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SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS

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Indian Standard

SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 24 December 1975, after the draft finalized by the Safety in Construction Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Handling and storage of building materials used in the construction industry form essential operations till their final use. Handling of such materials has, to be mostly multi-stage; but their storage too may become multi-stage when the materials are first received in a central depot or where the first unloading site is far from the work site or the storage site has to be shifted for any reason. Unloading, stacking, lifting, loading and conveying operations involved are, at present, mostly performed manually; but, gradually, more and more mechanical aids and gadgets are being brought into use. With the expanding construction activity, larger quantities of materials have to be handled/stored and also newer and bulkier materials are coming in and, consequently, the risks involved to workmen employed on handling and storage operations also would increase. It has, therefore, been felt necessary to prepare a safety code for giving guidance to workmen for carrying out their operations safely. Reference shall also be made to IS : 7293-1974* where mechanical means are used for handling materials.

0.3 A number of Indian Standards pertaining to building materials give guidance for their handling without damaging the same, while IS : 4082-1967† covers practices for ensuring their damage-free storage. This standard lays down complementary guidance framed to avoid accidents to workmen engaged on handling and storage of building materials. Such accidents may result in injury or loss of limb or life and, apart from expenses for attending to the injured and sometimes heavy compensations, must involve interruption of efficient execution of construction activity.

*Safety code for working with construction machinery.

†Recommendations on stacking and storage of construction materials at site.

0.4 In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in other countries.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down the safety requirements to be observed in handling and storage of building materials at building sites and receiving depots.

2. GENERAL

2.1 Stacking and Piling — Materials shall be segregated as to kind, size and length and placed in neat, orderly piles that are safe against falling. If the piles are high, they shall be stepped back at suitable intervals in height. Piles of materials shall be arranged so as to allow a passageway of not less than 1 m width in between the piles or stacks for inspection and removal. All passageways shall be kept clear of dry vegetation.

2.1.1 Materials shall be stacked on well drained, firm and unyielding surface. Material shall not be stacked so as to impose any undue stresses on walls or other structures.

2.1.2 Materials shall be stacked in such a manner as not to constitute a hazard to passersby. At such places the stacks shall have suitable warning signs in day time and red lights on and around them at night.

2.2 Manual Lifting — When the materials have to be handled manually each workman shall be instructed by his foreman or supervisor in the proper method of lifting heavy objects. Workmen shall be provided with suitable equipment for his personal safety as necessary. Supervisors shall also take care to assign enough men to each lifting job; the weight carried by each man shall be determined by the distance to be moved, difficulty of movement presented, time required, etc.

2.2.1 Whenever any stack exceeds 1·5 m height, suitable and safe means of access shall be provided for the use of workers and such means of access shall not disturb the stability of the stack.

*Rules for rounding off numerical values (*revised*).

2.3 Posting Storage Areas — Appropriate signs shall be placed at all storage locations where special conditions exist or where special precautions are necessary.

3. STORAGE AND HANDLING OF MATERIALS

3.1 The stacking, storage and handling of materials generally used in constructions shall be as given in **3.2** to **3.10**.

3.2 Timber

3.2.1 Timber shall be stacked on unyielding and level dunnage. Cross strips or cross piling shall be used where the pile is more than 1 m high.

3.2.2 The top of each pile shall be kept as level as possible when timber is being removed.

3.2.3 No nails shall be allowed to protrude so as to cause any injury hazard.

3.2.4 Two men shall carry long boards, and care shall be exercised at corners and cross-walks.

3.3 Cement, Lime and Pozzolana

3.3.1 *Handling* — Workmen, handling bulk cement, lime or fine pozzolana shall wear protective clothing, respirators, and goggles, shall be instructed in the need of cleanliness to prevent dermatitis; and shall be provided with hand cream, petroleum jelly, or similar preparation for protection of exposed skin.

3.3.2 *Stacking* — Stacks shall not be higher than 15 bags. If the stack has to be more than 8 bags high, the bags shall be arranged in header and stretcher fashion, that is, alternate layers lengthwise and crosswise, so as to tie the piles together to lessen the danger of toppling over. Bags shall be removed uniformly from the top of the piles to avoid tipping of the stack.

