, and fire notices

(c) A system of the fire alarm call points and sounders. The alarm should be audible throughout the whole area both above and below ground

(d) The adequate water supply shall include reserve tanks on the surface sited well clear of the crater area and if water is carried to hydrants underground, consideration shall be given to the provision of alternative supply.

43. Fire-fighting personnel: If underground storage system is there in the establishment, then the fire-fighting personnel of the establishment must, however, be familiar with the underground arrangements.

44. Breathing apparatus: Self-contained breathing apparatus is essential for the protection of fire-fighters underground. No person, unless equipped with such apparatus is to enter an underground site in which fire has broken out until the area has been certified free from noxious gases.

45. Ventilation: In Air-Conditioned sites or in sites provided with forced ventilation, the decisions relative to the opening or closing of ventilation must be left to the Officer-in-Charge, Fire Services.

Additional Equipment –Considerations

46. (a) Consideration must be given to the possible need, provision and maintenance of an adequate water supply system underground, having a means of above ground isolation in case of mechanical damage to pipe work or fittings.

(b) The system may include the following equipment as necessary:-

"Water hose reels and hydrants fitted with stand pipe (or alternatively landing valves) permanently charged with water".

(c) Water sprinklers or drencher systems capable of both automatic and remote manual operation.

47. (a) The conveyor belts must be stopped on the sounding of the fire alarm if it does not Create any additional hazard in doing so.

(b) A manual override must be fitted where conveyor is designed to automatically stop on the operation of the fire alarm system.

Fire Divisions –Actions

48. The fire-fighting action follows the general lines set out for the above ground sites. The following special conditions apply:

(a) ***Fire Division 1*****:** If immediate 'first-aid' measures prove ineffective, the whole site must be evacuated speedily and no further attempt made to fight the fire, other than by remotely controlled fixed fire-fighting installations.

(b) ***Fire Division 2*****:** If by reason of fire intensity it becomes necessary to withdraw fire-fighting personnel from the site, water jets, or monitors should be left in position, where possible.

(c) ***Fire Division 3*****:** If immediate 'first -aid 'fire fighting measures prove ineffective, the whole site must be evacuated speedily and no further attempt made to fight the fire from inside the premises, other than by remotely controlled fixed fire-fighting installations.

(d) ***Smoke Compositions*****:** Items containing smoke compositions must not be stored in underground sites because of the extreme difficulties which would be encountered in fire-fighting.

(e) ***Toxic Substances*****:** Weapons containing toxic substances should only be held at underground sites in very exceptional circumstances. Should they, however, be involved in a fire, the normal fire-fighting procedures will apply so long as it is clear that the packages only are affected. Where there is a risk of the contents being released and scattered due to loss of containment caused by heat or explosion, fire-fighting should be suspended inside the premises. Full protective equipment should be worn in all operations, and fire-fighting personnel in close proximity to the fire should spray water onto them to prevent its ignition. Following any suspension of fire-fighting operations, an interval of 2 to 3 days must be allowed after the fire has apparently ceased before re-entry by fully protected personnel for inspection purposes.

SECTION ---VII

DANGEROUS GOODS OF NON-EXPLOSIVES CATEGORIES RELATED BY FUNCTION TO EXPLOSIVES

Special Considerations

49. Certain dangerous substances related to explosives are made or stored in Govt. explosives establishments. A list of these appears below in Para 51. (Para 36 makes specific reference to metallic powders).

50. The Head of the establishment will make an assessment of the risks associated with any such substances for which he has a responsibility, for inclusion in the planning arrangements, and will advise the Officer-in-Charge Fire Services accordingly.

51. Building containing the following non-explosive ammunition stores shall be treated in the manner described for Fire Division 3 explosives and the building shall be marked with the Division 3 symbol:

(a) Ampoules, acetone.

(b) Ampoules, D.M.

(c) Ampoules for mine, practice, contact, A. Tk.

(d) Bombs, aircraft, practice, flame, break-up 81/2 lbs.

(e) Bombs, aircraft, practice, smoke filled F.M. or C.S.A.M.

(f) Boxes, smoke.

(g) Drums, F.M.

(h) Flame floart, aircraft, navigation.

(i) Light, indicating lifebuoy.

