

Safety Measures in Factories

39.1 Introduction

Increasing number of accidents involving workers has drawn our attention towards safety measures in the factories. Accidents not only affect workers losing their livelihood but also employers in terms of compensation to be paid to the workers. Accidents are a significant cause of dispute between workers and management. With the coming in of new set up of industries e.g., steel production, engineering, fertilizers, chemicals and petro-chemicals, oil refining etc., and increasing use of machine power, industrial complexities in terms of process of production have increased. This has given rise to **hazards** and risks. Safety measures are to be adopted against such risks and hazards. The Factories Act, 1948 has laid down certain measures for the safety of workers employed in the factories. In this lesson, we shall study about the safety measures in factories.

39.2 Objectives

After studying this lesson, you will be able to:

- explain the need for adopting safety measures in factories;
 - describe the safety measures provided for in the Factories Act;
 - understand the relationship between safety measures and efficiency of workers.
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39.3 Need for safety measures

Safety measures result in improving the conditions under which workers are employed and work. It improves not only their physical efficiency, but also provides protection to their life and limb. Inadequate provision of safety measures in factories may lead to increase in the number of accidents. Human failure due to carelessness, ignorance, inadequate skill, and improper supervision have also contributed to accidents, and the consequent need for safety measures. Other factors giving rise to the need for safety measures are:

- rapid industrialization with its complexities in manufacturing process and layout;
- expansion or modifications in existing factories;
- setting up of new industries involving hazards not known earlier;
- lack of safety consciousness on the part of both workers and management;
- inadequate realisation of the financial implications of accidents.

Intext Questions 39.1

1. State which of the following statement are true and which are false:
 - (i) Safety measures only improve physical efficiency of workers.
 - (ii) Inadequate provision of safety measures in factories gives rise to increase in number of accident.
2. Fill in the blanks as directed:
 - (i) Factors giving rise to the need for safety measures are _____ (mention any two factors)

- (ii) _____ result in improving the conditions under which workers are employed and work in factories. (fill in the gap with appropriate words)
- (iii) Rapid industrialisation with its complexities in manufacturing process has given rise to _____. (fill in the gap with appropriate expression).

39.4 Safety Measures

Safety measures which are provided in the Factories Act, 1948, are considered to be minimum in terms of adequacy. Such measures are required to be effectively implemented. In addition to implementing safety measures provided in the Factories Act, there is also need for providing training in safety to workers, and installing safety equipment in the factories. Employers should take the initiative in providing training in safety to employees. Workers' unions should take interest in safety promotion. Periodic training courses in accident prevention can be organised. Safety should become a habit with employers and the workers alike. The Factories Act provides for the following safety measures:—

(i) Fencing of Machinery

In every factory, measures should be taken for secured fencing of machinery. Safeguards of substantial construction must be raised and constantly maintained and kept in position while the parts of machinery (they are fencing) are in motion or in use. Fencing is necessary in respect of:

- every moving part of a prime mover;
 - headrace and tailrace of every water-wheel and water turbine;
 - every part of an electric generator, a motor or a rotary convertor;
 - every part of transmission machinery; and
 - every dangerous part of any other machinery.
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(ii) Work on or near Machinery in Motion

Where in any factory, it becomes necessary to examine any part of machinery, while the machinery is in motion, such examination shall be carried out only by specially trained adult male workers. Such workers shall wear tight fitting clothing and their names shall be recorded in the register prescribed in this connection. The machinery in motion with which such workers would otherwise be liable to come in contact during the course of its examination, shall be securely fenced to prevent such contact.

No woman or young person shall be allowed to clean, lubricate or adjust any part of a prime mover or transmission machinery, while the machinery is in motion.

(iii) Employment of Young Persons on Dangerous Machines

The Factories Act prohibits employment of young persons on certain types of machines as specified under Sec.23 of the Act. They can work only after they have been fully instructed as to the dangers arising in connection with the machines and the precautions to be observed. They should have received sufficient training in work at such machines. They should be under adequate supervision by a person who has a thorough knowledge and experience of the machines.

