

अध्याय – 17

रासायनिक आपदा पर दिशा निर्देश

(Chapter – 17)

GUIDELINES ON CHEMICAL DISASTERS ON INDIAN RAILWAYS

National Disaster Management Authority (NDMA) has issued guidelines on the management of chemical disasters. These guidelines are directed more towards their prevention and mitigation of their effects, if these happen than on rescue and relief operations afterwards.

Indian Railways have also been transporting chemicals and hazardous materials e.g. petroleum products (petrol, Naphtha, HSD, etc.), Caustic soda, Alcohol, compressed gases (LPG gas etc.) Chemical manures, Acids, Matches etc. These goods are carried either in the SLRs or in the Parcel Vans or in the goods wagons. Quantum and type of transportation of such hazardous material varies from railway to railway and different zonal railways need to prepare themselves based on the type and extent of hazardous material being handled and transported by them.

Indian Railway's Rules for carrying dangerous (hazardous goods) by rail have been legislated in the Railway Red Tariff Rule 2000 as per which dangerous goods have been classified into following 8 classes:

- I. Explosives
- II. Gases, Compressed, liquefied or dissolved under pressure
- III. Petroleum & other inflammable liquids
- IV. Inflammable solids
- V. Oxidising substance
- VI. Poisonous (Toxic Substances)
- VII. Radio-active substances Acids & other Corrosives.

Chapter I to VIII respectively deal with the above classes of dangerous goods which include General rules governing acceptance, handling, Carriage, storage, delivery and the list of commodities included in that class. Carriage of Goods of a hazardous nature other than those specified in these chapters shall not be accepted for transport by rail unless specially authorised by the railway administration as provided under these Rules.

Out of the above 8 classes of dangerous goods, classes II (Gases, Compressed, Liquefied or dissolved under pressure), III (Petroleum and other inflammable liquids) and VIII (Acids and other corrosives) are dealt in bulk on the railways- whereas other classes of dangerous goods are dealt in piecemeal/small quantities in parcel vans/SLRs. Railways may refer to the specific paras pertaining to all these classes of dangerous goods. However, important relevant details of the popular classes (I,II and VIII) of dangerous goods are detailed as under:

1.0 CLASS-II (GASES,COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE)

Gases compressed, liquefied or dissolved under pressure, which have been permitted for their carriage by rail, as per Red Tariff No. 20 are given below:

1. Dissolved Gases:

- Acetylene (compressed into porous substances)-

2. Compressed Gases:

- Air compressed
- Argon
- Coal gas
- Hydrogen
- Methane

- Neon
- Nitrogen
- Oxygen
- Sulphur Hexafluoride

3. Liquified Gases:

- Ammonia (Anhydrous)
- Chlorine
- Liquified petroleum Gas (Commercial Butane or Propane)
- Carbondioxide (Carbonic Acid Gas)
- Cyclopropane gas
- Ethyl Chloride
- Freon, Arcton or Genetron
- Hydro-cyanic Acid
- Medical Mixtures (Oxygen & CO₂, Oxygen & Helium mixture)
- Methyl Bromide
- Methyl Chlorine (Chloromethane)
- Nitrous oxide
- Sulphur Dioxide Toxic (Sulphurous Acid Gas)
- Liquid Air
- Liquid oxygen
- Liquid Nitrogen
- Liquid Helium

General Rules regarding acceptance of above commodities for carriage by rail are given in Rules 202, 203, 204, 205 & 206 of Red Tariff NO.20.

1.1 Packing

Before the above commodities are transported by rail, it must be packed as per rules 207.1 & 207.2 of Red Tariff NO.20.

However, Rule 207.2 i.e. rule for protection of cylinder valves during transport shall not apply to cylinders containing oxygen or nitrous oxide for medical purposes having water capacity less than 5 litres.

1.2 Marking & labeling of Cylinders or Containers

Rules for Marking & Labeling of cylinders are given in rules 208 & 209 of Red Tariff NO.20. It must be ensured that the date of the last hydrostatic test or hydrostatic stretch test with the code mark of recognized testing station is marked on every cylinder. In the case of liquefied petroleum gas cylinders, the quarter & the year of test shall be given additionally in a neck ring or on a shoulder plate.