(j) Marker, marine, aircraft.

(k) Matches, waterproof safety.

(l) Matches, fuse, safety.

(m) Container, smoke.

(n) Mine charge cases, filled sodium phosphide.

(o) Pistol, aircraft bomb, Nos. 37, 53, 73 & 79.

(p) Slow match.

SECTION –VIII

FIRE-FIGHTING MEASURES INVOLVING EXPLOSIVES WITH RADIOLOGICAL HAZARDS

Fire-fighting Classification and Symbols

52. (a) Explosives which, in a fire, may give rise to radiological hazard in addition to the explosives hazard will be classed in the fire division appropriate to the explosives hazard.

(b) Trefoil symbol (black on yellow circular background, (Fig.2) signifies the presence of a radiological hazard with the danger of the release of radioactive contaminated products of combustion in any fire. When self-contained breathing apparatus with full face mask and/or the wearing of protective clothing are required, the appropriate supplementary symbol (s) will also be displayed. The trefoil symbol may also be used to indicate a source of gamma radiation.

Fighting Fires in Aboveground Sites

53. (a) The fire-fighting procedures applicable to explosives involving either minor or major radiological risks are basically the same. There would, however, be marked differences in detail in the radiological protection aspects of the pre-arranged plans according to whether the explosives store would give rise to a major or no more than a minor radiological hazard.

(b) If the fire is detected early, prompt action with first-aid fire-fighting equipment should be taken. This should prevent the development of a serious fire. The fire alarm must be operated immediately.

(c) The pre-arranged plan regarding operation of drenchers, evacuation of non-essential personnel upwind to a safe distance, establishment of an exclusion area, alerting of police and other civil authority measures must be put into operation.

(d) Once the explosives have become involved the fire-fighting services should only continue to operate from behind cover appropriate to the fire division symbol displayed. Appropriate action to prevent the spread of fire to neighboring buildings should be taken.

(e) The pre-arranged plan must cover the requirements for the personal protective equipment to be used by fire-fighting personnel. Respirators fitted with suitable filters or self-contained breathing apparatus must be worn. Where the store can give a major radiological hazard, protective clothing must be used.

(f) Personnel known to have cuts and wounds or other skin conditions which might lead to radioactive uptake must not be permitted to remain in the vicinity. Those who suffer cuts or wounds in the course of their duties must be withdrawn for first-aid treatment to prevent contamination entering the body. Smoking, eating

and drinking must be prohibited in areas where contamination exists or is likely to occur.

(g) Success in fighting the fire is largely dependent on action being taken with suitable equipment before the fire can develop and subsequently on the availability of copious water supplies. Efforts must be made to avoid dispersing the radioactive materials any more than is necessary.

(h) All personnel are to be monitored for contamination before leaving the exclusion area and must undergo personal decontamination as necessary. Appropriate attention must be given to any cuts, wounds or other skin condition liable to radioactive uptake.

(i) Equipment and appliances used within the exclusion area must be retained in the area until checked for contamination and cleared by qualified personnel for removal. Equipment and appliances found to be contaminated must be clearly marked and segregated pending decontamination or disposal.

(j) Salvage operations must not be undertaken in the vicinity of the fire until guidance has been given by the appropriate authority that it is safe to do so.

Fighting Fires in Underground Sites

54. (a) The conditions given in Section VI are applicable. Monitoring for radioactivity and decontamination arrangements (para 53 above) is essential. Personnel must not be permitted to re-enter the underground site after the fire until it has been certified by qualified experts that it is safe to do so.

(b) In the pre-arranged plans, account will need to be taken of the likelihood of fumes from burnt or exploded stores with a radiological hazard being released into the open. Where this possibility exists, the appropriate measures given in para 53 above would need to be taken to cover aboveground risks.

SECTION –IX

GROWTH OF GRASS / SHRUBS / TREES IN AN EXPLOSIVES AREA –CONTROL AND PROVISION OF FIRE BREAK

General

55. (a) The aim of this section is to minimize the risk of spreading fires from one building to another building through indirect means such as by grass, shrubs and trees.

(b) As fire in a building containing explosives is likely to create serious problems, it is desirable to control the vegetation in an explosives area.