(iv) Striking Gear and Devices for cutting off Power

In every factory —

- i) suitable striking gear or other efficient mechanical appliances shall be provided and maintained, and used to move driving belts to and from fast and loose pulleys which form part of transmission machinery. Such gear or appliances shall be so constructed, placed and maintained as to prevent the belt from creeping back on to the fast pulley.
- ii) driving belts when not in use, shall not be allowed to rest or ride upon shaft in motion.

In every factory, suitable devices for cutting off power in

emergencies from running machinery shall be provided and maintained in every workroom.

(v) Self-acting Machine

No traversing part of a self-acting machine in any factory, and no material carried thereon shall, if the space over which it runs, is a space cover which any person is liable to pass, whether in the course of his employment or otherwise, be allowed to run on its outward or inward traverse within a distance of eighteen inches from any fixed structure which is not a part of the machine. This is to safeguard the workers from being injured by self-acting machines.

(vi) Casing of New Machinery

Every set screw, bolt or key on any revolving shaft, spindle, wheel, or pinion shall be so sunk, encased or otherwise effectively guarded as to prevent danger in all machinery driven by power and installed in the factory.

The State government is authorised to make rules specifying further safeguards to be provided in respect of any dangerous part of any particular machine or class or description of machines in this connection.

(vii) Prohibition of Employment of Women and Children near Cotton openers

No women or child shall be employed in any part of a factory where pressing a cotton-opener is at work.

(viii) Hoists and Lifts

In every factory—

- i) hoists and lifts shall be of good mechanical construction, sound material and of adequate strength;
 - ii) they shall be properly maintained, and shall be thoroughly examined by a competent person at least once in every period of six months. A register shall be kept containing the prescribed particulars of each such examination;
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- iii) every hoistway and liftway shall be sufficiently protected by an enclosure fitted with gates, and the hoist or lift and every such enclosure shall be so constructed as to prevent any person or thing from being trapped between any part of the hoist or lift and any fixed structure or moving part.
- iv) the maximum safe working load shall be plainly marked on every hoist or lift, and no load greater than such load shall be carried thereon.
- v) the cage of every hoist or lift used for carrying persons shall be fitted with a gate on each side from which access is afforded to a landing.
- vi) every gate shall be fitted with interlocking or other efficient device to secure that the gate cannot be opened except when the cage is at the landing and that the cage cannot be moved unless the gate is closed.

Where in the hoists and lifts used for carrying persons, the cage is supported by rope or chain, there shall be at least two ropes or chains separately connected with the cage and balance weight, and each rope or chain with its attachments shall be capable of carrying the whole weight of the cage together with its maximum load.

Efficient devices shall be provided and maintained capable of supporting the cage together with its maximum load in the event of breakage of the rope, chain or attachments. An efficient automatic device shall be provided and maintained to prevent the cage from overrunning.

(ix) Lifting Machines, Chains, Ropes and Lifting Tackles

‘Lifting machine’ means any crane, crab, winch, teagle, pulley block, gin wheel, and runway.

‘Lifting tackle’ means chain slings, rope slings, hooks, shackles and swivels.

In every factory, following safety measures shall be adopted in respect of every lifting machine (other than a hoist and lift) and

every chain, rope and lifting tackle for the purpose of raising or lowering persons, goods or materials—

- a) All parts including the working gear of every lifting machine and every chain, rope or lifting tackle shall be
 - of good construction, sound material and adequate strength, and free from defect;
 - properly maintained ; and
 - thoroughly examined by a competent person at least once in every period of twelve months.
- b) No lifting machine and no chain, rope, or lifting tackle shall be loaded beyond the safe working load which shall be plainly marked on it.
- c) While any person is employed or working on or near the wheel track of a travelling crane in any place where he would be liable to be struck by the crane, effective measures shall be taken to ensure that the crane does not approach within twenty feet of that place.

A lifting machine or a chain, rope or lifting tackle shall be thoroughly examined in order to arrive at a reliable conclusion as to its safety.

(x) Revolving Machinery

Effective measures shall be taken in every factory to ensure that the safe working peripheral speed of every revolving vessel, cage, basket, flywheel, pulley disc or similar appliance driven by power is not exceeded. A notice indicating the maximum safe working peripheral speed of every revolving machinery shall be put up in every room in a factory in which the process of grinding is carried on.