3.3.3 *Silos* — Bulk cement and pozzolana stored in silos or bins may fail to feed to the ejections system. When necessary to enter a silo or bin for any purpose, the ejection system employed shall be shut down and locked out. When necessary for a workman to enter such storage area, he shall wear a life-line, with another workman outside the silo or hopper attending the rope.

3.3.4 *Lime* — Unslaked lime shall be stored in a place inaccessible to water and because of the fire hazard, shall be segregated from the combustible materials.

3.4 Sheet Glass and Fibre Glass

3.4.1 Glass panes used in building construction shall be stacked on edge with suitable supports.

3.4.2 Glass edges shall be covered or otherwise protected to prevent injuries to workmen passing-by.

3.4.3 Waste glass pieces shall be stored or disposed of in such a manner as to avoid injuries to workmen.

3.4.4 Workmen handling glass panes, waste glass pieces and fibre glass shall be provided with suitable hand protection.

3.5 Pipe

3.5.1 *Stacking* — Pipe shall be stacked on solid, level sills and contained in a manner to prevent spreading or rolling of the pile. Where quantity storage is necessary, suitable packing shall be placed between succeeding layers to reduce the pressure and resulting spreading of the pile.

3.5.2 *Size and Length* — Orderly storage as to sizes and lengths enhances access and removal operations.

3.5.3 *Removal* — Removal of pipe from a pile shall be accomplished by working from the ends of the pipe.

3.5.4 *Transporting* — In loading pipe or transit, it shall be so secured as to insure against displacement.

3.5.5 *Power Lines* — In stacking and handling of pipes and other conducting materials the following minimum safety distances shall be ensured from the overhead powerlines:

11 kV and below	1·40 m
Above 11 and below 33 kV	3·60 ,,
Above 33 and below 132 kV	4·70 ,,
Above 132 and below 275 kV	5·70 ,,
Above 275 and below 400 kV	6·50 ,,

3.6 Piling and Poles

3.6.1 *Stacking* — Piling and poles shall be carefully stacked on solid, level sills and shall be so piled and blocked as to prevent rolling or spreading of the pile.

3.6.2 *Placing and Removing* — When placing piling or poles on the pile, workmen shall work from the ends of the pole. Like precautions shall be observed in removal from the pile.

3.6.3 *Tag Lines* — Tag lines shall be used to control piling and poles when handling for any purpose.

3.6.4 *Fire Hazard* — The storage area shall be maintained free of vegetation and flammable materials.

3.6.5 *Power Lines* — Precautions as laid down in **3.5.5** shall be followed.

3.7 Reinforcing and Structural Steel

3.7.1 *Stacking Reinforcing Steel* — Reinforcing steel shall be stored according to length, size and shape, and shall be piled in such a manner as to prevent tipping or falling.

3.7.2 *Lagging* — Steel shall be stored on a solid foundation, utilizing lagging as necessary to ensure stable piles.

3.7.3 *Safe Access* — Adequate spacing shall be maintained between piles to ensure safe access.

3.7.4 *Gloves* — Workmen handling deformed steel bars, barbed wire, expanded metal and the like shall be required to wear gloves.

3.7.5 *Stacking Structural Steel* — Structural steel shall be carefully piled to prevent sliding or tipping.

3.7.6 *Power Lines* — Precautions as laid down in **3.5.5** shall be followed.

3.7.7 *Tag Lines* — Tag lines shall be used to control the load in handling reinforcing or structural steel when a crane is employed.

3.7.8 *Manual Handling* — Heavy steel sections and bundles shall be lifted and carried with the help of slings and tackles and shall not be carried on the shoulders of the workman.

3.8 Sand, Gravel and Crushed Stone

3.8.1 *Location of Stockpiles* — Stockpiles of these materials shall be so located as to provide easy access for withdrawing. In stacking these materials minimum safety distances as mentioned under **3.5.5** shall be ensured between the material and the overhead power lines.

3.8.2 *Overhanging Prohibited* — When withdrawals are made from stockpiles, no overhang shall be permitted.

3.8.3 *Superimposed Loading* — Materials shall not be piled against walls that will be endangered by thrust, nor along the sides of any excavation or on the top of an embankment so as to cause slips.

