PRACTICE SAFETY

EVERY SECOND

EVERY MINUTE

EVERY HOUR

EVERY DAY

THERE IS NO HOLIDAY FOR SAFETY
Safety is Every Body's Responsibility

- 1. MANAGEMENT
- 2. SAFETY OFFICER
- 3. SUPERVISOR
- 4. WORKER
- 5. UNION LEADER
KALYANI CARPENTER

KALYANI CARPENTER SPECIAL STEELS LTD.
ACCIDENT STATISTICS

... WITH SAFETY

YEAR

ACCIDENT

1989 45
1990 32
1991 33
1992 16
1993 27
1994 20
1995 14
1996 8
1997 3
1998 6
1999 7
KALYANI CARPENTER

Safety, Health and Environment policy

WE COMMIT OURSELVES TO SAFE-GUARD

The SAFETY & HEALTH
OF OUR EMPLOYEES
AND FOR THE
PROTECTION OF
THE ENVIRONMENT
WITH THE SAFE USAGE OF
MACHINERY, EQUIPMENTS AND
OTHER RESOURCES, BY MEANS OF
EDUCATION, ENGINEERING
AND ENFORCEMENT
FOR ACHIEVING OUR BUSINESS GOALS!
IN THE EVENT OF ANY CONFLICT
 ARISING OUT OF THE EXIGENCIES OF
PRODUCTION AND THE REQUIREMENT OF
SAFETY & ENVIRONMENT,
WE RESOLVE NOT TO COMPROMISE
ON THE BASIC TENETS
OF SUSTAINABLE DEVELOPMENT III

Dated 3rd July, 1999

DR. MKS CHERUKURU
PRESIDENT & CEO

KALYANI CARPENTER SPECIAL STEELS LTD.
MUNDHWA, PUNE - 411 036
**ANNEXURE 2**

Ref. : Incident No. ____________________________ No. ____________________________

---

**SUPERVISOR’S REPORT ON INVESTIGATION OF ACCIDENT**

(To be completed immediately after the accident & First Copy (White) submitted to H.R.M. - Per. - Secund copy (Blue) to Safety Dept., & Third copy (Yellow) to be retained as an Office Copy).

**PART-A**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Name</td>
<td>(2) T.No.</td>
<td>(3) S/P/A/C</td>
</tr>
<tr>
<td>(4) Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Plant / Dept / C.C.</td>
<td>(6) Date of accident</td>
<td>(7) Time</td>
</tr>
<tr>
<td>(8) Designation</td>
<td>(9) Shift</td>
<td>(10) Age</td>
</tr>
<tr>
<td>Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(12) Exact place of incident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13) Specific narrative description (How did it occur)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(14) Nature of injury*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(15) Injury location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(16) Severity of injury*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(17) Agency*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(18) Agency part*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19) Accident type*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(20) Unsafe mechanical / physical / environmental condition*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(21) Unsafe personal act by injured and / or others*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(22) Unsafe personal factor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(23) Did the injured perform the job on his own, without any instructions received by him from his superiors?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(24) Did the injured contravene any of the legal provisions or instructions issued to him by his superiors?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(25) Requirement of Personal protective equipment (Safety shoes, glass, helmet, belt etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(26) Was injured using required personal protective equipment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If not why?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(27) What can be / has been / is being done to prevent the recurrence of such or similar incidents</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Name

Supervisor’s Signature

Line Manager’s Signature

Div. Head Signature

Date: / / |

---

**FOR THE USE OF HUMAN RESOURCES DEPT. (H.R.D.) ONLY**

(1) E. S. I. No. 
(2) Resumed duty on 
(3) Man days lost

T : Temporary P : Permanent A : Apprentice C : Casual

* Please refer the reverse page for details.
<table>
<thead>
<tr>
<th>Name</th>
<th>T. No.</th>
<th>ESI No.</th>
<th>Sex</th>
<th>Age (Yrs.)</th>
<th>Trade / Designation</th>
<th>Div / Dept.</th>
<th>Accident Date</th>
<th>Time</th>
<th>Location</th>
<th>Exact place of Accident - Loc</th>
<th>BC No.</th>
<th>Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

State, what exactly injured person was doing at the time of accident:

- Unsafe Condition
- Unsafe Action

Name of Supervisor / Incharge of Section:

 Witness of accident:
1) Name: ______________________ T. No. __________ Pimpri / Chinchwad
2) Name: ______________________ T. No. __________ Pimpri / Chinchwad

Give name or part of machine which caused accident:

- Agency Code:
- Unsafe action:
- I. S. Sr. No.:
- Accident Type:
- Body part Injured:
- F.I. / ESI Ref. No.:
- Injury Type:
- Date of Resuming:
- SPL Ref. No.:
- Unsafe Condition:
- Mandays lost:
- Safety officer's Name & Sign.:

FIRST AID REPORT:

Nature of injury, location, treatment given etc.:

Dispensary in hrs out hrs:

<table>
<thead>
<tr>
<th>Nature of injury</th>
<th>Location</th>
<th>Treatment given etc.</th>
</tr>
</thead>
</table>

Direction of Medical Officer:

- (A) Back to Work
- (B) Report to ESI Hosp
- (C) Come back on

Take rest for days:

Refer to Private Hospital (Name):

F. A Attendant:

Med Officer:

8845 4135 6002 For Medical Dept Copy PC 80 - F 102 (R1) 5/87
(14) The nature of injury:
1) Laceration (irregular cut)
2) Contused wound (swelling)
3) Prick wound (deep prick)
4) Burn (chemical, electrical, fire)
5) Abrasion (scratch, tearing, skin)
6) Puncture wound (straight cut)
7) Crush (steam, hot liquids, solids)
8) Severe (breathlessness)
9) Shock (nervous, electrical)
10) Unconsciousness, profuse bleeding, partial amputation and so on.

The Agency-Causative Agent:
The substance, object, radiation or person most closely related to the cause of injury/accident.
- Animals: Insect, snake, wild, domestic and so on.
- Boilers and pressure vessels: Steam boiler, superheated, condenser digester pressure piping and so on.
- Chemicals: Explosives, vapours, fumes, corrosives, poisons.
- Conveyors: Belt, sprocket, chains and other types.
- Ducts: Asbestos, silica, coal, lead, explosive and others.
- Electricity and Electric Apparatus: Motor, generator, thermostatic lamp, circuit breaker.
- Elevators: Passenger or freight, electric, steam, hydraulic and others.
- Fire: Ordinary/electrical/chemical.
- Hand tools: Axe, knife, chisel, file, hammer, screwdriver and so on.
- Highly flammable & hot substances: Lacquer, steam and others.
- Hoisting apparatus: Crane, derrick, dredge.
- Machines power transmission equipment: Drive shaft, bearings, pulleys, gears.
- Prime movers & pumps: Engine, compressor, blower fan.
- Radiation & radiation substances: Radium, X-ray.
- Working surfaces: Floor, ramp, road, stair, ladder, scaffold.
- Miscellaneous: Floor openings, windows and others.

The Agency Part:

The Accident Type:

According to source of injury
- Caught in or between: Crushing, pinching or squeezing between moving or moving and stationary objects.
- Struck by: Object causing impact or blow into person.
- Struck against: Injured striking against moving or stationary objects.

Fall of person (same level) from one level to lower level.
Fall of person (different level) from one level to lower level.
Contact:lol product, scratched: forceful pressing against rough, pointed or hard substances.
Over-exertion: Springs, ruptures, strains and so on.
Contact: (electric current): With live electric conductors, resulting in shock or burn.
Contact: (radiation sources, caustics toxic and noxious substances) by inhalation, ingestion or absorption.

20) Unsafe Mechanical/Environmental physical condition:
- Inadequate mechanical guarding.
- Defective condition of equipment: Rough slippery sharp corroded, cracked inferior, composition.
- Ladders, floors, chairs, piping and so forth.
- Unsafe design or construction.
- Hazardous process, operation or arrangement.
- Overloading aisles and so on.
- Inadequate or incorrect illumination.
- Inadequate or incorrect ventilation.
- Unsafe dress or PPE/apparel.
- Obstructions due to bad housekeeping.

21) Unsafe Personal Acts:
- Types of behavior that lead to injuries: (No attempt to probe at the reasons for a person's behavior)
- Working unsafely: Improper lifting, hazardous placement, incorrect mixing of material performing maintenance or repair on moving machinery, working under suspended solids, failure to take heed of warnings, adding chemical speedily, incorrectly at wrong time so on.
- Performing operations without training, authority and/or supervisory permission.
- Removing safety devices or altering their operations so they are ineffective.
- Operating at unsafe speed.
- Use of unsafe or improper equipment and tools, e.g. using a chisel with mushroomed head.
- Working under influence of alcohol.
- Horseplay, teasing, abusing, distracting attention of others.
- Failure to use attire, safety devices & personal protective equipment (PPE).
- Failure to follow standard safe operating procedure.

22) The unsafe Personal Factor:
- Unsafe attitude.
- Lack of knowledge or skill.
- Bodily defects, faulty vision, poor hearing and so on.
- Mental state, nervousness, fatigue and so forth.
MAHINDRA ENGINEERING & CHEMICAL PRODUCTS LIMITED
145, Mumbai-Pune Road, Pimpri, Pune - 411 018

PREVENTIVE ACTION REPORT FOR ACCIDENTS

1. Accident Details

2. No. of Persons involved
   (Designation, Level, Name etc.)

3. Location / Machine etc.

4. No. of Production Hours lost

5. No. of days / hours employee was
   always from work

6. Details of investigation (Why x 5)

7. Where else similar situation is existing?

8. Preventive actions required

9. Document changes required

Date: ..................................................  Signature of PIO
                                             Signature of HOD

TR-02 FM-02
SAFE ENTRY PERMIT

(Please return this permit to the initiator on completion)

(To be filled before starting the work & First copy submitted to Safety Dept., Second copy to Job Incharge & Third copy to Initiator)

No person will enter any chamber, tank, vat, pit, pipe, flue or other confined space in which dangerous fumes are likely to be present, to such an extent to involve risk of persons being overcome thereby, unless certified safe to enter and adequate safety measures, as specified, are taken and observed.

SAFE ENTRY CERTIFICATE

The said confined space is certified to be safe to enter at_________________on_________________as the concentration of_________________________________gas contaminated in the atmosphere inside the space is within the maximum allowable limits and / or the concentration of hazardous chemical in the wash water collected from the said space is negligible.

Use of gas mask: recommended ( ) not recommended ( )

Test witnessed by: (1)___________________ (2)____________________

Initiator (Mr. )  
Job Incharge (Mr. )  
Plant Incharge (Mr. )  
Safety Officer (Mr. )

Location of confined space: 
Dept./section 
Date:  
Time:  
Work to be done: 

Following precautionary measures have been taken

1. The said confined space has been completely isolated:
   a) inlet and outlet line valves are tightly closed
   b) inlet and outlet line valves are locked in close position
   c) inlet and outlet line are blinded off

2. The agitator switch is locked in ‘OFF’ position (i.e. isolated)

3. Ladders of adequate length are provided inside and outside.

4. Explosion proof extension light or hand lamp of 24 V. provided

5. Safety belts with adequate length of life line, provided

6. Observer has been posted near manhole, holding life line

7. Supply of fresh air has been provided inside and the same will be continued till operatives are in.

8. Protective wears required _____________ and _____________ provided.
   i) Helmet-cum-faceshield, ii) Gloves, iii) Gumboots, iv) Overall

9. Validity of permit: from ______________ hrs. to ______________ hrs.

10. Job completed and area cleared / cleaned / validity over 

11. Job not completed, validity extension required by ______________ hrs.

Reason: 

Checked  Sign

Initiator (Mr. )  
Job Incharge (Mr. )  
Plant Incharge (Mr. )  
Safety Officer (Mr. )

Special Precautions
1. In case of any problem inform immediately to Doctor and safety dept. Ph. 4300/4273
2. Do not carry match box and lighter.
3. No smoking and tobacco chewing in the confined space.

Checked: Found OK / Not OK, Remarks if any: 

Representative of Safety Department: 

SAF - 004
**SUB.: ELECTRICAL POWER SUPPLY**

1. **Contractor’s / Dept. Name**: 
2. **P. O. No.**: 
3. **Work to be carried out**: 
4. **Location of Work**: 
5. **Electrical Equipments to be used**: 
6. **Duration of Work**: 
7. **Power Supply / Elect. Connections required**: 

---

**Special Precautions**
1. 
2. 
3. 

Checked: Found OK / Not OK, Remarks if any:

**Date**: 

**Signature**

**Electrical Engineer**

**SAF - 011**
PERMIT: F

WORK ON HEIGHT
(Required for working on height more than 3 meter)
(To be filled before starting the work & First copy submitted to Safety Dept., Second copy to Job Incharge & Third copy to Initiator)

 Issued to: ____________________________ on _____________ at ____________ a.m./p.m.

 Work to be done: ____________________________

 Location: ____________________________

 Duration of work: From _____________ hrs. To _____________ hrs.

 Total No. of workmen working at one time : 1. _____________ 2. _____________ 3. _____________ 4. _____________ 5. _____________

 Following measures to be taken, P.P.E. to be provided and used.

 A) Ladders (Telescopic if required) ( ) ( ) ( ) ( ) ( )
 B) Safety belts with adequate lifeline ( ) ( ) ( ) ( ) ( ) ( )
 C) Industrial safety helmet ( ) ( ) ( ) ( ) ( ) ( )
 D) Face shield/Goggle, if situation demands ( ) ( ) ( ) ( ) ( )

 Precautionary measures required to be taken :-
 A) Instruction to workmen on safety and use of P.P.E. by supervisor.
 B) This work must be done under strict supervision.
 C) Use above mentioned safety equipments and safety wears.