(xi) Pressure Plant

If in any factory, any part of the plant or machinery used in a manufacturing process is operated at a pressure above atmospheric

pressure, effective measures shall be taken to ensure that the safe working pressure of such part is not exceeded.

(xii) Floors, Stairs, and Means of Access

In every factory—

- a) all floors, steps, stairs and passages shall be of sound construction and properly maintained, and where it is necessary to ensure safety, steps, stairs, and passages shall be provided with substantial hand rails;
- b) there shall, so far as is reasonably practicable, be provided, and maintained safe means of access to every place at which any person is at any time required to work.

(xiii) Pits, Sumps, openings in floor etc. which may be a source of danger, shall be either securely covered or securely fenced. Securely fencing a pit means covering or fencing it in such a way that it ceases to be a source of danger.

(xiv) Excessive Weights

No person shall be employed in any factory to lift, carry or move any load so heavy as to be likely to cause him an injury.

(xv) Protection of Eyes

If the manufacturing process carried on in any factory is such that it involves (a) risk of injury to the eyes from particles thrown off in the course of the process or (b) risk to the eyes by reason of exposure to excessive lights, effective screens or suitable goggles shall be provided for the protection of persons employed on, or in the immediate nearness of, the process.

(xvi) Precautions against Dangerous Fumes and use of Portable Light

- i) No person shall enter any chamber, tank, vat, pit, pipe or other confined space in a factory in which dangerous fumes are likely to be present to such an extent as to cause risk of persons being overcome thereby;
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- ii) No portable electric light of voltage exceeding twenty four volts shall be permitted in any factory for use inside any confined space. Where the fumes present are likely to be inflammable no lamp or light, other than of flame-proof nature, shall be allowed to be used.
- iii) No person in any factory shall be allowed to enter any confined space, until all practicable measures have been taken to reverse any fumes which may be present and to prevent any ingress of fumes.
- iv) Suitable breathing apparatus, reviving apparatus and belts and ropes shall be kept in every factory for instant use. All such apparatus shall be periodically examined and certified by a competent person to be fit for use.
- v) No person shall be permitted to enter in any factory, any boiler, furnace, chamber, tank, pipe, or other confined space for the purpose of working or making any examination until it has been sufficiently cooled by ventilation or otherwise to be safe for persons to enter.

(xvii) Explosive or Inflammable Dust, Gas etc.

If any manufacturing process in the factory produces dust, gas, fume, or vapour of such a nature as is likely to explode on ignition, measures shall be taken to prevent any such explosion by:

- effective enclosure of the plant or machinery used in the process;
- removal or prevention of the accumulation of such dust, gas, fume or vapour;
- exclusion or effective enclosure of all possible source of ignition.

Measures shall also be adopted to restrict the spread and effects of the explosion by providing in the plant or machinery of chokes, baffles, vents, or other effective appliances.

(xviii) Precautions in case of fire

- i) Every factory shall be provided with such means of escape in case of fire as may be prescribed;
- ii) In every factory, the doors affording exit from any room shall not be locked so that they can not be easily and immediately opened from the inside while any person is within the room, and all such doors, unless they are of sliding type, shall be constructed to open outwards.
- iii) Every door, window or other exit affording a means to escape in case of fire shall be distinctively marked in a language understood by the majority of the workers. Such marking should be in red letters of adequate size or by some other effective and clearly understood sign.
- iv) An effective and clearly audible means of giving warning, in case of fire, to every person shall be provided in the factory.
- v) A free passage-way giving access to each means of escape in case of fire shall be maintained for the use of all workers in the factory.
- vi) Effective measures shall be taken to ensure that in every factory all workers are familiar with the means of escape in case of fire and have been adequately trained in the routine to be followed in such a case.

(xix) Safety of Building and Machinery

In case it appears that any building, machinery or plant in a factory is in such a condition that it is dangerous to human life or safety, the manager of the factory may be served an order specifying measures to be adopted as prescribed. Further, in case it appears that the use of any building, machinery or plant in a factory involves imminent danger to human life or safety, an order may be served prohibiting the use of such building or machinery, until it has been repaired or altered.