(c) Vegetation in explosives area has got various advantages viz. camouflage, keeping the place cool, reduction to some extent in blast pressure, arresting of fragments and to prevent erosion of soil.

(d) On the other hand the fire risk with dry leaves in certain seasons, risk from fall of trees in case of storm, risk from lightning strike if trees are close to the buildings, interference with electrical services and LP systems are some of the disadvantages of the vegetation in an explosives areas.

(e) Thus the vegetation in an explosives area requires careful attention. These instructions are based on the judicious compromise between safety from the fire and utilizing them in a manner so as to derive maximum benefit from them.

(f) Controlled burning of dry grass / leaves in enclosed explosive area is not permitted.

Growth of Vegetation in an Explosives Area

56. (a) The choice of trees should be such that they shed less number of leaves and not have far spreading roots.

(b) Small shrubs and grass maintained properly and which also help in binding the soil and prevent erosion of the earth in monsoon are recommended for growing in an explosives area.

(c) Earth mounds of traverse of an explosive building erode readily due to rain. It will be desirable to grow controlled grass on the traverse to overcome this problem.

Fire break

57. (a) In case of untraversed explosive buildings, a fire break of concrete up-to a distance of 5 m all around the building should be provided.

(b) In case of traversed explosives buildings, the space between the building wall and the traverse should be made of concrete.

Location of Grass Shrubs and Trees

58. Aboveground explosive buildings

(a) *Grass*

i. Grass including sand binders should be weeded out within a perimeter of 5 m.
ii. Beyond 5 m and up to a distance of 15 m all round a building, grass and undergrowth should be kept controlled/short. The evergreen creeper/ plant called 'Ipomea Palmata' may be grown since it acts as a weedicide and prevents erosion by acting as an effective binder with the soil.
iii. 5-10% Vinegar per volume of water should be used as an organic alternative to chemical weedicides/herbicides to avoid massive growth of wild grass/weeds in explosive areas.

(b) *Shrubs*

No shrub other than that of evergreen variety is permitted up to a distance of 15 m from an untraversed building and up to the limit of outer end of a traverse in case of a traversed building.

(c) *Trees*

i. No tree is permitted up to a distance of 15 m or a distance equal to the height of the tree whichever more in case of an untraversed building.
ii. No tree is permitted within and upon the traverse of a traversed building.
iii. No tree should be within the zone of protection of LP system of any explosives building.

59. *Bunker type explosive buildings*

(a) *Grass*

i. Grass including sand binders should be weeded out upto a distance of 5 m all-round the ventilators.
ii. Excessive grass growth on or around should be cut and kept short.

(b) *Shrubs*

The shrubs which have deep penetrating roots are not permitted.

(c) *Trees*

No tree should be within the zone of protection of LP system or on its mound.