3.8.4 *Hoppers* — Employees required to enter hoppers shall be equipped with safety belts and lifelines, attended by another person. Machine-driven hoppers, feeders, and loaders shall be locked in the off position prior to entry.

3.9 Paints, Varnishes and Thinners

3.9.1 *Method of Storage* — Paints, varnishes, lacquers, thinners and other flammable materials shall be kept in a properly sealed or closed containers. The container shall be kept in a well ventilated location, free from excessive heat, smoke, sparks or flame.

3.9.2 *Limited Storage Areas* — Paint materials in quantities other than required for daily use shall be kept stocked under regular storage place.

3.9.3 *Supply of Milk* — Each workman handling lead based paints shall be issued ½ litre milk per day for his personal consumption.

3.9.4 *Cleanup* — Paint scrapings and paint-saturated rags and debris shall be removed daily from the premises and, preferably, destroyed by burning at a safe place.

3.9.5 *Ventilation and Lighting* — Ventilation adequate to prevent the accumulation of flammable vapours to hazardous levels of concentration shall be provided in all areas where painting is done. When electric lights, switches or electrical equipment are necessary, they shall be of explosion-proof design.

3.9.6 *Fire Protection* — Buckets containing sand shall be kept ready for use in case of fire. Fire extinguishers, when required, shall be of foam type conforming to IS : 933-1967*.

3.9.7 *Spray Painting* — No smoke or open flame, exposed heating elements, or other sources of ignition of any kind shall be permitted in areas or rooms where spray painting is being done.

3.9.8 *Heating* — When painting is done in confined spaces where flammable or explosive vapours may develop, any necessary heat shall be provided through ductwork remote from the source of flame.

3.10 Bitumen, Bituminous Emulsion and Road Tar

3.10.1 *Stack Size* — No stack shall exceed 100 drums (180/200 litres). A safety distance of 6 m minimum, shall be kept between stacks.

3.10.2 *Drum Position* — Drums shall be kept stacked on their sides so that water does not collect on them. The bungs, if eccentric, shall be upper most namely in 12 o'clock position.

3.10.3 *Stack Height* — Pyramid stacking shall always be used and the height of the stack shall not exceed 3 tiers.

3.10.4 *Handling* — To facilitate rolling of drums of the middle and top tiers, in building up or breaking down the stack, suitable skids shall be temporarily laid on the tier over which rolling has to be done.

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*Specification for portable chemical fire extinguisher, foam type (*first revision*).

3.11 Flammable Materials

3.11.1 *Regulations* — Flammable materials shall be stored in accordance with the relevant regulations and rules so as to ensure the desired safety during storage. Explosives like detonators shall be stored in accordance with the existing regulations of Indian Explosives Act.

3.11.2 *Personnel* — Operations in connection with handling, storage and issuance of flammable liquids shall be under the supervision of qualified and experienced persons.

3.11.2.1 *Clothing* — Workmen shall be required to guard carefully against any part of their clothing becoming contaminated with flammable fluids. They shall not be allowed to continue work when their clothing becomes so contaminated.

3.11.3 *Handling* — Petroleum products delivered to the job site and stored there in drums shall be protected during handling to prevent loss of identification through damage to drum markings, tags, etc. Unidentifiable petroleum products may result in improper use, with possible fire hazard, damage to equipment, or operating failure.

3.11.3.1 Bulk delivery and storage of petroleum products requires the same care in identification, and particular attention to fire hazards during handling.

3.11.4 *Storage* — Outdoor storage of drums requires some care to avoid contaminations. Moisture and dirt in hydraulic brake and transmission fluid, gasoline, or lubricants may easily cause malfunction or failure of equipment, with possible danger to personnel. The storage area should be free of accumulations of spilled products, debris and other hazards.

3.11.4.1 Compressed gases and petroleum products shall not be stored the same building or close to each other.

3.11.4.2 *Bulk Storage* — For bulk storage of petroleum, kerosine oil and the like, the storage shall comply strictly with the specifications given in the Petroleum Rules (and with the relevant act).