 Safety belt No. 1. _____________ 2. _____________ 3. _____________ 4. _____________ 5. _____________ 6. _____________ 7. _____________ 8. _____________

 Initiator Plant Incharge Job Incharge
 Mr. ____________________________ [ Mr. ____________________________ ] [ Mr. ____________________________ ]

 Job completed and area cleared / validity over ( )
 Job not completed, validity extension required by _____________ hrs.
 Reasons :

 Special Precautions

 1. 
 2. 
 3. 

 Checked : Found OK / Not OK, Remarks if any :
 Representative of safety dept. ____________________________

 Return of permit: Received on _____________ at ____________

 Initiator Plant Incharge Job Incharge
 Mr. ____________________________ [ Mr. ____________________________ ] [ Mr. ____________________________ ]

 Special Precautions

 1. 
 2. 
 3. 

 Checked: Found OK / Not OK, Remarks if any :

 Representative of safety dept. ____________________________

 SAF.009
FORM : G

Sr.

Date

EXCAVATION : PERMIT TO WORK

(PLEASE RETURN THE PERMIT TO THE INITIATOR ON COMPLETION)
(To be filled before starting the work & First copy submitted to Safety Dept., Second copy to Job Incharge & Third copy to Initiator)

In plants with numerous underground systems, such as pipelines or power conduits or, where soil conditions are unstable or possibly contaminated, digging or excavation operations are required to be controlled. Thus, this permit system is to be issued by the initiator to the operation-incharge, where excavation is done departmentally or through contract to ensure that any of the following desirable measures have been or will be taken.

Excavation for ____________________________________________

Location ________________________________________________

Caution : Contained with excavation are:

Area to be barricaded and marked:

<table>
<thead>
<tr>
<th>Safety Precautions</th>
<th>Done</th>
<th>Checked</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The drawings of the area have been checked for existing lines and the operation-incharge agrees to the operation.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>2. The soil has been checked for contamination by flammable or toxic materials.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>3. The area has been checked for underground power conduits / electrical cables / pipelines</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>4. Precautionary measures as regards above hazards have been discussed and specified.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>5. The area is properly posted and barricaded or roped of.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>6. Protective wears needed and provided</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>PVC - Rubber overall ( ) Gumboots ( ) Face Shield ( ) Handgloves ( ) Safety Goggles ( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>7. Validity of permit from _______ hrs. to _______ hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INITIATOR

8. Job completed and area cleared / validity over _______ hrs.

9. Job not completed, validity required to be extended by _______ hrs.

Reasons:

Recd. on _______ at _______ at

INCHARGE

10. Special Precautions

1. 

2. 

3. 

11. Checked : Found OK / Not OK, Remarks if any :

Representative of safety dept.
EQUIPMENT/LINE BREAKING PERMIT

(Please return the permit to the initiator on completion)

(As prescribed under Rule 73-C of Maharashtra Factories Rule 1965)

(To be filled before starting the work & first copy submitted to Safety Dept., Second copy to Job Incharge & third copy to Initiator)

Work of opening any equipment, system and/or pipeline containing flammable liquids or gases will not be carried out unless adequate safety measures as specified are taken and observed.

Mr. ______________________ is authorised to break/open/enter __________________________ (equipment / system / pipeline) located at ________________________________ on __________________________ at __________________________

Safety precautions needed and taken

1) Line & system have been cleared/emptied/drained/flushed/steamed
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
2) Broken & all opening are blanked
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
3) Area wet down
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
4) Area barricated & posted
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
5) Hose lines laid & connected
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
6) Fire watch with extinguishers posted
   (CO2/DCP/FOAM)
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
7) Forced ventilation arranged
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
8) Neutralising agent ____________ on hand
   Needed ( ) Done ( ) Checked ( ) Sign. ( )
9) Spark proof tools have been provided

Hazard of material and special measures needed:

Personal Protective Equipment Needed and Provided:

10) Rubber Overall with full sleeves ( ) Helmet cum Faceshield ( ) Gumboots ( )
    Faceshields / Goggles ( ) Hand Gloves ( )
    Done ( ) Checked ( )
11) Hot lines in the vicinity are properly wet down
    Needed ( ) Done ( ) Checked ( )
12) Validity of permit: from __________ hrs. to __________ hrs.

INITIATOR (Mr.___________)

JOB-INCHARGE (Mr.___________)

Department Head (Mr.___________)

Issuing Authority (Mr.___________)

13) Job completed and area cleared / validity over ( )
    Received on ___________ at ___________

14) Job not completed, validity extension required by ___________ hrs.
    Reasons: ____________________________________________

INITIATOR

JOB-INCHARGE

15) Special Precautions
    1. ___________________________________________________
    2. ___________________________________________________
    3. ___________________________________________________
16) Checked: Found OK / Not OK, Remarks if any:
    Representative of safety department: ___________________________

SAF-006
ACCIDENT REPORT

1. Full Name of the injured person ..............................................
   (in the block letters)
2. Age of the I.P. ...........................................................................
3. Dept. and Shop ...........................................................................
4. Tkt. No./Name of Cont. .................................................................
5. Designation ..............................................................................
6. Insurance Number ......................................................................
7. Total work experience
   (a) in this company .................................................................
   (b) in this dept. ........................................................................
   (c) in this job ...........................................................................
8. (a) Date/Shift and hour of Accident ...........................................
    (b) Hour at which the I.P. started
duty that day .............................................................................
9. Exact place of Accident ..............................................................
10. Cause of Accident ....................................................................
11. What the I.P. was doing ............................................................
12. State exact how the
    Accident occurred ....................................................................
CLASSIFICATION OF ACCIDENT

1. AGENCY

Agency is the Object or Substance which is most closely related with the Accident causing the Injury and with respect to which adoption of safety measure could have prevent accident.

2. UNSAFE MECHANICAL OR PHYSICAL CONDITION

This identifies the Safe Mechanical or Physical condition or condition deviations related to the agency which contributed to the causation of accident.

3. UNSAFE ACT

This identifies the deviation from accepted and laid down safe procedure which contributed on causation of accident.

4. UNSAFE PERSONAL FACTOR

This identifies the Anatomical Physiological or the Psychological characteristic with permitted or occasioned the selected unsafe act.

5. TYPE OF ACCIDENT

Type of accident is the manner in which the object or substance causing the injury comes in contact with the injured person or movement of the injured person which result in injury.

6. NATURE OF INJURY

This identifies the injury in terms of its principal characteristics.

7. LOCATION OF INJURY

Location of injury identifies the part of the injured person's body directly affected by the injured person.
COST OF ACCIDENT

DIRECT COST TO MANAGEMENT
2. Medical Expenses.

INDIRECT COST TO MANAGEMENT
1. Time Lost of injured employee.
2. Time lost of other employee.
3. Time lost of Supervisor, Engineers, Managers.
4. Cost of time spent by First Aid/Doctor.
5. Cost due to damage to machine tools and property.
6. Cost incurred in putting back equipment in order.
7. Incidental cost due to interference of production.
8. Cost under employee welfare scheme.
9. Output of injured is below normal after rejoining work.
10. Cost due to Loss of Profit on injured productivity and idle machine.
11. Expenses like hiring, training new employee, overtime, renting equipment's.

INDIRECT COST TO INJURED PERSON
2. Incapacity to perform out-turn of work.
3. Loss of wages.
4. Medical expenses.
5. Loss of Labour Life.

INDIRECT COST TO SUPERVISOR
1. Worry - loss of prestige.
2. Loss of output - morale.
4. More Supervision to new employee.

INDIRECT COST TO SOCIETY
1. Increased lost of product.
1. Financial burden on dependent.
HANDBOOK ON SAFETY
सुरक्षिततेवरील हस्तपुस्तिका
3.3 Welding & Gas Cutting

While carrying out Welding or Gas cutting operation following precautions must be taken:

1. If Welding / Gas cutting operation is to be carried out outside the designated place; then work permit must be collected before starting the operation.

2. No combustible material should be stored near the area where Welding/Gas cutting operation is being carried out.

3. Availability of fire extinguisher / water supply should be ensured before starting the work.

4. While welding ensure that earthing is done to the nearest earthing point and the job to be welded is near the welding machine.

5. While gas cutting ensure proper condition of pressure gauges, hose pipes and nozzle.

6. After the welding / gas cutting work is over, after 15-20 minutes ensure that there is no fire and only then leave the place.

3.4 Forklift Driving

1. Ensure the Forklift truck is fit for use before you drive e.g. brakes are working properly.

2. Do not drive unless you are fully conversant with all controls of the forklift truck.

3. Ensure the load being handled / carried in the forklift is properly balanced so that during movement it does not fall down, especially in case of handling of sheets & extra long bars.

4. Ensure other's safety when you drive.

5. Avoid jerky driving.

6. Ensure use of stopping pins on forks.

7. Ensure correct fitment of extensions on forks.

8. Do not allow any other person on the forklift while driving.

9. Be careful while driving on slopes.

10. While loading material on forks ensure that it does not obstruct your vision while driving.
HEALTH AND SAFETY POLICY

The Company is committed to the protection of Health & Safety of its employees.

Creation of a safe and healthy workplace will be achieved by:

A. Establishing and maintaining safe and healthy working environmental condition in the factory premises.

B. Adopting Safe and Healthy methods in manufacturing activities, handling and maintenance of machinery installed in the factory.

C. Ensuring and adopting Safe and Healthy methods for the storage, handling and transportation of various goods brought into the factory.

D. Ensuring and adopting methods to provide information and instructions on Safety & Health to the employees from time to time.

E. Conducting training classes, carrying out drills and demonstrations & other activities for employees to increase the Safety and Health awareness.

F. Constantly reviewing the methods adopted, auditing the laid down practices and making improvement on a continuous basis.

3.2.3 Handling EOT cranes / Wire ropes

1. Use proper and approved lifting tools & tackles for lifting heavy material in the shop.

2. Never stand below a hanging load.

3. Before starting the work, check operations of all limit switches of EOT crane.

4. When you have to lift a load with the help of EOT crane, it should be placed exactly below the crane. Never allow the job to swing.

5. If you find any deformity in any chain, wire rope or other lifting tackle, inform your superiors immediately.

6. After use, keep the lifting slings at their proper place.
3.5 Electrical Equipment Handling

1. Only authorised and trained Electricians should work on electrical installations.
2. Never try to work on “Live” electric lines.
3. While working on electrical installation, put the display board “Men at work” at prominent place.
4. While working on higher voltage use special handgloves.
5. Use wooden ladders while carrying out electric work at heights.
6. If any employee gets an electric shock, remove him from the source with the help of any non-conductive material like wooden stick etc. Try to give him artificial respiration if his breathing has stopped and immediately move him to the Ambulance room.

3.6 Work at Height

1. While working at a height of 8 feet or more take Safety permit.
2. Use of Safety belt while working at heights is compulsory.
3. The scaffolding or platform being used to stand for working at heights should be of adequate strength & the platform should have proper railing and a foot rest to prevent the person standing on it from falling.
4. While working at heights, check that there is no live electric supply nearby.
5. Avoid detailing employees with cardiac problem, colour blindness or physical disability to work at heights.
3.7 Storage & Housekeeping

1. Keep work area clean.

2. Keep passageways clean. Keep access towards emergency escape doors and fire extinguishers always clean & without any obstructions.

3. Never keep any material near electrical panels.

4. Store empty & filled gas cylinders separately. Store oxygen & acetylene cylinders at separate places.

5. Keep the storage area well ventilated. Never store combustible material up to the roof height.

3.8 Personal Protective Equipments

To protect human body from external hazards the best method is to eliminate the source of hazard. The second method is to provide some barricade between the hazard & the human body. But where both the above methods are not possible then the option is to use protective equipment to keep the body protected.

Here is a list of protective equipment which must be used while performing the jobs mentioned next to them.

- **Helmets** While handling heavy objects with help of EOT cranes and while working at height.
- **Safety Goggles** While working on shop floor.
- **Safety shoes** While working on shop floor.
- **Ear plugs / Ear muffs** While working in high noise area.
- **Face shields** While handling corrosive / hot chemicals.
- **PVC Aprons** While handling corrosive / hot chemicals.
Cotton/Rexin Aprons  While deburring & painting.
Dust/Fume Masks  While carrying out jobs such as deburring, shot blasting, painting, oil spraying, welding etc.
Safety belts  While working at height
Gum boots  While handling hot/corrosive chemicals

4. Fire fighting & Evacuation plan

All possible efforts must be taken to prevent a fire. For that some simple rules are ...

• Never smoke inside the Plant
• Take utmost care and follow procedures while performing hot jobs like welding / gas cutting
• Never permit temporary electrical connections in the Plant.
• Area around Electrical installations should be free from any combustible material.

In spite of taking all the precautions if there is a fire then the procedure which should be followed is ...

• Any employee who notices the fire should immediately inform the following authorities ...

1. Security DepartmentPhone No. 2921, 2922, 2923, 2935
2. Factory Manager Phone No. 2904, 2905, 2906, 2909
3. Plant Engineering Phone No. 2701, 2703, 2704

After the information of fire, Security Department will sound the Emergency siren to alert all the employees and rush to the site of fire.
- In case of fire only trained employees in fire fighting should gather at the site of fire. All others should keep away.

- In case of a major fire all other employees should leave their working area & should gather at assembly points. (Please refer page No. 17) Nobody should stand in between the road or passageways causing hindrance to fire fighting & rescue operation.

- Trained personnel in fire fighting should immediately start fire extinguishing operation.