Intext Question 39.2

1. Tick the appropriate expression:

Fencing provision applies to

- (i) every moving part of a prime mover
- (ii) headrace and tailrace of every water wheel, and water turbine
- (iii) every part of an electric generator
- (iv) every part of transmission machinery, and
- (v) every dangerous part of any other machinery
- (vi) all the above
- (vii) (iv) and (v) above
- (viii) none of the above

2. Fill in the blanks with suitable words:

- (i) The Factories Act prohibits employment of _____ on certain types of machines under Sec. 23.
- (ii) The Factories Act prohibits employment of _____ to lift carry or move any load so heavy as to be likely to cause an injury to them.
- (iii) Measures to escape from fire shall be provided in every _____ .

Safety measures and efficiency of workers

There is a close relationship between safety measures and the efficiency of workers. Efficiency results in increasing the average output per worker. It is reflected in increased productivity. Safety measures are concerned not only with the physical efficiency, and safety of the workers, but also his general well being. Being related with welfare,

lack of safety exposes workers to health hazards. It also involves occupational health risks.

Indian workers are generally considered to be less efficient as compared to workers in other countries. Such a statement does not reflect any inherent deficiency on the part of workers. It is stated to be due to longer hours of work, low wages, and poor living conditions. Health and safety measures provided in factories are also of poor standard. This may be stated as the basic reason for the inefficiency of workers in India. Climatic factors, illiteracy, low standard of living may also affect the efficiency adversely, but the poor working conditions happen to be the main reasons. Working environment in the factory is not conducive to increased efficiency of worker. Under unhealthy surroundings, we cannot expect workers to put in hard and sustained work. Safety measures as listed above partly prevent workers from being exposed to the risk of accidents, and protection against dust and fumes and inflammable gases, etc. These are partly welfare in nature e.g., preventing employment of young persons on dangerous machines. Other safety measures reduce the strain from working under difficult conditions.

Intext Question 39.3

1. State whether the following statements are true or false.
 - (i) There is a close relationship between safety measures, and the efficiency of workers.
 - (ii) Safety measures are concerned only with the physical efficiency of workers.
 - (iii) Lack of safety measures leads to occupational health risk
2. Fill in the blanks with appropriate words:
 - (i) Indian workers are generally considered to be _____ efficient as compared to workers in other countries.
 - (ii) Inefficiency of Indian workers are due to _____ (mention reasons only in points).
 - (iii) Under _____ we cannot expect workers to put in hard and sustained work.

39.5 What you have learnt

There is a close relationship between safety measures and efficiency of workers.

- Increase in number of accidents and declining efficiency has led to adoption of safety measures in factories.
- The Factories Act, 1948 has laid down certain measures to be adopted for the safety of workers employed in factories.
- The safety measures result in increasing the efficiency of workers. It results in increasing the productivity. It improves not only workers' physical efficiency, but provide for protection against risks of injury and ill-health.
- Safety measures in factories include provision for fencing and prohibition of work on or over the machinery in motion; provision of striking gear and devices for cutting off power; casing of new machinery; hoist and lifts; protection of eyes; precaution against dangerous fumes; explosions and inflammable dust and gas, fire, and provision of safety of buildings and machinery.

39.6 Terminal Exercise

1. Describe, in brief, factors responsible for safety measures in the factories.
 2. Mention safety measures as provided in the factories Act. Explain any two of the measures in detail.
 3. Do you find any relationship between safety measures and the efficiency of workers? Explain.
 4. Write short notes on
 - a) Safety measures relating to protection of eyes;
 - b) Precautions against dangerous fumes;
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- c) precautions against fire; and
- d) Safety of building and machinery.

39.7 Answer to Intext Questions

- 39.1**
- 1. (i) F
 - (ii) T
 - 2. (i) Mention factors e.g., rapid industrialisation, inadequate provision of safety measures.
 - (ii) Safety measures.
 - (iii) The need for safety measures.
- 39.2**
- 1. (vi) All the above
 - 2. (i) Young person
 - (ii) Person
 - (iii) Factory
- 39.3**
- 1. (i) T
 - (ii) F
 - (iii) T
 - 2. (i) Less
 - (ii) Mention points – climatic factors, illitracy, low standard of living and poor working conditions.
 - (iii) Unhealthy surrounding.
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