60. Open storage points

(a) *Grass*

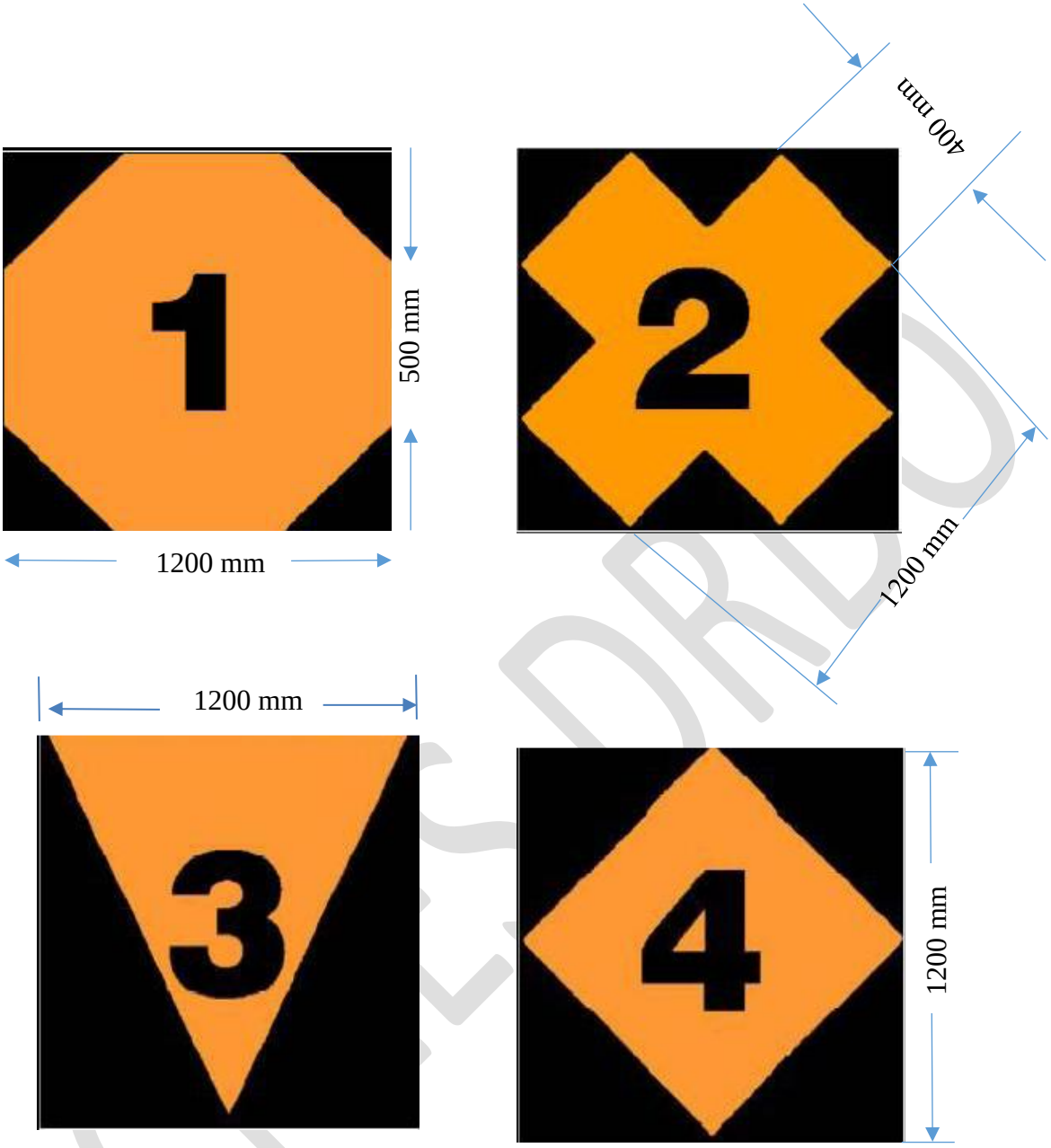
Grass should be weeded out up to a distance of 5 m all round the point.

(b) *Shrubs*

No shrub is permitted up to a distance of 5m.

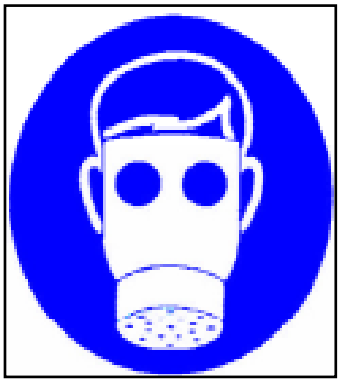
(c) *Trees*

No tree is permitted up to a distance of 10 m all round the point.

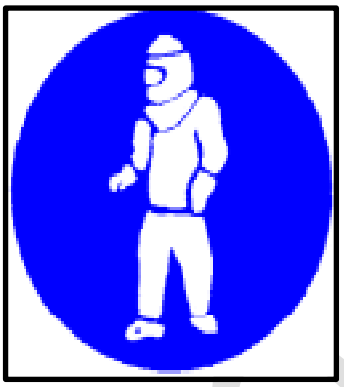


Notes: The Compatibility Group letters which follow the Hazard Division numerals are purely examples.