1.3 Storage (Refer Rule No. 211 of Red Tariff No.20). Following points must be ensured:

- Thin wall cylinders such as liquefied petroleum gas cylinders and dissolved gas cylinders shall not be stacked in a horizontal position.
- Cylinders containing flammable gases other toxic gases shall be kept away from cylinders containing other type of gases.
- Cylinders shall not be stored along with any combustible material.
- **Precautions in handling & storing gas cylinders or containers:** (Refer Rule No.212 of Red Tariff No.20)
Commodities mentioned in this chapter, shall not be stored or handled with or near explosives or other dangerous goods. Smoking and carrying any type of fire must not be allowed near these commodities.

1.4 Modes of Transportation

Regarding modes of transportation, refer rules 213, 214, 215, 216, 217 & 218 of Red Tariff no.20.

1.5 Stowage and Carriage

Stowage & carriage rules of Gases, compressed, liquefied or dissolved under pressure are discussed in rules 219,220, 221, 226,227 & 228 of Red Tariff NO.20.

1.6 Additional Rules.

Exceptional or Additional Rules regarding packing, marking & labeling, carriage by Goods/Mixed/Parcel train and stowage & Carriage rules have been specified in Table II, Chapter II of Red Tariff NO.20. Characteristic property of gas & pictorial level indicating main characteristics of the gas is also indicated in column 2 & column 3 of table II.

2.0 CLASS - III (PETROLEUM & OTHER INFLAMMABLE LIQUIDS)

Petroleum and other inflammable liquids i.e. mixture of liquids & liquids containing solids in solution which give off inflammable vapour and is capable of ignition in suitable concentration of air when exposed to a source of ignition. Petroleum and other inflammable liquids are considered dangerous as per Railways Act 1989 (24 of 1989) and have been classified in three classes i.e. Class 'A' , Class 'B' & Class 'C',

- (i) Class A: Petroleum & other inflammable liquids, the vapour of which having flash point below 23°C.
- (ii) Class B: Petroleum & other inflammable liquids, the vapour of which having flash point above 23°C but below 65°C.
- (iii) Class C: Petroleum & other inflammable liquids, the vapour of which having flash point at 6E:0C and above.

A list of items included under above three classes is given in table III, Chapter III of Red Tariff NO.20,

Rules regarding general restrictions on conveyance & acceptance of petroleum & other inflammable liquids have been detailed In rules 302, 303,304, 305 & 306 of Red Tariff No.20.

2.1 Packing, Marking & Labeling

It is to be ensured that the words "Highly inflammable" and "Inflammable" as the case may be is marked on every package containing petroleum & other inflammable liquids, Every tank vehicles used for transportation of petroleum must be marked on each side, and rear thereof in letters at least 7cms high on a background of sharply contrasting colour the word "FLAMMABLE" and the common name of the liquid being transported e.g. "MOTOR SPIRIT", "KEROSENE" etc.

For method of packing, marking & labeling of petroleum & other inflammable liquids, Rules 308,309 & 310 of Red Tariff No. 20 may be referred.

2.2 Time of Loading & Unloading :

All operations of loading,unloading and handling of petroleum and other Inflammable liquids shall be conducted between sunrise and sunset: Provided that consignments to be sent in brake-vans of passenger, mixed or parcel trains and by trans-ship or Road van trains may be handled at any hour, after due precautions have been taken to prevent accidents. Loading and unloading of petroleum products shall be allowed at any hours if, adequate electrical lighting and fire fighting facilities as determined by Chief Controller of Explosives, have been made available at the place of loading and unloading.

Prohibition of smoking, fires etc. Petroleum & other inflammable liquids must not be stored or handled near explosives and other dangerous goods. Smoking, taking fire or naked light matches or other articles of inflammable nature is strictly prohibited near petroleum and other inflammable liquids. All due precautions should be taken at all times to prevent any escape of petroleum and other inflammable liquids. Rules 312 and 313 of Red Tariff nO.20 may be referred for detail.

2.3 Transportation

Subject to the provisions of Rules (i) and (ii):

- (a) Petroleum & other inflammable liquids, class 'A', shall be transported by goods trains only.

- (b) Petroleum and other inflammable liquids, Class . B' & 'C', may be transported in wagons by all trains except assenger trains

Rule (i) Petroleum and other inflammable liquids, class 'A' may be transported in wagons by a mixed or parcels train on any line or section Oil which goods trains are not running provided that immediately on entering any section on which goods trains are running, the wagons containing petroleum and other inflammable liquids class'A' shall be detached from the mixed or parcels train.