- Only Factory manager or a person deputed by him will have the authority to call outside Fire brigade inside the Plant to control the fire.
SAFETY RULES FOR INDUSTRIAL EMPLOYEES

ANNEXURE 4

... 238
08] उपन्यास, कस्ट, ध्यान पापायारी मोरी अगर कहा अनुक्षेप का जागी आगे। हे आपाय भी मिल जाता भावना लाल पेदरा लाता आईना त्यामोकेदी गृहसे कंथा पाणि।

09] पापायारा पापायाराय वाटेकोत्स लक अदृश्या। महाने प्यारेन परने, दोनों भागेन देखा पापायारा धारा कहूने कहने याबाबुन्यो होणा-या बुझापरी दाक्षिण देखिदी।

10] क्षुद्रानात येदी खोलौ तेघे क्षुद्रानां बह्न नहीं।

11] ज्यादी दिदिस्त जागा दुर्लभ अति जेह ताक्ष व्यायकी साधिले अस्त लर्न र्या लगेत्रु प्रक्रिया धरा।

12] देखे अंदनामुः तायने देखी अतिशदे देखे व्यायामें व्यायाम रत्ना आणा वाहेर वाणीये रस्ते योत बनी असोटी अंदोटे देखु नाह।

13] पापाया, धारू नाह - देखे कुट्याख अंदोटे देखे बालकामाची लाग्ना उपयोग असर - कुट्याख नाल्याक, नर्त्यानसन स्नाता उल्लथा हातात्तेन लागा स्तोणे वांतनमालुन हृदयत रस्ता:या बवाव उत्तर नेश्वः।

14] "हार्दिक-दार्दा उपयोग एक नाह - रस्ता जोत्तिथाती जला वसेना धागा आतल देर्दू करता जोत्तात्तिः।

15] ज्यापायर धारूं जाँय जाँय जाण रागिना रस्ता कनोगो असेत तरफ रुटे धारू। लागा।

16] धारापाया धारापाया धूरू नाह अगर धारापायां धूरू मारू नाह - धारण धारणात्तह लागात वागा अगर देर्दू आळाः।

17] ज्यापायराली दुखानाची खाते दुखानाकाला या - दुखानाकाला तमाशा धाण घ्या -

18] काव्येनका रंज वंजामुक्ती नाथ अतरणा अश्वर ग्रह कालारे महे अदृश्या व्यायाम तर वी अदृश्यमुक्त धाणाणा - ती तायने यस्ता रागिना र्यास्तात क्षाण।

... 239
20) स्वायत्त देश वाले जीवन के प्रदर्शन साधन, उपलब्ध घबरे दृश्य दर्शन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

21) जीवन का प्रदर्शन जीवन के प्रदर्शन साधन से आता है। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

22) पादरी रूप में अनुसारी विश्व के हावाज़ा वातावरण दर्शन (पादरीय विश्व) पाठ।

23) जीवन का प्रदर्शन जीवन के प्रदर्शन साधन से आता है। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

24) उपकरण रूप में अनुसारी विश्व के हावाज़ा वातावरण दर्शन (पादरीय विश्व) पाठ। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

25) विद्यालय में नाटक और नाटकों के साथ धार्मिक विकास का इलाज किया जाता है। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

26) शास्त्रीय अनुसारी विश्व के हावाज़ा वातावरण दर्शन (पादरीय विश्व) पाठ। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

27) लीला अनु धार्मिक अनुसारी विश्व के हावाज़ा वातावरण दर्शन (पादरीय विश्व) पाठ। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

28) उपकरण में नाटक और नाटकों के साथ धार्मिक विकास का इलाज किया जाता है। जीवन रूपांतरण जीवन के प्रदर्शन साधन के साथ सामान्य शैक्षणिक पुस्तक उपयोग करने वाले लोग उन्हें समझते हैं।

पादरी रूप में अनुसारी विश्व के हावाज़ा वातावरण दर्शन (पादरीय विश्व) पाठ।
... 241

31] ताहकी कहा, शान्त दर दरती दाधा दाधा कर्ममण्डली केवल तर्फ दर्शनी हायनी अत: र्यामन्यज्ञ ाराम्या राय त्या घट बृहस्पते देव.

32] मुखाप्वा लाबुदेर्वा अलोनि अह वदार त्याला तुम्ही शुद्धताला द्वारकादेव गार अज वारावास अर्ज वाचु उद्धवतात व्याल हरिवान्यास जिंतारी तः प्रामणः

33] ताहकी कहा, विले, ्रेमे सिरस्तु बाहेर होनाकणारे उदारावध रिके हिर्यादेव श्रीनु टाळा पाल्या श्रीनु टाळा.

34] मया अयोध्याकपो शाक्तुने शेयः मया शायर एक आग सावू शेयः तर तो होरकणार नाही यावी शाखळी शेयः अतरा दिविगुले राखादेव पनु दृष्टे दोनाक्र अधिके देवू नासः

35] मया साहका अषेल अगर रफोला अछेल त्यामोक्षी निर्माण भुनेता जाणा तोडः.

36] धीर पराजियाहरे माहात्म्य मयकड भागु मरणे केमे क्षेत्र प्रस्तरित देवलांने के हर्षु दिव्ये कवि शे दहात नाही शीघ्रे हुणापारिते उहेः

37] यः दौरे परं दूरती ग्यालाता तो मया नीट प्राणता कमे यावी आरोग्य शाक्ता निर्माण शाखेचा शेयः अन्न धर्मः

अंहारुपी गणां के दृष्टिर्द्वारे केलेले

38] विरोधेशी केम तनावनामाणा तुम्हाला अयांक माथ्यानावः ते अधिकू हुणु बहुन नासः, वालानु नास अगर हुसरु बहु नासः)

39] विरोधेशी केम हुसरु अवित्त्वमणीया असर त्याग मान वात्यां त्रायस त्या वैष्णोधे रेडियो नाडानात टाळत देयः अत वेदायणुन लायक तरः, अत तुद्धारा देणारारा पाठ्या त्यायर तत्तवः

40] तुम्ही व्या त्याच्याद्वार अहै शरीर आत्म वात्य तुम्हाला अल्प्ही दये हृद दूषण टाळा पाहा केम नेदीच्ये प्रमाणे सुरक्षातिम शेयः वालानु नाही जो अहै अतूत तर ते धीर सरकार कुंद करी शारणा केम हुसरु बाह्या-ग्रामायण ते पसः हुणु बहु नासः.

...
41) ओणताडी पोषा पोंडोपणार नाही अर्थ अथा अर्थी अर्थ- वर्ष का ओणताडी पोषा, पोडवळ आणि पोखरा मुळ अर्था.

42) यंद पासून अभावाना व्यायाम हुसूब असे नाही, साधसाही असे नाही अर्थ र्वा वेता. तेल टाकू नाही.

43) राजकुमार अतर्कन्या जोगापणाने समस्त दुर्गम योगदान निवड तयार राखला नाही. वागळाने जोगापण बनाव.; ते जोगापण बनाव नाही. तेल र्वा वेता नाही. नाही. नाही.

44) सन्थानाने जाणी.

45) आपली अभावानी जाणा सवळे भेकयाशी सळम टानून ख्यात.

46) समाधान अपडोनित घ्रीं पलनी आणा टानून टाका आणि र्वा वसूल त्या आणी ख्यात.

47) ओणताडींन सवळू वाकळे वंच केली आने त्याने विधा विधा अडकता होत आते असा प्राण टाका.

48) दुकान्ने डाकरेट डाले डावणे पूर्ण टेपिंग नीट टिक्का.

49) तेलेबंद, वेक्या व रेस्तॉर, आ-वास्ता मेंदावं टाका.

50) शोराडार टाका असा (रोम) ठावले भांडून ठाका.
ANNEXURE 5

Telco – Pune
Training Division

<table>
<thead>
<tr>
<th>Title of the course:</th>
<th>Fire Prevention and Extinction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code No.</td>
<td>31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of the author:</th>
<th>S. B. Pawar -Security</th>
</tr>
</thead>
</table>

Employees' Development Cell

अभि आणि अभिप्रतिबंधक उपाययोजना

प्रदेश उद्योगमध्ये निरनिरलया ज्याच्याही प्रसारित चार ते ज्याच्या प्रसारणाने आणि आपल्याच्या शक्तिशाली असती. आणि त्याने असती ना वास्तवानीकरण करत कसे होते.

आता मुख्य करणे कसे?

कार्यालयात आणि प्रणालीच्या एक सारखे निर्देशक प्रकार नृत्य अभि होय. याचे प्रकाश व उन्माद यांची उत्सर्जन होते.

अभिनवीती धारकीत तीन गोष्टी महत्त्वाची असतात.

1) प्रणाली (डॅ) 2) उन्माद 3) ज्ञानारे पदार्थ (द्रवे, द्रव्य या यापुस्तक असताय) आकृतीत वा.

आकृती "अ"  आकृती "ब"  

प्रणाली (डॅ)  उन्माद  आध्यान  करणे  गंधारा  विभाजन  करणे

आकृती "ब" संध्ये वरील तीन गोष्टीच्या प्रधान केंद्रस्थाने आभार वाचाविल्यास आहे.

1) प्रणाली (डॅ)  या द्रवयांचं बंद करणे, आध्यान टाकणे.
2) उन्माद करणे व प्रणालीचा उपयोग करत गंधारा आणणे.
3) ज्ञानारे पदार्थ अभिनवीत विभाजन करणे देखील करणे.

अभिनवीती वरील करणद---

अभिनवीती लक्ष्याकारण कार्यक्रमातील करत पदार्थ.

1) "ए" वर्ग - लक्ष्य, कार्य, कार्यक्रम व वारील पदार्थांनी ती ज्याच्याच सहभागी विश्वास जाते.
2) "बी" वर्ग - पदार्थ, द्रव्यांकडून पदार्थ, वाचविल्यास असे ज्याच्याप्रमाणे वेदोत्तयत होते.
आप्रवाचन सूचना:

01) गखपाहिया वेलेनॅंटर रिव्युरिटिंग फाइट सोस्यूट इंटर लव साईट बंध करावेत.
02) धान संपते की महजन बंध कराये.
03) व्याकरणी पर्दाच भाष्यकर्त्ता नखल उपयोगकर्ता करायी.
04) व्याकरणी पदार्थांची नखल वारीत धारणकर्ता.
05) व्याकरणी पदार्थांची नखल दूर देखावा व बांधकर्ती "पुढील निर्देश" असा बोई देखावा.
06) व्याकरणी / स्थानक पदार्थांचा आवश्यक मिळती, मॅनकरी इत्यादी मदत, रेडियो नवेत.
07) पेक्षेंचा कारणता अधिकृत परिवाराची धारण व देखे आप्रवाचनिकाची व्यक्ती करायी.
08) हेंड्रॉफ़ व्यक्तीने उधःस्थता जोड शेळर तर व्यक्त इन्फेक्शन करावे.
09) हेंड्रॉफ़ व्यक्ती, गंड कनेक्शन इत्यादी धोक्याच्या वंशांची परतेवर तपासणी करायी.
10) योग भूमिका बांध करावा.
11) व्यक्तीचे निकायन स्थूल ठेवावे, तरीही ठेवू या धारणाची योग तपासे तेजस्वी.

आप्रवाचन प्राप्ती दुर्मविशेषता मुख्यसत्ता सूचना संबंध आपण:

विवेकची उपकरण जरातील आचारी लाभार्थिंग मोठी भर टाकून असतात. व्याघ्री योग वाणू-पौषांचा पैदा करता हा धोका आणण टाकू शकती. मुख्यतः ध्यानात राखून राखून व माहिती करा, धारावे देखभालकरी देखावा करा व धारावेंची धारण करा.

01) खालील विवेकी योग असल्याची घाती करावा.
02) खालील विवेकी उपकरण धारण करतील धारण व नीती तिसरे वाणूचा रखतील फायदा करावा.
03) तालुक्याचे विवेकी पैक नका.
04) खालील विवेकी उपकरणांच्या योग पाहीजे आरामात जोडले आपण धारण करावा.
05) एका फायदा आणि ते पैक बंधावू नका.
06) त्योहाराचे आणि उत्सवाचे उत्सव उत्सवात फायदा करावा.
07) विवेकी उपकरण रघुवंश वेजीरी तुजे लाभार्थिंग वेजीरी, वोट धारणातील धारण करते.
08) विवेकी वेजीरी नं वेजीरी धारण करावा, तेजस्वी हानी करावा.
09) आणण बंध देखावा परंपरा करण आणण आसाधी में नं वेजीरी बंध करावा.
10) 130 

गंगा

लघुध्यांक पिंपळा माजी उपमाण्य करणपूर्वी मृत्तिका भाषित करण घात.

01) गंगा या आर तर धारण करनार घात, प्रथम इंटरकार्डा वाणू, फेशर रयुक्तर आणि गंगा शेयरध्राम होटल बंध करावा.
02) लघुध्यांक पिंपळा सर्व निवेश विवशय व तरी होदे देखकर्ता युक्ति आणि तपासणी हुाण्या वितरकला कोण घात.
03) ठोसकारी विरूद्धिकर्ता तुम्हाचा तलिहितता निर्देशन देशता, हुजूम वाजि करण घात. धारण करते तर तुम्हा तलिहित हुजूम वाजावे हडपण वारूण्याचा प्रमाण करावा.
04) तुम्हाचा शेयरध्राम दरम्यान जरी पेट्रल नाला किळ्या शेयरध्राम काही विवाद झाला आसाधी लघुध्यांक तुंगणाचा वितरकला कोण.
ANNEXURE 6

TEN COMMANDMENTS OF
SAFETY FOR SUPERVISORS

On-the-job accidents represent a serious threat to the physical well-being of your workmen. Their prevention calls for your constant vigilance. Therefore, if you would guide your workmen safely through their daily work, get yourself guided by these precepts:

1. You are a supervisor and thus in a sense, have two families. Care for your people at work as you would care for people at home. Be sure each of your workmen understands and accepts his personal responsibility for safety.

2. Know the rules of safety that apply to the work you supervise. Never let it be said that one of your workmen was injured because you were not aware of the precautions required on his job.

3. Anticipate the risks that may arise from changes in equipment or methods. Make use of the expert safety advice that is available to help you guard against such new hazards.