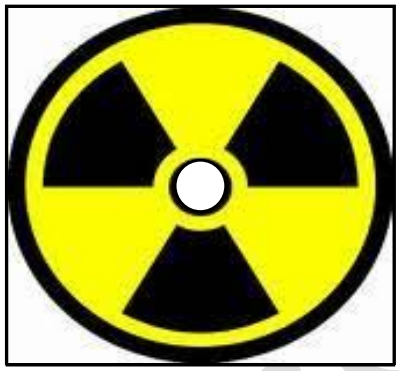
Figure 1: Fire Division Symbols for use on Explosive Buildings and Stacks



Wear Breathing Apparatus



Wear Full Protection Clothing



Radiological Hazard

Apply No Water

(No. 6.1)
Division 6.1 Toxic substances
Symbol (skull and crossbones): black:
Background: white; “6” in bottom corner

(No. 8)
Symbol (liquids, spilling from two glass vessels and attacking a hand and a metal): black
Background: upper half white; lower half black with white border: ‘8’in white in bottom corner

Fig. 2 : Supplementary Fire Symbols

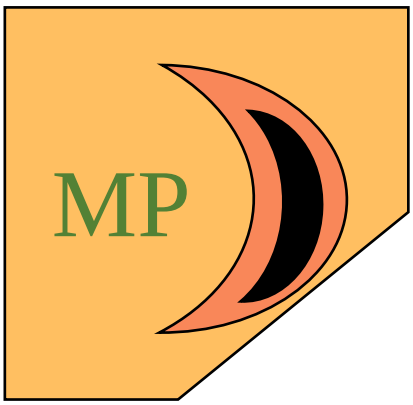


Figure 3: Fire, Symbols for use on Buildings containing Metallic Powders

Figure 4: Fire, Symbols for use on Road and Rail Transport

Notes

(a) The Hazard Division signs shown in Fig.4 are to be fixed, one on each side (total 2) of every freight container and rail wagon containing explosives. The consignor is responsible for the provision and fixing of signs. The consignee is responsible for their removal, once all explosive have been off-loaded.

(b) The height and location of these signs should provide for their being easily seen, unobstructed by doors in the open position and out of easy reach of unauthorized persons. The Hazard Division sign will be used in addition to any label normally used by the railway authorities.

(c) Where the load consists of explosives of more than one Hazard Division, all will be deemed to be in that Division amongst them which comes highest in the following list, that is, Hazard Division 1.1 (highest), 1.2, 1.3, 1.4 (lowest). In the case of a freight container or rail wagon carrying explosives of different Compatibility Groups, no Compatibility Group letter shall be written on the placards.

Appendix 'A'

SPECIFICATION FOR FIRE DIVISION SYMBOLS

A. Fire Symbols

(a) Dimensions: *Fire symbols*

i. Outer squares, sides 1200mm each.
ii. Octagon - for Fire Division 1, sides 500 mm each resting horizontally on one side of the square.
iii. Cross - for Fire Division 2 having arms 1200 mm long with a width of 400 mm each resting on the base, making an angle of 45° with each arm of the square.
iv. Inverted triangle - for Fire Division 3 with a horizontal arm of length 1200 mm coinciding with upper arm of the square and resting with vertex on the center of the lower arm of the square.
v. Inner square - for Fire Division 4, with diagonals 1200 mm long meeting centers of the arms of square.
vi. Quarter moon - for buildings containing metallic powders –outer with 600 mm radius and inner with 400 mm radius. Letters MP with a height of 300 mm and width 350 mm.

(b) Dimension: *Numbers*

i.	Height	-	500 mm
ii.	Thickness	-	100 mm
iii.	Width (Except 1)	-	350 mm

(c) Colour : *Fire Symbols*

i. Squares –white with black line border.
ii. Octagon, cross, triangle and square –Orange colour.
iii. Quarter moon –inner with black colour, MP and outer strip with yellow colour.

(d) Colour: *Numbers*

All numbers shall be of black colour.

B. Supplementary Fire Symbols

(a) Dimensions: *Supplementary fire symbols*

i. Outer squares, side 1200 mm each.
ii. Outer circles –with a radius of 600 mm.
iii. Inner circles for 'wear full protective clothing', 'wear breathing apparatus', Metallic Powder' and 'Radiological Hazard' are of 575mm.
iv. Inner circles (two) for 'Apply No Water' – of radii 575mm and 435mm respectively. Strip of 280mm thick making an angle of 45° with the horizontal.

(b) Colour

i. Square –white with black border.
ii. Outer circle –border black.
iii. Inner circle -

a. 'Wear Full Protective Clothing' & 'Wear Breathing Apparatus' — Circles-blue; Figures- white

b. 'Apply No Water'–strips both segmented by inner circles and diagonal –red. Figure –emptied bucket, water and fires –black.

c. Radiological (Trefoil) –Inner circle –yellow
Figure –black.