Rule (ii) Carriage in brake-van of passenger, mixed or parcel trains- Except as otherwise provided in column 5 of table III of Red Tariff No.20, petroleum and other inflammable liquids shall not be carried in brake-van of passenger, mixed or parcel train. Whenever these commodities are permitted to be carried in the brake van, the following points must be ensured:

- (a) The total quantity in the brake-van of anyone train at any one time shall not exceed 50 litres.
(b) Petroleum and other inflammable liquids shall not be conveyed in the same carriage with any matches or fuses or appliances producing ignition, or any explosives other dangerous goods.
(c) Packages containing petroleum and other inflammable liquids shall be carried only. in the rear brake-van which shall be well ventilated.
(d) Packages containing petroleum and other inflammable liquids shall be placed as far as possible from other packages in the brake-van and from the tail light of the train.

Conveyance in tank wagons

Tank wagons used for the conveyance of petroleum and other inflammable liquids shall be of a design approved by the chief controller of explosives.

Precautions to be observed while loading and unloading tank wagons;

- (i) Tank wagons used for the conveyance of petroleum and other inflammable liquids shall be in goods condition and free from leakage.
(ii) In filling tank wagons, an air space of more than 5% of the capacity of the tank wagon shall be left provided that the prescribed air space may be reduced to
- (a) 2.5 percent in the case of some important items like.
High speed diesel oil
Furnace oil
Kerosene oil
Aviation Turbine fuel.
- (b) 4 percent in the case of some important items like.
Aviation spirit
Petrol
Naphtha
- (iv) All inlets and outlets shall be securely closed.
(v) Petroleum and other inflammable liquids, class 'A' shall not be filled in or discharged from tank wagons –
(a) At any place where tank wagon is exposed to sparks.
(b) Within a distance of 30 M from any fire, furnace or artificial light capable of fighting inflammable vapour. Distance may be reduced to 9m when the liquid is filled or discharged under seal and closed vapour return pipelines are provided.

Empty Tank Wagons : .All 'empty' tank wagons which have contained petroleum and other inflammable liquids shall, except when they are opened for the purpose of cleaning them & rendering them free from vapour, be kept securely closed unless they have already been thoroughly cleaned and rendered free from vapour.

2.4 Stowing in wagons, labeling, sealing and locking

Guidelines regarding stowing, labeling, sealing & locking of wagons have been discussed in Rules 322 & 323 of Red Tariff No.20. A 'Dangerous' label as shown in Rule NO.323 of Red Tariff No,20 must be affixed to both sides of every wagon in which petroleum & other inflammable liquids are stored for dispatch or delivery or while in transit.

The rules for shunting, Marshalling and delivery of consignments have been discussed in Chapter III of Red Tariff No.20.

2.5 Additional Rules

Any additional or exceptional rules applicable for any specific item regarding packing, marking & labeling carriage by Goods Train, Carriage in brake van of Passenger, mixed or parcel train and stowage & carriage rules have been discussed in detail in table-III, Chapter III of Red Tariff nO.20,

3.0 CLASS – VIII : ACIDS AND OTHER CORROSIVES

A list of Acids and other corrosives which have been considered dangerous goods are given in Chapter VIII, table VIII of Red Tariff No,20. Only these acids and other corrosives shall be accepted for conveyance by rail. Regarding general restrictions on conveyance of acids and other corrosives by rail and notice of despatch to be given by sender, rules 802, 803, 804, 805 & 806 of Red Tariff NO.20 may be referred,

3.1 Packing, Marking and Labelling

Although, acids and other corrosives is to be packed by consignor but more precautions need to be taken by concerned Railway Officials, that it is packed 807 of Red Tariff NO.20.

The outermost Package containing acids and other corrosives must be marked with the word "Corrosive" and name of the acid or corrosive. Labelling of package must be done as per rule 808,809 & 810 of Red Tariff NO.20.

3.2 Handling and Storage

(a) time of loading and unloading:

All the operations of loading, unloading and handling of acids and other corrosives shall be conducted between sunrise & sunset. Consignments sent in sectional vans may be handled at any hour by taking all due precautions to prevent accidents, including provision of adequate lighting.