4. Encourage your workmen to discuss with you the hazards of their work. No job should proceed where a question of safety remains unanswered. When you are receptive to the ideas of your workmen, you tap a source of first-hand knowledge that will help you prevent needless loss and suffering.

5. Instruct your workmen to work safely, as you would guide and counsel your family at home - with persistence and patience.

6. Follow up your instructions to them consistently, see to it that the workmen make use of the safeguards provided.

7. Set a good example. Demonstrate safety in your work habits and personal conduct.

8. Investigate and analyse every accident—however insignificant that may befall any of your workmen, where minor injuries go unheeded, a crippling accident may later strike.

9. Co-operate fully with those in the organisation who are actively concerned with employee safety. Their dedicated purpose is to keep your workmen fully able on the job and to cut the heavy toll of accidents.

10. Remember: Not only does accident prevention reduce human suffering and loss, from the practical point of view, it is also a good business practice. Safety, therefore, is one of your prime obligation - to your Company, your Fellow Managers, and your Fellow Men.
NEED FOR SAFETY

1. To increase production and to contribute to the economic growth of the nation.

2. To reduce the cost of the product by avoiding unnecessary overheads.

3. To eliminate the waste of labour resources so as to conserve and make best use of the skilled labour available.

4. Humanitarian motives - the desire to be safe and avoid needless suffering.

We realise that accident prevention which is of great importance requires the co-operation of all.

TWO SIDES OF THE SAME COIN

SAFETY

PRODUCTION
**GRINDING WHEELS AND GRINDING MACHINES**

**DO's**

Do always handle and store wheels in a careful manner.

Do visually inspect all wheels before mounting for possible damage.

Do make sure operating speed established for machine does not exceed wheel speed.

Do check mounting flanges for equal and correct diameter.

Do use mounting blotters when supplied with wheels.

Do be sure work rest (tool rest) is properly adjusted, centre of the wheel or above not more than 1/8" away from wheel.

Do always wear safety goggles or face shield or other type of eye protection when grinding.

Do allow newly mounted wheels to run at operating speed, with guard in place for at least one minute before grinding.

Do always handle and store wheels in a careful manner.

Do visually inspect all wheels before mounting for possible damage.

Do make sure operating speed established for machine does not exceed wheel speed.

Do check mounting flanges for equal and correct diameter.

Do use mounting blotters when supplied with wheels.

Do be sure work rest (tool rest) is properly adjusted, centre of the wheel or above not more than 1/8" away from wheel.

Do always wear safety goggles or face shield or other type of eye protection when grinding.

Do turn off coolant before stopping wheel to avoid creating an out-of-balance condition.
DON'T

Don't ever exceed maximum operating speed established for the wheel.

Don't use a wheel that has been dropped. Don't force a wheel onto the machine or alter the size of the mounting hole - if wheel won't fit the machine, get one that will fit.

Don't use mounting flanges on which the bearing surfaces are not clean and flat.

Don't tighten the mounting nut excessively.

"HANDLE ALL GRINDING WHEELS WITH CARE." REMEMBER THAT THERE IS NO SUCH THING AS AN UNBREAKABLE GRINDING WHEEL.
Don't grind on the side of the wheel. Don't start the machine until the wheel guard is in place. Don't jam the work into the wheel. Don't stand directly in front of a grinding wheel when grinding has started. Don't grind material for which the wheel has not been designed.

UNSAFE METHODS AND PRACTICES
IN USING PORTABLE GRINDERS (STRAIGHT TYPE)

Use flange on one side only.

Providing smaller sizes of flanges.

Providing different sizes of flanges on both sides.
Nut not mounted fully on the spindle of the grinder.

Providing used wheels in place of spacers.

Using wheel without guards.
Mounting a wheel on a grinder having more speed.

Flanges are put in reverse way.
Flanges are not used on the grinder.
CORRECT METHOD OF MOUNTING GRINDING WHEELS ON STRAIGHT GRINDER

CORRECT METHOD OF MOUNTING FLANGES ON STRAIGHT GRINDER

UNSAFE METHODS AND PRACTICES IN USING DEPRESSED CENTRE WHEEL ON ANGLE GRINDER

The back flange is not used.
The adaptor nut and the back flange are not used.

Wheel used on straight grinder without proper flanges and adaptors.

Wheel used as support for paper wheel.

The back flange is used but the adaptor nut is not used.

Old used wheels are used in place of back flange.

Old used wheels are used in place of back flange with recessed flanges.
Metal plates are used in place of back flange.

Ordinary recessed flange is used in place of back flange with an ordinary nut.

Grinding wheels speed is less than the speed of the spindle.

Cut-off wheel is used on angle sander in place of depressed centre wheel.

Old used wheel is used in place of back flange and ordinary recessed flange and nut is used in place of an adaptor nut.

Straight grinding wheel is used in place of back flange and ordinary nut is used in place of an adaptor nut.
CORRECT METHOD OF MOUNTING DEPRESSED CENTRE WHEEL ON ANGLE SANDER

CORRECT METHOD

ANGLE GRINDER

SPINDLE OF ANGLE GRINDER = 5/8" DIA

BORE DIA = 7/8"

WHEEL DIA = 7"

BACK FLANGE

DEPRESSED CENTRE WHEEL

ADAPTOR NUT

ALLEN KEY
CAUSES OF GRINDING WHEEL’S BREAKAGE

If the breakage of grinding wheels could be prevented, there would be no need for a guard. Conversely, if all machines could be completely guarded, there would be no cause for worry about wheel breakage. However, both must be considered. Everything must be done to prevent wheel breakage.

Some of the common causes for wheel breakages on portable machines are given below:

1) Improper mounting of the wheel. 4) Careless handling of machine.
2) Excessive speeds. 5) Improper machine maintenance.
3) Abused operation.

MOUNTED WHEELS

![Diagram of mounted wheels showing different orientations and conditions.](image)
Do's and Don'ts for Safe Mounted Wheel Operations

**DO's**

1. Do check all wheels for damage before mounting.

2. Do check machine speed against the established standard maximum speed found in the tables. If you do not know the speed of your machine, have it checked.

3. Do check the overhang on the spindle to be sure it is right.

4. Do check to see if it is holding mandrel evenly and securely. Replace mandrel if worn.

5. Do always wear proper eye protection while grinding.

6. Do stand clear of the mounted wheel when starting the grinder.

**DON'Ts**

1. Don't use damaged wheels or one with bent mandrels.

2. Don't use wheels on a grinder that runs faster than the established standard maximum speed from the tables.

3. Don't run wheels with more overhang than tables allow.

4. Don't handle machine carelessly.

5. Don't use excessive side pressure which could spring or bend mandrel.

---

Do's and Don'ts for portable Grinder Operations

**DO's**

1. Do check all wheels for cracks or other damage before mounting.

2. Do check machine speeds against approved operating speed of the wheel.

3. Use blotters provided with wheels.

4. Do make sure that wheel hole, (threaded or unthreaded), fits machine arbor properly and that flanges are clean flat and of proper type for the wheel you are using.

5. Do always run wheel in protected area for at least one minute before grinding.

6. Do use the wheel guard furnished with the machine.

7. Do always wear protective safety glasses or face shield.

**DON'Ts**

1. Don't use wheels which have been dropped or otherwise damaged.

2. Don't use a grinding wheel that has a rated speed less than the speed of the grinder.

3. Don't use excessive pressure when mounting wheel between flanges. Tighten nut only enough to hold wheel firmly.

4. Don't use heavy side grinding pressure on any straight wheel.

5. Don't handle machine carelessly.

6. Don't use relieved or recessed flanges with threaded hole wheels, cones or plugs.

7. Don't mount more than one wheel on a single arbor.
The basic rules for hand tools are, use right tool for right job in correct manner.

Hand tools can cause injuries unless they are kept in good shape, used properly and stored in the right place in a tidy manner.

Always use the correct tool for the job. Do not use tools they are not meant for, e.g., using spanner as a hammer or a knife as a screwdriver.

Keep tool handles and tools in good condition and change them when they are worn out or damaged. Defective tools e.g. chisels with mushroom heads, spanners with open jaws, broken file handles, hammers with broken or split handles, must be brought to the notice of your supervisor.

Never use a file or rasp without a handle.
Make sure hammer heads are firmly attached/wedged.

Do not throw the tools from one man to another. Instead hand them over in a safe way.

**STOP!**

Keep the heads of cold chisels ground down, mushroomed heads are very dangerous.

Use the right spanner for the job.

Keep the edges of cutting tools sharp and keep them covered when not in use. Do not carry edge tools in your pockets.

Remove tools from machine beds before starting up.

Do not leave tools hanging on platforms, pipes, work tables or on machinery which on falling may cause injury.

Take care and avoid using tools which do not have handles. As they may cause injury.
ELECTRICITY

1. If you have to use electricity, use it with respect.

2. Electricity is lethal and you are unlikely to get a second chance if you get a shock.

3. Repairs to electrical installations of equipment must be carried out by an electrician, report any defect without delay.

4. If you use any portable electrical equipment -
   a) Check cables, plugs or sockets for any defects.
   b) Keep loose cables off the floor as much as possible and certainly away from any traffic.
   c) Disconnect appliances / equipment when not in use, but never withdraw a plug from its socket by pulling the cable without switching off the plug switch.
   d) Keep equipment clean and dry
   e) Don’t stand on a wet or damp floor.

5. Do not repair electrical equipment without first switching off the power at mains and locking it, or by removing the fuses.

6. Do not use water, soda acid or foam fire extinguishers on electrical fires as they may result in a fatal shock. **Switch off the power and use only dry chemical powder or carbon-dioxide fire extinguishers.**
MACHINES AND MACHINE GUARDING

Machinery can be a good friend but a dangerous enemy-so operate it with care.

See that guards are in position and that they are properly adjusted wherever applicable.

If the guards are removed for repairs or essential maintenance, make sure that they are replaced before the machine is restarted.

Do not remove the guard unless and until the machine is completely stopped.

Do not fool yourself that you can work faster without having guards in place.

Always replace worn or damaged tools without delay. Do not wait till they cause an injury.

Know how to stop a machine in an emergency. Somebody's life may depend on it - it may be yours one day.

Use goggles or face shield while grinding any material and while machining cast iron or nonferrous material/job to protect your eyes.

Do not tamper or interfere with any machinery that you are not operating or repairing.

Do not attempt to operate or set in motion any machine or equipment to which you are not assigned.

Do not wear finger rings or wrist watches near moving machinery as many machinists have had finger injuries because of wearing rings.

Always use a brush or hook for removing metal cuttings/chips. Do not use your fingers and do not blow filings with your breath.

Never reach across the exposed moving parts of a machine.

Where machines are provided with counterweights, adjust the weights with care. See the hooks to which the weights are suspended are in order, because weights suspended can hurt your toes.
DRILLING MACHINES

1. See that the work/job is securely clamped/held onto the table in order to prevent its spinning.
2. Remember to remove the chuck key before you start drilling.
3. Use personal protective equipments such as face shields or goggles whenever necessary for the operation.
4. Remove the swarf and chippings with a brush - not with your hands.

LATHE

1. See that the stock bar projecting beyond the headstock is properly guarded/supported.
2. Never wrap the emery cloth/paper around the work piece or hold it in the hand. Use a properly made polishing stick or jig.
3. Check all stop controls before starting work.
4. Remove the chuck key before starting machine.
5. Do not handle swarf with bare hands. It is safer to use a brush or swarf hook.
6. If using a file on a work piece/job, make sure it has a sound handle.
7. Do not use calipers or gauges on work pieces or jobs while the machine is in motion. Do not "hand brake" the chuck or job.
8. Take extra care while mounting or removing chuck. Falling chuck will injure your toes.
9. Wear eye protection to guard against flying chips/particles.
10. Keep the saddle of the lathe bed free from tools, measuring instruments, and other objects.
DRILLING MACHINES

1. See that the work/job is securely clamped or held on the table in order to prevent its spinning.

2. Remember to remove the chuck key before you start drilling.

3. Use personal protective equipment such as face shields or goggles whenever necessary for the operation.

4. Remove the swarf and chippings with a brush - not with your hands.

LATHE

1. See that the stock bar projecting beyond the headstock is properly guarded/supported.

2. Never wrap the emery cloth/paper around the work piece or hold it in the hand. Use a properly made polishing stick or jig.

3. Check all stop controls before starting work.

4. Remove the chuck key before starting machine.

5. Do not handle swarf with bare hands. It is safer to use a brush or swarf hook.

6. If using a file on a work piece/job, make sure it has a sound handle.

7. Do not use calipers or gauges on work pieces or jobs while the machine is in motion. Do not "hand brake" the chuck or job.

8. Take extra care while mounting or removing chuck. Falling chuck will injure your toes.

9. Wear eye protection to guard against flying chips/particles.

10. Keep the saddle of the lathe bed free from tools, measuring instruments, and other objects.
SHEARING MACHINE

Do not interfere with the guards or safety devices. Make sure they are securely in position before you start work.

Keep the bed clear of waste, unwanted stock or tools which will interfere with the safe and efficient operation of the machine.

Wear gloves for protecting hands when handling sheet metal.

In case of foot operated machine, keep your foot off the foot pedal used for making the stroke.

Switch off power to the machine for any cleaning or adjustments.

PORTABLE ELECTRIC POWER DRILLING MACHINE

Electric drills are one of your most useful tools - handle them with care. They can be the safest of tools.

Keep your drilling machine in good condition with the housing and cord clean and intact.

Allow the drill to work at its own speed and refrain from 'forcing it'.

Avoid working in wet or damp conditions.

Use a vise to secure the work rather than trying to hold the work piece in your hand.

Unplug the drilling machine before changing the drill bits and when you are not using it.

Never carry the drilling machine by its cord. Carry it by the handle.

See that the bits are always sharp and of the right size for the job.

Avoid makeshift arrangements.