C. Symbols for use in Posters for Road and Rail Transport

a) Fire Symbols

Dimensions
These signs have minimum dimensions of:

Sides	=	250 mm
Orange Outer Border	=	5 mm
Black Borders	=	5 mm
Hazard Division Numerals	=	75 mm

Compatibility Group Letters	=	75 mm
UN Classification No.	=	25 mm

For road transport, two of the above signs will be displayed, one on each side of the vehicle.

Colour

Orange background with black letters

b) **Supplementary Fire Symbols**

Dimensions

1/3rd those of main supplementary fire symbols in all respect.

Colour

Same as for main supplementary fire symbols

c) Colour Code

The Colour Specification should conform to IS: 5 (latest / Revised edition)

TABLE –1

CHEMICAL AGENTS CONTAINED IN AMMUNITION AND THE SUPPLEMENTARY SYMBOLS REQUIRED IN STORAGE

Sl. No.	Chemical Agents contained in Ammunition	Compa-tibility Group	Supplementary				
			Wear Full Protective Clothing			Wear Breathing Apparatus	Apply no water
			Set 1	Set 2	Set 3		
1	2	3	4	5	6	7	8
1	Casualty Agents (1)	K	X				
2	Tear Gas, O –Chlorobenzo-lmalononitrile (CS)	G		X			
3	Smoke, Titanium tertrachloride (FM)	G		X			
4	Smoke, Sulphur trioxide chlorosulphonid	G		X			
5	Smoke, Aluminium zinc oxide hexachloroethane (HCE)	G		X			X
6	White Phosphorus (WP)	H			X		
7	White Phosphorus plasticized (PWP)	H			X		
8	Thermite or Thermate (TH)	G				X	X
9	Pyrotechnic material (PT)	G				X	X
10	Calcium phosphide	L				X	X
11	Signalling Smoke	G				X	
12	Isobutylmethacry late with oil (IM)	J				X	
13	Napalm (NP)	J				X	

TABLE –2

FIRE-FIGHTING ACTIONS –SUMMARY

Characteristic / Hazard	Actions
FIRE DIVISION 1	
Explosives susceptible to explosion en masse. Blast, flame, high speed fragments and debris constitute the major hazard.	a) Fight fire immediately with 'first-aid' equipment in its incipient stage. b) Open the drenchers immediately. c) If fire reaches the explosives, abandon the building without delay to a safe distance. d) Prevent the fire spreading to adjacent building/stack by spraying water on them.
FIRE DIVISION 2	
Explosives which do not explode en masse, having a projection hazard but minor explosion effects. Blast effects are limited.	a) Fight fire with 'first-aid' equipment in its incipient stage. b) Open the drenchers immediately. c) If explosives become involved, fight fires from behind cover. d) Spray water on the affected items and adjacent buildings to prevent spread of fire.
FIRE DIVISION 3	
Explosives which do not explode en masse, having a mass fire hazard with minor or no explosion effects. Intense heat with emission of considerable thermal radiation over a wide area constitutes the major risk.	a) Fight fire with 'first-aid' equipment in its incipient stage. b) Open the drenchers immediately. c) If explosives are involved, fight fire from a protection position. d) Spray water on unaffected items and adjacent buildings to prevent spread of fire.

FIRE DIVISION 4

Explosives which present no significant hazard accept a moderate fire risk.

a) Fight fire with 'first-aid' equipment in its incipient stage.
b) Open the drenchers immediately.
c) If the explosives are involved, continue to attack the fire from a protected position.
d) Spray water on unaffected items and adjacent buildings to prevent spread of fire.

METALLIC POWDERS

These constitute a special risk because they are capable of burning fiercely and reacting violently with water extinguishing metallic powder fires.

a) Do not use water, foam or chemical extinguisher.
b) Use sand powdered graphite, talc, soda ash, and lime stone, all of which must be in a dry state.
c) Use chemical dry powder suitable for extinguishing metallic powder fires.
d) Do not agitate the burning powder until it has cooled below its ignition temperature.