4. UNLOADING RAIL ROAD WAGONS AND MOTOR VEHICLES

4.1 Loading and Unloading Rail Road Wagons

4.1.1 Appropriate warning signals shall be displayed to indicate that the wagons must not be coupled or moved. Other equipment may not be placed on tracks, that would interfere with the view of the signals at any time, without notifying the workman responsible for placing the signals.

4.1.2 The wheels of wagons shall always be spragged or chained while the wagons are being unloaded and their brakes alone shall not be depended upon to hold them stationary.

4.1.3 Special level bars shall preferably be used for moving rail wagons rather than ordinary crow bars.

4.1.4 Where gangplanks are used between wagons and platforms of piles (heaps), cleats at lower end of gangplank, or pin through end of gangplanks, shall be used to prevent sliding. If gangplank is on grade, cleats or abrasive surface shall be provided for entire length.

4.1.5 When rail road wagons are being loaded or unloaded near passageways or walkways, adequate warning signals shall be placed on each end of the wagon to warn pedestrians.

4.2 Loading and Unloading from Motor Vehicles

4.2.1 The motor vehicles shall be properly blocked while being loaded or unloaded; brakes alone shall not be dependent upon to hold them.

4.2.2 When motor vehicles are being loaded or unloaded near passageways or walkways, adequate warning signs shall be placed on each end of the vehicle to warn the pedestrians.

4.3 Handling Heavy/Long Items

4.3.1 Loading and unloading of heavy items, shall, as far as possible, be done with cranes or gantries. The workman shall stand clear of the material being moved by mechanical equipment. The slings and the ropes used shall be of adequate load carrying capacity, so as not to give way and result in accidents.

4.3.2 While heavy and long components are being manually loaded into motor vehicle, wagons, trailer, etc, either wooden sleepers or steel rails of sufficient length shall be put in a gentle slope against the body of the wagon/vehicle at 3 or 4 places for loading. These long items shall be dragged, one by one, gently and uniformly along these supports by means of ropes, being pulled by men with feet properly anchored against firm surface. As soon as the items come on the floor of the vehicle, the same may be shifted by crow bars and other suitable leverage mechanism, but not by hands to avoid causing accident to the workmen.

4.3.3 Similar procedure as outlined under **4.3.2** above shall be followed for manual unloading of long heavy items.

5. DISPOSAL OF WASTE MATERIAL

5.1 Scrap Lumber and Waste — Scrap lumber, waste materials, and similar debris shall be collected and stored in piles or containers daily for removal and disposal.

5.2 Pollution Control — All applicable regulations relating to the pollution of streams, reservoirs, lakes, ground water or water courses shall be fully complied with. The manner of disposing of waste materials shall be subject to the approval of the engineer-in-charge/depot-in-charge.

6. FIRE EXTINGUISHING EQUIPMENT

6.1 Appropriate and adequate fire extinguishing equipment shall be provided at all storage locations (*see* IS : 2190-1971*).

6.2 Bulk Storage Depots — Where flammable and combustible materials are stored in bulk, for considerable period an automatic fire alarm of suitable design shall preferably be installed.

6.3 Workers handling excavated earth from foundation, particularly if the site happens to be reclaimed area or marshy area, shall be protected against infection effecting their exposed portions of the bodies.

7. HOUSE KEEPING

7.1 Safe Access — Stairways, walkways, scaffolds, and accessways shall be kept free of materials, debris and obstructions.

7.2 Scaffolds and Walkways — The engineer-in-charge/the foreman shall initiate and carry out a programme requiring routine removal of scrap and debris from scaffolds and walkways.

7.3 General — Efficient and orderly storage of materials coupled with routine house keeping are most important factors in safety and fire prevention. It is essential that good house keeping be maintained throughout all storage areas.

*Code of practice for selection, installation and maintenance of first aid fire appliances (*first revision*).

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Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 FEBRUARY 1983

TO

IS:7969-1975 SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS

Alteration

(*Page 8, clause 3.10.2*) - Substitute the following for the existing clause:

'3.10.2 *Drum Position* - The drums or containers of all type bitumen/bitumen emulsion and road tar shall be stacked vertically on their bottom in up to three tiers. Damaged drums shall be segregated and stacked separately in such a way as to avoid leakage. Empty drums shall be stored in pyramidal stacks neatly.'

(CED 45)

Reprography Unit, BIS, New Delhi, India