Use only bits designed for your drills.

SOME IMPORTANT INSTRUCTIONS ABOUT POWER TOOLS

Never use a tool with a frayed cord or an extension cord in a poor condition.
Remove adjusting keys and wrenches before starting a Power tool.

Do not surprise or touch anyone when they are operating a power tool. Their attention may be suddenly diverted and an accident may occur.

Check the condition of all electrical tools before use. Do not attempt field repairs.

Do not force tools. Be alert in cramped, crowded or confined areas.

Never use electrical tools under damp or wet conditions. Be alert to other potential hazards in the area such as combustibles or explosive materials.

Never adjust, change bits, blade or cutter of an electrical tool that is plugged in.
WORKING ON FRAGILE ROOFS LIKE ASBESTOS CEMENT SHEET, PERSPEX, POLYESTER OR OTHER TYPE OF PLASTIC FIBRES, TARPALIN.

Do not go on such roofs unless you obtain a valid work permit from the Safety Department.

(The work permit is shown alongside)

Take necessary safety instructions from your supervisor and understand them properly before you start the work.

Use the following equipments while working on the above type of roofs.

a) Cat ladder/Cat walk.

b) Crawling board.

c) Safety belt.

Inspect safety belt, crawling board & other equipment before you start work and make sure that they are in proper condition and safe to use.

Follow the given Safety Instructions throughout the period of work on such roofs.

WORK PERMIT IS A MUST!
**WORK PERMIT**

(issued subject to fulfilling all the conditions mentioned in Safety Card)

**PERMIT No.**

<table>
<thead>
<tr>
<th>DATE OF WORKING</th>
<th>TIME OF WORK</th>
<th>LOCATION OF WORK</th>
<th>INITIATING DEPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM 199</td>
<td>TO 199</td>
<td>FROM 199 AM/PM</td>
<td>AM/PM</td>
</tr>
</tbody>
</table>

**NAME OF CONTRACTOR**

**NAME OF CONTRACTOR'S SUPERVISOR ON SITE**

**No. OF PERSONS**

**DETAILS OF WORK TO BE CARRIED OUT**

**GENERAL DECLARATION BY CONTRACTOR'S SUPERVISOR WHO WILL BE AVAILABLE AT SITE**

I declare that the work detailed above will be carried out strictly as per safety precautions mentioned in card. I ensure that only those persons who are instructed by me about the safety precautions to be observed and who are trained in such work will do the said work.

I will ensure that work will be carried out as per the Safety Instructions given in the Contractor's Safety Card.

I will be available at site throughout the period of work.

**DATE**

**SIGNATURE OF CONTRACTOR'S SUPERVISOR**

(Please ensure that appropriate safety cards are attached to this permit)

**PERMISSION GRANTED FOR**

1. WORKING ON ASBESTOS - (Refer Safety Card 1)

2. HOT WORK - (Refer Safety Card 2)

3. WORKING NEAR LIVE ELECTRICAL LINES - (Refer Safety Card 3)

4. WORKING AT HEIGHT - (Refer Safety Card 4)

5. BLASTING OPERATION - (Refer Safety Card 5)

**L&T SUPERVISOR**

AUTHORIZED BY SAFETY DEPARTMENT

<table>
<thead>
<tr>
<th>NAME</th>
<th>WORK PERMITTED UPTO [DATE]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEL EXTN No</th>
<th>STAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PPG: O&M F 3003B PSF

COPY DISTRIBUTION: 1st (GREEN) 2nd (BLUE) CONTRACTOR PSF

PTO
CLEARANCE FROM DEPARTMENT CONNECTED WITH THE WORK NEAR ELECTRICAL LIVE WIRE / CABLES.

THE ELECTRICAL SUPPLY TO THE LIVE WIRES / CABLES / CONDUCTORS WILL BE SWITCHED OFF BEFORE THE WORK STARTS AND THE FUSES WILL BE REMOVED

__________________________  ____________________  ____________________
NAME                      DEPARTMENT                SIGNATURE

DECLARATION BY THE CONTRACTOR CARRYING OUT BLASTING OPERATION.

THE BLASTING OPERATION WILL BE CARRIED OUT BY A LICENSED BLASTER POSSESSING HIS LICENSE ISSUED BY THE CONTROLLER OF EXPLOSIVES.

THIS LICENCE WILL BE SHOWN TO THE PERSON FROM SAFETY DEPARTMENT AUTHORIZING THE PERMIT.

__________________________  ____________________
NAME OF LICENSED BLASTER    SIGNATURE OF BLASTER
WORKING AT HEIGHTS
(Other than working on Fragile Roofs)

Take necessary safety instructions from your supervisor before you start work.

See that the crane cannot move within a distance of at least 20 feet from the place of your work when you want to work on or near to the crane rails.

Use safety belt and anchor it properly before starting the work. Keep the safety belt in continuous use throughout the period of work.

Keep the tools at proper height so that they will not fall down and cause injury to anyone working/passing below.

Do not throw tools/materials from a height. Lower them with a rope in a proper and safe manner.

After you finish your work, see that no tool/material is left at height, before you leave your work place.

OFFICE SAFETY

Safety is the concern - and indeed the responsibility - of all of us.

You have responsibility for
a) Your Staff.

b) Visitors to your office - including members of the public and contractors.

c) Yourself.

Safety may seem to be just common sense - but neglect of the obvious or a momentary lapse in safe behaviour may result in an accident.

Start with a safe work place and keep it that way by good housekeeping and vigilance.
Plan the layout of furniture or equipment so that you are not colliding with objects or working in poor light.

See that the stair treads are not worn out.

See that the handrails are not damaged.

See that the carpets are not worn out.

See that the walking surface is not slippery.

See that there are no broken glasses.
See that there are no obstructions like furniture, cartons, trolleys etc. in corridors and gangways.

See that the lighting on stairs and in store rooms is proper.

Badly placed furniture and equipment will cause you to collide with sharp corners of desks and cabinets, trailing telephone cables and electrical leads.

Open and protruding drawers of filing cabinets can cause accidents. Close them as soon as the work is over and never leave them in opened condition.

Open only one drawer of a cabinet at a time. Opening more than one can topple the cabinet.

Never use insecure step ladder.

Never stand on a swivel chairs.

MACHINES

Treat all machines with respect and let no one play with them.

Never allow machines which ought to have guards to be operated without them.

Know how to stop these machines before you start them.

PERSONAL PROTECTIVE EQUIPMENTS

THE WAY TO PROTECT YOURSELF FROM DISASTER/ACCIDENTS IS BY USING PERSONAL PROTECTIVE EQUIPMENT
MAN IS AN AMAZING ANIMAL !!!
HE IS EQUIPPED WITH....

<table>
<thead>
<tr>
<th>HEAD</th>
<th>TO THINK</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARS</td>
<td>TO HEAR</td>
</tr>
<tr>
<td>ARMS</td>
<td>TO LIFT</td>
</tr>
<tr>
<td>ELBOWS AND KNEES</td>
<td>TO ALLOW BENDING</td>
</tr>
<tr>
<td>LEGS</td>
<td>TO WALK AND RUN</td>
</tr>
<tr>
<td>EYES</td>
<td>TO SEE</td>
</tr>
<tr>
<td>NOSE</td>
<td>TO SMELL AND BREATHE</td>
</tr>
<tr>
<td>MOUTH</td>
<td>TO TALK AND EAT</td>
</tr>
<tr>
<td>LUNGS</td>
<td>TO BREATHE</td>
</tr>
<tr>
<td>CHEST</td>
<td>TO PROTECT VITAL ORGANS</td>
</tr>
<tr>
<td>HANDS</td>
<td>TO DRESS, CATCH AND WRITE ETC.</td>
</tr>
<tr>
<td>FEET</td>
<td>TO SUPPORT AND BALANCE</td>
</tr>
</tbody>
</table>

KNOW HOW TO USE AND MAINTAIN YOUR PERSONAL EQUIPMENTS

LEARN TO DRESS FOR DANGER
PROCESSES FOR WHICH EYE PROTECTION IS REQUIRED

Dry grinding of metals or articles of metals applied by hand to a revolving wheel or disc driven by mechanical power.

Turning (external or internal) of non-ferrous metals and cast iron

Welding or Gas cutting of metals by means of an electrical arc, oxy-acetylene or similar process.

Fettling of metal involving the removal of metal by means of hand tools or other portable tools.

Cutting out or cutting off cold rivets or bolts from boilers or other equipment, or from ships by means of hand tools or other portable tools.

Chipping or scaling of boilers or ship's plates by means of hand tools or other portable tools.

Breaking or dressing of stone, concrete, or slag by means of hand tools or other portable tools.

Welding or cutting of metals by means of an electrical, oxy-acetylene or similar process.

All work on furnace where there is a risk of exposure to excessive bright flashing light or infrared radiation.

Process such as rolling, casting, or forging of metals where there is risk of exposure to excessive bright flashing light or infra-red radiation.

Any other process where there is risk of injury to eyes from exposure to bright flashing light or ultraviolet or infrared radiation.

Carrying out operations with acids, alkalis, solvents etc.
KERODEX BARRIER CREAM PREVENTS OCCUPATIONAL SKIN HAZARDS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PROTECTION AGAINST</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KERODEX 71 BARRIER CREAM (Water Repellent)</td>
<td>Protection against cutting oils, coolants, kerosene, petrol, acids, alkalis, resins, paints.</td>
<td>Apply as an ordinary vanishing cream. Use only 2 gms. on clean dry hands before starting work. Re-apply after 4 hours.</td>
</tr>
<tr>
<td>KERODEX Light Deflectant (Water Repellent)</td>
<td>Protection against Ultra-violet and Infra-red radiation during welding, furnace and heat treatment operations.</td>
<td>Apply cream on exposed areas like face, neck, chest, forearms before starting work. Reapply after 4 hours.</td>
</tr>
<tr>
<td>KERODEX 52 KERODEX BARRIER POWDER</td>
<td>Protection against Glasswool, laminated fibre glass dust, fibre glass, mica tape etc.</td>
<td>Apply 2 gms to clean dry hands or 4gms upto elbow before work as a vanishing cream. Sprinkle Kerodex Barrier Powder on top of the film of cream liberally. Note:- After completion of work do not rub your skin but rinse hands with running water. Apply every 4 hours.</td>
</tr>
<tr>
<td>KEROCLEANSE 22 (Skin Cleaning Cream)</td>
<td>To remove paints, varnishes, resins, adhesives, etc. from the hands.</td>
<td>Apply the cream to the contaminated areas, rub it vigorously for half a minute, wipe out with cotton waste and wash hands with water.</td>
</tr>
</tbody>
</table>
MATERIALS HANDLING
MATERIALS HANDLING

The movement of loads and materials is a major activity in an engineering industry. To achieve smooth movement, safety plays a very important role. To achieve the desired load movement lifting appliances are used.

**LIFTING APPLIANCES**

**LIFTING MACHINES**
- Crane
- Hoists
- Chain
- Jib
- Pulley
- Blocks
- Cranes

**LIFTING TACKLES**
- Shackles
- Lifting
- Clamps
- Wire
- Rope
- Sling
- Chain
- Sling

Every lifting machine and lifting tackle should bear the following markings:
- Identification mark or number (relating to the test certificate)
- Safe working load.
- Date of proof load test (Stamping)

The lifting machines and tackles not bearing these marks should not be used on shop floor.

Remember that

All the multiple leg wire rope slings and chain slings are tested with their legs 90° apart.

All the shackles and eye bolts are tested in straight pull.

All the loop type wire rope slings are tested in straight pull.

To eliminate and avoid all types of accidents due to materials handling the following principles should be kept in mind and they should be practised on shop floor.
It should be ensured that the load is safe and when slung, is as secure in the air as it was on the ground.

The slinging method should be suitable for the type of load to be lifted having adequate means of attachment to both the load and the lifting appliances.

The weight of the load must not exceed the safe working load of the slinging gear (i.e. lifting machine, tackle etc.)

The complete load must be contained or held securely by the slinging gear.

The load must be so slung that it will not suffer collapse, change of form or posture or internal displacement when subjected to jerks, swings and bumps after the initial tightening.