(b) Handling of Packages

- (i) Packages containing acids and other corrosives not be thrown, dropped down or dragged along the ground of floor and care should be taken to avoid striking them against any hard object.
- (ii) When loading and unloading heavy drums or casks cushions of a suitable type,thick coir matting, felt, bags filled with saw dust or similar protection should be used to avoid damage to the drums or casks and to prevent leakage
- (iii) Whenever practicable, packages containing acids and other corrosives shall be carried or conveyed on trolley or hand barrows.

(c) Acids and other corrosives not to be stored or handled with or near explosives or other dangerous goods or articles of inflammable nature.

- (d) Acids and other corrosives not to be stored or handled with or near foodstuffs or foodstuffs empties.
- (e) The floor of any place or wagon on which acids and other. Corrosives have been stored or the' wagon or trolley or hand barrow in which they have been carried shall swept and thoroughly cleaned after removal of the goods there from.

3.3 Transportation

- (i) Acids and other corrosives in wagons may be transported by all trains including passenger trains, but not to be transported in the brake van of trains.
- (ii) Acids and other corrosives shall be carried in covered iron wagon and tank wagons. End opening carriages or wagons shall not be used.

Conveyance in tank wagons

Tank wagons used for the conveyance of acids and other corrosives shall be of a design approved by the chief controller of Explosives.

Precautions to be taken while loading tank wagons

(i) Tank wagons used for the conveyance of acids and other corrosives shall be in good condition and free from leakage.

(ii) In filling tank wagons, an air space of not less than 5% of the capacity of the tank shall be left.

(iii) All inlets and outlets shall be securely closed subject to provision of vents where required.

3.4 Stowing in wagons

(i) Packages containing acids and other corrosives should be compactly loaded so that they do not shift during transit.

(ii) Different kinds of acids and other corrosives when loaded together in the same wagon shall be kept as far apart from the another as may be practicable.

(iii) Drums containing acids and other corrosives shall as far as possible, be loaded on end.

(iv) Bottles, jars and carboys should not be loaded on top of other goods, and the other goods should not be loaded on the top of bottles, jars and carboys.

3.5 Labelling, Sealing and locking of Wagons

A 'Dangerous' label as shown in rule 824 of Red tariff no. 20, shall be affixed on both side of every wagon in which acids and other corrosives are stored for dispatch or delivery or while in transit.

3.6 Precautions to be taken during shunting

Shunting of wagons containing acids and other corrosives shall not be carried out, except under the superintendence of a duly authorized officer who shall ensure that during shunting operations:-

(a) the speed of all movements does not exceed 8 KMPH

(b) no rough hump, fly or loose shunting takes place .

3.7 Additional Rules

Any additional or exceptional rules applicable for any specific items regarding Packing, marking & labeling, Carriage etc have been discussed in details in table VIII, Chapter VIII of Red tariff no.20.

4.0 Stationary Storage of Dangerous Goods

Some of the dangerous goods like HSD oil, lubricants etc. are also stored by the railways for their own consumption in diesel loco sheds, ROIs at stations, store depots etc. These places of storage of dangerous goods must have sufficient fire fighting equipments and trained man power to deal with initial phases of fire. All such locations of storage must also have the road access so that fire tenders can approach in the event of any major fire. Adequate security arrangements should be made at these locations to prevent any outside interference which may cause any untoward incident. The facilities for storage of petroleum products by the Railways should conform to the Petroleum Rules 2002 notified in the Gazette of India.

In addition to the railways own storage, there are major storage points of dangerous goods adjacent to the railway infrastructure under the private ownership. Railways should liaise with such private owners to ensure that adequate safety precautions are taken and locations are suitably guarded by them to obviate any untoward incident that might affect railway system.

5.0 Rescue Relief and Restoration Operations

Railway's expertise in dealing with the mis- happenings like spillage, catching fire etc. of these dangerous goods is very limited. It is therefore imperative that the respective zonal railways will develop and nurture coordination with those agencies and Organisations on their system that have expertise in dealing with the hazardous material being handled and transported on the respective zonal railways. Contact details e.g. Name, Designation, Telephone Nos., Mobile Nos. etc. of such agencies should be available in the divisional and' zonal Railway Disaster Management Plan so that these agencies can be called for without any delay during any untoward incident. However, not to mention the least nominated staff of ARMVs, ARTs and few of the staff maintaining the rolling stock which is used for transportation of hazardous material may be trained and equipped with the equipment used for dealing with such material in the eventualities.