The load must not damage or be damaged by the slinging gear.
SAFE & UNSAFE
METHOD OF
MATERIALS HANDLING

- Ordinary Bolt
  - Unsafe
  - Tested Endless Chain Sling
  - Safe

- Shackles
  - Unsafe
  - Ordinary Bolt
    - Safe

- Plate Directly Lifted on Hooks of Sling
  - Unsafe
  - Safe

- U Bends of Clamp on Dead End
  - Unsafe
  - Safe

- Hoist Line
  - Unsafe
  - Load Line

- Live End
  - Unsafe
  - Dead End
CHAIN SLINGS

WIRE ROPE SLINGS
PLATE LIFTING CLAMPS

HORIZONTAL GRIP
CAM TYPE

HORIZONTAL GRIP
JAW TYPE

VERTICAL GRIP
ROLLER TYPE

VERTICAL GRIP
CAM TYPE

PLATE

PLATE
Take good care of your chain slings and yourself

REMEMBER
EVERY CHAIN OR CHAIN SLING IS AS STRONG AS IT'S WEAKEST LINK
TYPES OF DEFECTIVE LINKS

NEVER KNOT A CHAIN
DO NOT REPAIR CHAIN WITH BOLT

USE PADS AROUND HARD CORNERS

STORE PROPERLY

SEE IDENTIFICATION MARKS

BENT LINK
CRACK AT WELDING
ALONGATED LINK
WEARING OF LINK
TWISTED LINK
CUT ON LINK
## SAFE WORKING LOAD OF VARIOUS ROPES

<table>
<thead>
<tr>
<th>TYPES</th>
<th>NYLON</th>
<th>POLYESTER</th>
<th>POLYPROPYLENE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR OF SAFETY</td>
<td>INCH</td>
<td>mm</td>
<td>WT PER METER</td>
</tr>
<tr>
<td>3/16</td>
<td>4.7</td>
<td>119</td>
<td>0.01</td>
</tr>
<tr>
<td>1/4</td>
<td>6.4</td>
<td>163</td>
<td>0.02</td>
</tr>
<tr>
<td>5/16</td>
<td>7.9</td>
<td>199</td>
<td>0.04</td>
</tr>
<tr>
<td>3/8</td>
<td>9.5</td>
<td>234</td>
<td>0.05</td>
</tr>
<tr>
<td>7/16</td>
<td>11.1</td>
<td>269</td>
<td>0.07</td>
</tr>
<tr>
<td>1/2</td>
<td>12.7</td>
<td>304</td>
<td>0.10</td>
</tr>
<tr>
<td>9/16</td>
<td>14.3</td>
<td>339</td>
<td>0.12</td>
</tr>
<tr>
<td>5/8</td>
<td>15.9</td>
<td>374</td>
<td>0.16</td>
</tr>
<tr>
<td>3/4</td>
<td>19.0</td>
<td>409</td>
<td>0.22</td>
</tr>
<tr>
<td>13/16</td>
<td>20.6</td>
<td>444</td>
<td>0.25</td>
</tr>
<tr>
<td>7/8</td>
<td>22.2</td>
<td>512</td>
<td>0.30</td>
</tr>
<tr>
<td>1</td>
<td>25.4</td>
<td>576</td>
<td>0.39</td>
</tr>
<tr>
<td>1 1/16</td>
<td>27.0</td>
<td>600</td>
<td>0.43</td>
</tr>
<tr>
<td>1 1/8</td>
<td>28.6</td>
<td>634</td>
<td>0.51</td>
</tr>
<tr>
<td>1 1/4</td>
<td>31.8</td>
<td>680</td>
<td>0.60</td>
</tr>
<tr>
<td>1 5/16</td>
<td>33.3</td>
<td>714</td>
<td>0.67</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.1</td>
<td>783</td>
<td>0.82</td>
</tr>
<tr>
<td>1 5/8</td>
<td>41.3</td>
<td>848</td>
<td>1.01</td>
</tr>
<tr>
<td>1 3/4</td>
<td>44.5</td>
<td>912</td>
<td>1.23</td>
</tr>
<tr>
<td>2</td>
<td>50.8</td>
<td>1056</td>
<td>1.41</td>
</tr>
<tr>
<td>2 1/8</td>
<td>54.0</td>
<td>1131</td>
<td>1.62</td>
</tr>
<tr>
<td>2 1/4</td>
<td>57.2</td>
<td>1206</td>
<td>1.92</td>
</tr>
<tr>
<td>TYPES</td>
<td>HIGH DENSITY POLYTHYLENE</td>
<td>3 STRAND FIBRE ROPE</td>
<td>WIRE ROPE (6X37) FIBRE CORE</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------</td>
<td>---------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MANILA</td>
<td>SISAL</td>
</tr>
<tr>
<td>FACTOR OF SAFETY</td>
<td></td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>DIAMETER</td>
<td></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>INCH</td>
<td>mm</td>
<td>KG</td>
<td>KG</td>
</tr>
<tr>
<td>3/16</td>
<td></td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>1/4</td>
<td></td>
<td>0.020</td>
<td>0.03</td>
</tr>
<tr>
<td>5/16</td>
<td></td>
<td>0.029</td>
<td>0.06</td>
</tr>
<tr>
<td>3/8</td>
<td></td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>7/16</td>
<td></td>
<td>0.071</td>
<td>0.11</td>
</tr>
<tr>
<td>1/2</td>
<td></td>
<td>0.10</td>
<td>0.20</td>
</tr>
<tr>
<td>9/16</td>
<td></td>
<td>0.125</td>
<td>0.25</td>
</tr>
<tr>
<td>5/8</td>
<td></td>
<td>0.16</td>
<td>0.25</td>
</tr>
<tr>
<td>3/4</td>
<td></td>
<td>0.20</td>
<td>0.34</td>
</tr>
<tr>
<td>13/16</td>
<td></td>
<td>0.24</td>
<td>0.40</td>
</tr>
<tr>
<td>7/8</td>
<td></td>
<td>0.24</td>
<td>0.40</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0.38</td>
<td>0.40</td>
</tr>
<tr>
<td>1 1/16</td>
<td></td>
<td>0.50</td>
<td>0.54</td>
</tr>
<tr>
<td>1 1/8</td>
<td></td>
<td>0.58</td>
<td>0.54</td>
</tr>
<tr>
<td>1 1/4</td>
<td></td>
<td>0.77</td>
<td>0.89</td>
</tr>
<tr>
<td>1 5/16</td>
<td></td>
<td>0.83</td>
<td>1.10</td>
</tr>
<tr>
<td>1 3/4</td>
<td></td>
<td>0.83</td>
<td>1.13</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>1.60</td>
<td>1.60</td>
</tr>
<tr>
<td>2 1/8</td>
<td></td>
<td>1.86</td>
<td>1.86</td>
</tr>
<tr>
<td>2 1/4</td>
<td></td>
<td>2.17</td>
<td>2.17</td>
</tr>
</tbody>
</table>
**SPECIFICATION FOR WIRE ROPE USED FOR LOOP TYPE WIRE ROPE SLING 6X37 CONSTRUCTION**

Indian Standard : I.S. 2266  
British Standard 302

<table>
<thead>
<tr>
<th>Safe working load of sling at 90° degrees (kg)</th>
<th>Safe working load of sling at 0° degrees (kg)</th>
<th>Factor of Safety</th>
<th>4 LEG SLING</th>
<th>2 LEG SLING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SWL of one leg</td>
<td>Tensile strength of one wire (kg/mm²)</td>
</tr>
<tr>
<td>5000</td>
<td>7,070</td>
<td>6</td>
<td>3,535</td>
<td>180</td>
</tr>
<tr>
<td>10,000</td>
<td>14,140</td>
<td>6</td>
<td>7,070</td>
<td>160</td>
</tr>
<tr>
<td>15,000</td>
<td>21,210</td>
<td>6</td>
<td>10,605</td>
<td>180</td>
</tr>
<tr>
<td>20,000</td>
<td>28,210</td>
<td>6</td>
<td>14,140</td>
<td>180</td>
</tr>
<tr>
<td>25,000</td>
<td>35,350</td>
<td>6</td>
<td>17,675</td>
<td>160</td>
</tr>
<tr>
<td>30,000</td>
<td>42,450</td>
<td>6</td>
<td>21,210</td>
<td>160</td>
</tr>
<tr>
<td>40,000</td>
<td>56,560</td>
<td>6</td>
<td>28,280</td>
<td>-</td>
</tr>
<tr>
<td>50,000</td>
<td>70,700</td>
<td>6</td>
<td>35,350</td>
<td>-</td>
</tr>
<tr>
<td>60,000</td>
<td>84,840</td>
<td>6</td>
<td>42,420</td>
<td>-</td>
</tr>
</tbody>
</table>

**Allowed Tolerance +4%**

**- 1%**
### SPECIFICATION FOR WIRE ROPE USED
FOR LOOP TYPE WIRE ROPE SLING 6X37 CONSTRUCTION

Indian Standard: I.S. 2266  
British Standard: 302

<table>
<thead>
<tr>
<th>Safe working load in straight pull (kg)</th>
<th>Factor of Safety</th>
<th>Tensile strength of one wire (kg/mm²)</th>
<th>Breaking strength of rope (kg)</th>
<th>Minimum dia. of wire rope (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>6</td>
<td>180</td>
<td>6,000</td>
<td>11</td>
</tr>
<tr>
<td>2,000</td>
<td>6</td>
<td>160</td>
<td>12,000</td>
<td>16</td>
</tr>
<tr>
<td>3,000</td>
<td>6</td>
<td>160</td>
<td>18,000</td>
<td>20</td>
</tr>
<tr>
<td>5,000</td>
<td>6</td>
<td>180</td>
<td>30,000</td>
<td>24</td>
</tr>
<tr>
<td>10,000</td>
<td>6</td>
<td>160</td>
<td>60,000</td>
<td>36</td>
</tr>
<tr>
<td>15,000</td>
<td>6</td>
<td>160</td>
<td>90,000</td>
<td>44</td>
</tr>
<tr>
<td>20,000</td>
<td>6</td>
<td>180</td>
<td>120,000</td>
<td>48</td>
</tr>
<tr>
<td>25,000</td>
<td>6</td>
<td>180</td>
<td>150,000</td>
<td>56</td>
</tr>
<tr>
<td>30,000</td>
<td>6</td>
<td>-</td>
<td>180,000</td>
<td>-</td>
</tr>
<tr>
<td>40,000</td>
<td>6</td>
<td>-</td>
<td>240,000</td>
<td>-</td>
</tr>
<tr>
<td>50,000</td>
<td>6</td>
<td>-</td>
<td>300,000</td>
<td>-</td>
</tr>
<tr>
<td>60,000</td>
<td>6</td>
<td>-</td>
<td>360,000</td>
<td>-</td>
</tr>
</tbody>
</table>

Allowed Tolerance: +4% -1%
CHECK LISTS FOR INSPECTION AND DISCARDING OF CHAIN SLINGS, WIRE ROPE SLINGS, SHACKELS, PLATE LIFTING CLAMPS AND LOOP TYPE WIRE ROPE SLING

INSPECTION

(a) CHAIN SLINGS

1. Elongation of any leg of the chain sling.
2. Bending, cracking, twisting, cutting elongation of any link in the chain.
3. Deformation, bending, cracking, twisting of the bull ring.
4. Increase in throat opening of the hooks of legs.
5. Any cut, bend, twisting of the sling hooks.

(b) WIRE ROPE SLINGS

1. Elongation of any leg of the wire rope sling.
2. Broken wires in the wire rope.
3. Deformation, bending, cracking, twisting of the bull ring.
4. Increase in throat opening of the hooks of legs.
5. Any cut, bend, twisting of the sling hooks.

(c) SHACKLES

1. Deformation in any direction of the body of the shackle.
2. Bending, cracking, twisting of shackle pin.
3. Shackle pin threads or body threads damaged.
4. Pin is not fitting properly in the body.

(d) PLATE LIFTING CLAMPS

1. Any type of deformation of the body and jaws of the clamp.
2. Bending of jaws and cracks on the jaws.
3. Crushing of teeth of the jaws.
4. If the plate lifted slips from the clamp in actual lifting.

(e) LOOP TYPE WIRE ROPE SLINGS

1. Elongation of sling.
2. Broken wires in the wire rope.
3. Condition of splicing of the sling.
5. Severe kinks formed on the wire rope.
WIRE ROPE - WEAR AND DAMAGE

A wire rope which has been kinked. A kink is caused by pulling down a loop in a slack line during improper handling, installation or operation. Note the distortion of the strands and individual wires. Early rope failure will undoubtedly occur at this point.

A single strand removed from a wire rope subjected to “strand nicking”. This condition is the result of adjacent strands rubbing against one another and is usually caused by core failure due to continued operation of a rope under high tensile load. The ultimate result will be individual wire breaks in the valleys of the strands.

A typical failure of a rotary drill line with a poor cut-off practice. These wires have been subjected to excessive peening causing fatigue type failures. A predetermined, regularly scheduled, cut-off practice will go far toward eliminating this type of break.

A “bird cage” caused by sudden release of tension and resultant rebound of rope from overloaded condition. These strands and wires will not return to their original positions.

Localised wear over an equalizing sheave. The danger of this type wear is that it is not visible during operation of the rope. This emphasizes the need of regular inspection of this portion of an operating rope.

An example of a wire rope with a high strand, a condition in which one or two strands are worn off before adjoining strands. This is caused by improper socketing of seizing, kinks or dog legs. Picture A is a close-up of the concentration of wear and B shows how it recurs in every sixth strand (in a six strand rope).
A wire rope which has been subjected to repeated bending over sheaves under normal loads. This results in "fatigue" breaks an individual wires, these breaks being square and usually in the crown of the strands.

An example of "fatigue" failure of a wire rope which has been subjected to heavy loads over small sheaves. The usual crown breaks are accompanied by breaks in the valleys of the strands, these breaks being caused by "strand nicking" resulting from the heavy loads.

A close-up of a rope subjected to drum crushing. Note the distortion of the individual wires and displacement from their normal position. This is usually caused by the rope scrubbing on itself.

An illustration of a wire rope which has broken under tensile load in excess of its strength. It is typically recognised by the "cup and cone" appearance at the point of failure. The necking down of the wire at the point of failure to form the cup and cone indicates that failure occurred while the wire retained its ductility.

An illustration of a wire which shows a fatigue break. It is recognized by the squared off ends perpendicular to the wire. This break was produced by a torsion machine which is used to measure the ductility. This break is similar to wire failures in the field caused by excessive bending.

A wire rope which has jumped a sheave. The rope itself is deformed into a "curl" as if bent around a round shaft. Close examination of the wires show two types of breaks - normal tensile "cup and cone" breaks and shear breaks which give the appearance of having been cut on an angle with a cold chisel.

An example of a wire rope that has provided maximum service and is ready for replacement.

A fatigue break in a cable tool drill caused by a tight kink developed in the rope during operation.
## SAFE WORKING LOAD OF 2 LEG SLING AT VARIOUS ANGLES

<table>
<thead>
<tr>
<th>Safe working load of sling marked on sling at 90° legs apart</th>
<th>Safe working load at 0° legs apart</th>
<th>Safe working load at 30° legs apart</th>
<th>Safe working load at 60° legs apart</th>
<th>Safe working load at 120° legs apart</th>
<th>Test load to be applied at 0°</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tonnes</strong></td>
<td><strong>Tonnes</strong></td>
<td><strong>Tonnes</strong></td>
<td><strong>Tonnes</strong></td>
<td><strong>Tonnes</strong></td>
<td><strong>Tonnes</strong></td>
</tr>
<tr>
<td>1</td>
<td>1.414</td>
<td>1.365</td>
<td>1.225</td>
<td>0.707</td>
<td>2.828</td>
</tr>
<tr>
<td>2</td>
<td>2.828</td>
<td>2.730</td>
<td>2.450</td>
<td>1.414</td>
<td>5.656</td>
</tr>
<tr>
<td>3</td>
<td>4.242</td>
<td>4.095</td>
<td>3.675</td>
<td>2.121</td>
<td>8.484</td>
</tr>
<tr>
<td>15</td>
<td>21.21</td>
<td>20.460</td>
<td>18.375</td>
<td>10.605</td>
<td>42.42</td>
</tr>
<tr>
<td>20</td>
<td>28.28</td>
<td>27.280</td>
<td>24.500</td>
<td>14.14</td>
<td>56.56</td>
</tr>
<tr>
<td>25</td>
<td>35.35</td>
<td>34.100</td>
<td>30.625</td>
<td>17.675</td>
<td>70.70</td>
</tr>
<tr>
<td>30</td>
<td>42.42</td>
<td>40.920</td>
<td>36.750</td>
<td>21.21</td>
<td>84.84</td>
</tr>
<tr>
<td>35</td>
<td>49.49</td>
<td>47.740</td>
<td>42.875</td>
<td>24.745</td>
<td>98.98</td>
</tr>
<tr>
<td>40</td>
<td>56.56</td>
<td>54.600</td>
<td>49.000</td>
<td>28.28</td>
<td>113.12</td>
</tr>
<tr>
<td>45</td>
<td>63.63</td>
<td>61.420</td>
<td>55.125</td>
<td>31.815</td>
<td>127.26</td>
</tr>
<tr>
<td>50</td>
<td>70.70</td>
<td>68.240</td>
<td>61.250</td>
<td>36.35</td>
<td>141.40</td>
</tr>
<tr>
<td>55</td>
<td>77.77</td>
<td>75.060</td>
<td>67.375</td>
<td>38.885</td>
<td>155.54</td>
</tr>
<tr>
<td>60</td>
<td>84.84</td>
<td>81.880</td>
<td>73.500</td>
<td>42.42</td>
<td>169.68</td>
</tr>
<tr>
<td>65</td>
<td>91.91</td>
<td>88.700</td>
<td>79.625</td>
<td>45.955</td>
<td>183.82</td>
</tr>
<tr>
<td>70</td>
<td>98.98</td>
<td>95.520</td>
<td>85.750</td>
<td>49.49</td>
<td>197.96</td>
</tr>
<tr>
<td>75</td>
<td>106.05</td>
<td>102.340</td>
<td>91.875</td>
<td>53.25</td>
<td>212.10</td>
</tr>
<tr>
<td>80</td>
<td>113.12</td>
<td>109.160</td>
<td>98.000</td>
<td>56.56</td>
<td>226.24</td>
</tr>
<tr>
<td>85</td>
<td>120.19</td>
<td>115.980</td>
<td>104.125</td>
<td>60.095</td>
<td>240.38</td>
</tr>
<tr>
<td>90</td>
<td>127.26</td>
<td>122.800</td>
<td>110.250</td>
<td>63.63</td>
<td>254.52</td>
</tr>
<tr>
<td>95</td>
<td>134.33</td>
<td>129.620</td>
<td>116.375</td>
<td>67.165</td>
<td>268.66</td>
</tr>
<tr>
<td>100</td>
<td>141.40</td>
<td>136.440</td>
<td>122.500</td>
<td>70.70</td>
<td>282.80</td>
</tr>
</tbody>
</table>

**P X Cos**

<table>
<thead>
<tr>
<th><strong>45°</strong></th>
<th><strong>P</strong></th>
<th><strong>15°</strong></th>
<th><strong>P X Cos</strong></th>
<th><strong>30°</strong></th>
<th><strong>P X Cos</strong></th>
<th><strong>60°</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Diagram:

- **LEG 1**
- **LEG 2**
- **LEG 3**
- **MAIN RING**
SAFE WORKING LOAD OF LOOP TYPE SLING IN VARIOUS POSITIONS
(Wire rope and fibre rope sling)

<table>
<thead>
<tr>
<th>VALUE OF P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1T 2T 3T 4T 5T 10T 15T 20T 25T 30T 35T 40T 45T 50T</td>
</tr>
<tr>
<td>2T 4T 6T 8T 10T 20T 30T 40T 50T 60T 70T 80T 90T 100T</td>
</tr>
<tr>
<td>2T 4T 6T 8T 10T 20T 30T 40T 50T 60T 70T 80T 90T 100T</td>
</tr>
<tr>
<td>2T 4T 6T 8T 10T 20T 30T 40T 50T 60T 70T 80T 90T 100T</td>
</tr>
<tr>
<td>1.74 3.48 5.22 6.96 8.70 17.4 26.10 34.8 43.50 52.2 60.9 69.6 78.3 87.0</td>
</tr>
<tr>
<td>1.41 2.82 4.23 5.64 7.05 14.1 21.15 28.2 35.25 42.3 49.35 56.4 63.45 70.5</td>
</tr>
<tr>
<td>1 2 3 4 5 10 15 20 25 30 35 40 45 50</td>
</tr>
<tr>
<td>0.75T 1.5T 2.25 3.0 3.75 7.5 11.25 15.0 16.75 22.5 26.25 30.0 33.75 37.5</td>
</tr>
</tbody>
</table>
METHOD OF USING
BULL DOG CLAMPS

U-BEND OF CLAMP

DEAD END OF ROPE

BRIDGE NUTS LIVE END OF ROPE

CORRECT METHOD
METHOD OF CLAMP INSTALLATION

APPLY FIRST CLAMP No. (1)

USE BASE WIDTH FROM DEAD END
OF WIRE ROPE - TIGHTEN NUTS EVENLY

APPLY CLAMP No. (3)

NEAR TO THE LOOP AS CLOSE AS POSSIBLE. TURN
THE NUT FIRMLY BUT DO NOT TIGHTEN TOO TIGHT

APPLY CLAMP No. (2)

SPACE EQUALLY BETWEEN CLAMP No.(1) AND
(3) TURN ON NUTS - TAKE UP ROPE SLACK AND
TIGHTEN ALL NUTS EVENLY ON ALL CLAMPS

GENERAL
- Use proper size of Clamps as per diameter of rope.
- Minimum 3 Nos. of Clamps are needed for any loop.
- Use correct number of Clamps and spacing between 2 clamps as per diameter of rope.
SAFE WORKING LOAD OF LOOP TYPE WIRE ROPE & FIBRE ROPE SLINGS

$P = \text{Safe working load of one loop-type sling in straight pull}$
SAFE WORKING LOAD OF FIBRE ROPES

Polypropylene (Garware-wall) Ropes

<table>
<thead>
<tr>
<th>Diameter of Rope (mm)</th>
<th>Factor of Safety</th>
<th>Breaking Strength in straight pull (kg)</th>
<th>Position A Tested (kg)</th>
<th>Position B Tested (kg)</th>
<th>Position C Tested (kg)</th>
<th>Position D Tested (kg)</th>
<th>Position E Tested (kg)</th>
<th>Position F Tested (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>6</td>
<td>2030</td>
<td>338</td>
<td>676</td>
<td>253</td>
<td>588</td>
<td>476</td>
<td>338</td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>5370</td>
<td>895</td>
<td>1790</td>
<td>671</td>
<td>1557</td>
<td>1261</td>
<td>895</td>
</tr>
<tr>
<td>28</td>
<td>6</td>
<td>10100</td>
<td>1680</td>
<td>3360</td>
<td>1260</td>
<td>2923</td>
<td>2368</td>
<td>1680</td>
</tr>
<tr>
<td>56</td>
<td>6</td>
<td>36000</td>
<td>6000</td>
<td>12000</td>
<td>4500</td>
<td>10440</td>
<td>8460</td>
<td>6000</td>
</tr>
</tbody>
</table>

Manila Rope 3 Strand

<table>
<thead>
<tr>
<th>Diameter of Rope (mm)</th>
<th>Factor of Safety</th>
<th>Breaking Strength in straight pull (kg)</th>
<th>Position A Tested (kg)</th>
<th>Position B Tested (kg)</th>
<th>Position C Tested (kg)</th>
<th>Position D Tested (kg)</th>
<th>Position E Tested (kg)</th>
<th>Position F Tested (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5</td>
<td>2450</td>
<td>490</td>
<td>960</td>
<td>367</td>
<td>852</td>
<td>690</td>
<td>490</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td>1200</td>
<td>240</td>
<td>480</td>
<td>150</td>
<td>117</td>
<td>338</td>
<td>240</td>
</tr>
</tbody>
</table>

A = SAFE WORKING LOAD OF SLING IN STRAIGHT PULL
B = WEIGHT OF JOB TO BE LIFTED IN A 'U' SLING
C = WEIGHT OF THE JOB AT 60°
D = WEIGHT OF THE JOB AT 90°
E = WEIGHT OF THE JOB AT 120°
SAFE WORKING LOAD OF LOOP TYPE WIRE ROPE SLING

A = SAFE WORKING LOAD OF SLING IN STRAIGHT PULL

B = WEIGHT OF JOB TO BE LIFTED IN "U" SLING

C = WEIGHT OF THE JOB AT 60°

D = WEIGHT OF THE JOB AT 90°

E = WEIGHT OF THE JOB AT 120°

Safe working load (in Tonnes) of one loop type wire rope sling at various angles.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1.74</td>
<td>1.41</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>3.48</td>
<td>2.82</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>5.22</td>
<td>4.23</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>6.96</td>
<td>5.64</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>8.7</td>
<td>7.05</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>17.4</td>
<td>14.10</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>30</td>
<td>26.1</td>
<td>21.15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>40</td>
<td>34.8</td>
<td>28.20</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>50</td>
<td>43.5</td>
<td>35.25</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>60</td>
<td>52.2</td>
<td>42.30</td>
<td>30</td>
</tr>
<tr>
<td>35</td>
<td>70</td>
<td>60.9</td>
<td>49.35</td>
<td>35</td>
</tr>
<tr>
<td>40</td>
<td>80</td>
<td>69.6</td>
<td>56.40</td>
<td>40</td>
</tr>
<tr>
<td>45</td>
<td>90</td>
<td>78.3</td>
<td>63.45</td>
<td>45</td>
</tr>
<tr>
<td>50</td>
<td>100</td>
<td>87.0</td>
<td>70.50</td>
<td>50</td>
</tr>
</tbody>
</table>
Wherever possible, gloves should be worn to protect hands against cuts, scratches or punctures.

Wear safety shoes to protect toes from falling loads.

Size up the load and if necessary make a trial lift of a few inches.

Never attempt to lift alone any load that is too heavy, too large or awkward to hold.

Ensure that there are no obstructions in the direction you will be moving.

Take up position, feet hip breadth apart, one foot slightly advanced pointing in direction it is intended to move. Bend the knees, (back muscles should be relaxed.)

Get a firm grip of the load.

Lift, keeping the back straight, arms close to the body and leg muscles taking the strain.

Step off in the direction where your advanced foot is pointing and load held close to your body.

Do not carry a load which obstructs your vision.

Lift load to a height from the floor in two stages.
Take the standard weight and test your steering wheel before lifting a load.

Do not move with loads that are not secured

Travel with load low and fully tilted back.

Travel at safe speeds consistent with conditions.

Ensure a clear view and look in the direction you are travelling.

Start and stop smoothly. Never with jerks.

Move load over stack. Bring mast to vertical and lower until forks are free of load.

Stop at face of stack and raise load to stacking height still tilted back.

When truck is to be left unattended set the parking brake with forks on the ground, switch off and remove starter key.

Never allow a second person along with operator to ride on a forklift truck.
HOUSEKEEPING

Don’t leave rubbish lying around.

Keep all gangways, passages, aisles and stairways clear.

Wipe up spilt oil, grease or liquids from floors and stairs.

Clear up swarf, chips or off-cuts from machines and floor.

Use metal containers for oily or greasy rags and waste.

Stack goods and materials clear of gangways.

Store your tools safely when not in use.

Keep benches and work tops uncluttered.

Don’t accumulate scrap or waste.

Don’t leave loose tools on running machines.

Ensure that access to fire extinguisher is not obstructed.

Keep all fire doors and exits clear of obstructions.

A clean factory means fewer accidents.
Improved housekeeping.
LADDERS

Never use an unsound ladder.

Be sure the ladder is set on a firm level base.

Have a man at the foot of lash the top.

Make certain the ladder is set on a firm level base.

The correct pitch of a ladder is 1 foot out at the base for every 4 feet vertical height.

Do not carry loads on ladders - use a hoist line.

Do not lean sideways from a ladder - it is safe to move the ladder.

Use the right size ladder for the job.

Never lash two short ladders to make a longer one.

Face the ladder when climbing or descending.

Beware of wet, greasy or icy rungs.

Inspect ladders before use and regularly when stored.

FALLS ARE FATAL BE SAFE WHILE WORKING ON LADDERS
GAS CUTTING

Always ensure that the adjusting screw on the regulator is fully released before opening any compressed gas cylinder.

Oil or grease must not come in contact with fittings of oxygen cylinder.

Open cylinder valve slowly. Close valve when not in use.

Do not use gas cylinders as work supports.

Do not allow any source of heat to reach cylinders.

Keep hose lines clear of traffic lanes.

Use gas cutting goggles.

UNSAFE METHODS OF HANDLING GAS CYLINDERS

NO VALVE PROTECTION CAP IS PROVIDED, CHOKER HITCH IS PROVIDED IN THE FIBRE ROPE. THE CYLINDER IS LIFTED WITH EOT CRANE

THE CYLINDER IS LIFTED BY CRANE, THE FIBRE ROPE IS TIED TO VALVE PROTECTION CAP
UNSAFE METHOD OF HANDLING GAS CYLINDERS

THERE IS NO VALVE PROTECTION CAP, THE CYLINDER IS LIFTED BY USING THE CHAIN SLING AND EOT CRANE. THERE IS EVERY POSSIBILITY OF SLIPPING OF THE CYLINDER DURING TRANSPORTING.

THERE IS NO VALVE PROTECTION CAP, THE CYLINDER IS LIFTED BY EOT CRANE AND IN INVERTED POSITION. THE FIBRE ROPE IS USED AND IT IS TIED TO THE VALVE.

THERE IS NO VALVE PROTECTION CAP HANDLING WITH 2 LEG CHAIN SLING. ONE HOOK IS PROVIDED ON CYLINDER VALVE AND ANOTHER IS ON THE BACKSIDE.

HOOK OF THE CHAIN SLING IS ATTACHED TO THE VALVE PROTECTION CAP. THE CYLINDER IS LIFTED BY CRANE.

UNSAFE OBSERVATIONS: THE ENDLESS CHAIN IS PROVIDED ON THE CYLINDER VALVE. THERE IS NO VALVE PROTECTION CAP.
UNSAFE METHOD OF HANDLING GAS CYLINDERS

There is no valve protection cap, the leg of the sling is put around the cylinder as choker hitch.

There is no valve protection cap, the leg of chain sling is put as choker around the cylinder.

There is no valve protection cap, the sling hook is put as choker around the cylinder.

There is no valve protection cap, the leg of chain sling is put around the cylinder as choker hitch.

There is no valve protection cap, the leg of chain sling is put in choker hitch. There is every chance of slipping of the cylinder during handling.

There is no valve protection cap, the cylinder is lifted by means of EOT crane. There is every possibility of slipping of cylinder during transportation.

There is no valve protection cap.

Rolling of cylinder on ground, there is no valve protection cap. There is every chance of cylinder falling when rolled.

There are no valve protection caps on both the cylinders. The cylinders are not chained and they are lifted with EOT crane.
RUBBER CORD OR ROPE

UNSAFE METHOD OF HANDLING GAS CYLINDERS

DRAGGING OF THE CYLINDER ON THE GROUND BY FIXING FIBRE ROPE ON THE VALVE. THERE IS NO VALVE PROTECTION CAP.

PERSON CARRYING CYLINDER ON SHOULDER. THERE IS NO VALVE PROTECTION CAP.

MORE THAN ONE CYLINDER LIFTED BY USING CHAIN SLING AND BY USING EOT CRANE.

TO CRANE HOOK

FIBRE ROPE

VALVE PROTECTION CAP

GAS CYLINDERS
Use proper type of welding shield, for protection of eyes.

Ensure that cables and connections are in good condition and firmly attached.

Make sure that the welding equipment, bench or work piece is properly earthed.

See that the electrode holder is fully insulated. Always place it on an earthed surface when not in use.

Avoid welding near flammable materials.

Keep trailing welding cables clear of road walkways and moving jobs.
Most emergencies strike suddenly without any warning. At one moment everything appears to be going along smoothly, the next moment one may be involved in some serious accident resulting in injuries.

Knowledge of rendering first-aid to injured person is necessary until the patient is in the hands of a doctor. First-aid accomplishes two important things namely,

Making the patient more comfortable.

Reduces the chances of further injury either from the loss of blood or the danger of unnecessary movement.

Further care is the responsibility of the doctor and the hospital.

**WHAT TO DO FIRST**

**TAKE CHARGE OF THE SITUATION**

Be tactful but firm. If others try to interfere, send them on useful errands such as calling for an ambulance or informing the patient’s relatives etc.

**KEEP CALM**

Do what must be done as promptly as possible and you must be in a control of yourself.

**SEE HOW BADLY THE VICTIM IS HURT**

a. Bleeding
b. Fractures
c. Burns
d. Shock
e. Breathing normally.
TREATMENT FOR WOUNDS WITH SLIGHT BLEEDING

Tell patient he is going to get better.
Give him rest, and assurance.
Clean the wound with antiseptic solution.
Apply a dressing with pad if necessary and bandage firmly.
Raise injured part.

TREATMENT OF WOUNDS WITH SEVERE BLEEDING.

Lay the casualty down in a comfortable position and lower the head if possible.

SIGNS & SYMPTOMS

Pain at or near the fracture made worse by movements.
Tenderness at affected part.
Swelling of the area and discolouration.
Loss of normal movements of that part.
Unnatural movement at point of fracture.
Deformity of the limb.

TREATMENT

Make the patient comfortable and start treating the bleeding first.

If clothes catch fire, wrap rug, blanket or coat around the person firmly. Do not allow him to run in panic as movement fans flames.
Lay the person on soft covering, with head low and cover with blanket. Loosen clothing, raise feet about 8" by propping up one end of the bed. Never remove clothing unless it is soaked with corrosive liquid or petrol.
Place burned part under slow running cold water or immerse in cool water.
Cover burns with clean dry cloth.
Do not apply any antiseptic cream or lotion.

Raise injured part except in the case of a fractured limb.
Clean the wound with antiseptic solution.
Try to stop the bleeding by direct pressure immediately.
Apply a dressing extending beyond the edges of the wound firmly.
Rush the patient to medical centre/hospital.
Use tourniquet, if direct pressure on bleeding point does not stop bleeding.

FRACTURES

Keep support or immobilise the affected part up to joints or both ends using splints or any other stiff material.
Never attempt to bring the bones to normal position or reduce the fracture.
Check bandages every 15 minutes (to make sure that they are not too tight).
Transport the casualty very gently especially if you suspect backbone injury.
Rush to Medical Centre/Hospital as quickly as possible.

BURNS

Rush to Medical Centre/Hospital.

CHEMICAL BURNS

Wash off the chemical by flooding the affected part with water.
Cut out contaminated clothing.
Do not touch the burnt area with bare fingers.
Treat as for burns.
In case of acid burns of the eyes thoroughly flood the eyes with water from inner corner for at least 15 minutes continuously.
ELECTRICAL SHOCK

Switch off current. If this cannot be done, remove supply from victim. Beware, use something made of wood and not metal, eg. walking stick, hockey stick or some dry clothes.

If the victim is cold, clammy, breathing is shallow and pulse is rapid and weak, then give him reassurance. Make him comfortable and keep him warm with blankets.

If the victim has stopped breathing start artificial respiration immediately. Get medical help.

POISONING

If an accident does happen Keep the person warm and send for Doctor.

Try to identify the type of poisoning.

For corrosive poisons i.e. those that burn the mouth or throat, do not induce vomiting

i. For acid poisons give plenty of water mixed with “Milk of Magnesia”

ii. For caustic soda poisons, give plenty of water mixed with vinegar, lemon or other juices

For drug poisoning i.e. sleeping tablets etc. induce vomiting by tickling the back of throat or by giving a glass of tepid water with two tablespoons of salt.
**WHAT IS FIRE?**

**A** When any material starts burning, we call it a "FIRE".

**B** Material is known as FUEL, which starts burning on application of HEAT in the presence of AIR/OXYGEN.

**C** FIRE can be controlled by reducing FUEL or HEAT or Air.

**D** Before extinguishing any fire, it is essential to know the classification of the Fire.

**What is a class A fire?**

Basically, it is one involving ordinary combustibles such as wood, cloth, paper and some plastics.
What is a class B Fire?
Such fires involve flammable or combustible liquids like kerosene, petrol, spirit, thinner and similar materials.

What is class C Fire?
Substance in the gaseous form like LPG, Acetylene, Hydrogen etc.

What is a class D Fire?
Pertains to those involving certain combustible metals such as magnesium, sodium, potassium etc.

Why classify a Fire?
When material burns, it behaves in different manners. It depends on its physical property. Extinguishment depends on the physical properties of the material. Portable extinguishers are designed in accordance with extinguishing methods.

How many types of Portable Extinguisher are there?
1. SODA-ACID-WATER TYPE
2. FOAM-CHEMICAL-MECHANICAL TYPE
3. CARBON DIOXIDE TYPE
4. DRY CHEMICAL POWDER TYPE

What means is used to employ these extinguishers?
The portable fire extinguisher is often referred to as "The first line of defense" against fire.

On which fires is water used and why?
Class A only. Because it is a cooling, soaking penetrating and quenching agent.

On which fires is Foam used and why?
Class A and class B, because it is a smothering and blanketing agent.

On which fires is Carbondioxide used and why?
Class B and class C because it cuts off air and leaves no residue.
On what fires is Dry chemical powder used?

Class D only, because it is a smothering and coating agent.

How do you know which extinguisher to use on fire?

All extinguishers are marked prominently as to its type and the class or classes of fire upon which it can be used. Each extinguisher is different in shape. It is important to be familiar with extinguishers.

Remember, know your work place, extinguishers and the fire upon which they can be used. It’s all on the label, so read it well before the fire strikes; there won’t be time later. Because fires are faster than you.

Do not use water on energised electrical equipment and flammable liquids like Petrol, Oil, Thinner, Paint etc.

PREVENTION IS BETTER THAN CURE

Fire prevention and fire fighting are two aspects of fire protection. Fire can be extinguished by early detection and prompt action with suitable fire extinguishers, but it can be prevented earlier by adopting simple preventive measures.

The following measures are suggested for the prevention of fire:

Know your place of work, the fire hazards present, the location of fire fighting appliances and the electrical switchboard.

Keep all fire fighting appliances clear of obstructions. Easy accessibility to fire fighting appliances means saving in time and minimising damage due to fire.
Oil soaked cotton waste rags are to be kept in a metal bin container with a lid to avoid spontaneous combustion. Waste should be periodically disposed off.

Keep your place of work clean and tidy. Good housekeeping is an important factor in preventing fire. Periodical cleaning of trenches and surroundings, preventive maintenance of electrical distribution points, earthing, removing loose and worn out flexible wiring and to rectify the leakage or spillage of flammable materials quickly.

Do not smoke in an area where flammable liquids are stored or handled and signboards of 'No Smoking' are put.

Avoid contact of oils, grease or paint with oxygen cylinders. There may be an explosion due to oxidisation. Check regulator before mounting on cylinder. It should be free from oil or grease.

Make sure that items like cotton waste, thinner, acetone etc. are not stored on the shop floor beyond two days requirement.

Put out lighted bidi/cigarette or any smouldering fire before leaving the work place.

Never check LPG/Acetylene gas leakage with lighted match stick or naked flame.

Never gas cut or weld drums which may have contained explosive and flammable materials or liquids.

All petroleum products, flammable substances should be stored in specified area having flame proof electrical fittings and lightings.

Empty petrol and solvent containers should be securely fitted with lids. Disposal of such empty containers must be done only after purging with water.

Work permit must be obtained and certified by Safety Dept. Before carrying out any hot work at hazardous locations such as warehouses, paint storages, and LPG storages etc. Make certain that all personnel involved in the hot work at any place are aware of characteristics of hazardous chemicals and what they are supposed to do in case of any fire. Fire fighting appliances should be in operative condition.
Never keep kerosene, acetone, lacquer or any flammable liquid near the place of grinding, welding or any other source of heat.

Do not store unwanted materials in electrical rooms, A.C. plant rooms, air handling unit rooms etc.

Check electrical tools before using them, to avoid spark due to short circuit. Check and switch off electrical supply when not in use. If LPG/Petrol/Acetone leakage is noticed do not operate Electrical Switches.

Avoid overloading temporary circuits.

Stacking of material on racks should not touch electrical lamps and fittings. Keep a 3 ft. safe distance from all electrical points.

**HOW FIRE STARTS**

It has been said that for a fire to start it requires, fuel, an oxidizer (oxygen) and a source of ignition. A knowledge of chemical properties of fuel enables decisions to be made as to the method, or methods to be employed in any particular case for fire extinguishment. In a few cases it may be even advisable to allow the fuel to burn itself out and to concentrate on preventing the fire from spreading.

**SOME COMMON CAUSES OF FIRE**

- Mechanical sparks - by tramp metal
- Mechanical friction - Overheated bearings
- Hot surfaces - Boiler ducts, flues, lamps
- Combustion sparks - Rubbish burning furnaces
- Overheated materials - Process temperature
- Welding cutting operations - Torches, Blow lamps
- Chemical reactions - High Temperature
- Electrical sparks - Motors, switches, controls
- Spontaneous combustion - oil soaked rags
- Static spark - liquid pouring
- Lightning - By act of God
- Smoking - Cigarette/ bidi butts
- Burner flames - Gas oil

1. **CARELESSNESS (80%)**
   
   Throwing of burning cigarette or bidi butt on fuel, unsafe handling of flammable material, bad house keeping and poor maintenance etc.

2. **IGNORANCE (18%)**

   Fire resulting out of hot work carried out in an explosive atmosphere, chemical reaction etc.
3. **ACCIDENTAL (2%)**

The falling of lightning on fuel resulting in a fire.

**SIMPLE EXTINGUISHING METHODS**

1. **COOLING**

Reducing the temperature of fuel when it is burning (by using water) so that it falls below the ignition point.

2. **SMOTHERING**

Excluding all or part of the supporter of combustion (i.e. cutting down the supply of oxygen).

3. **STARVATION**

Removing the limiting fuel itself.

**GENERAL HINTS FOR FIRE FIGHTING AT INCipient STAGE**

As fire spreads quickly, a speedy attack is essential to extinguish it.

If any one is nearby, tell him to report the outbreak of fire to.

**Safety Dept:** Ext. No. 2604 or 2041

Pager No. 9624-217898

2624-217899

**Security Dept:** Ext. No. 2480 or 2518

Pager No. 9624-217905

Fire extinguishers are only to deal with small fire. Do not use water from fire hydrant unnecessarily.

Use correct fire extinguishers on fires and one at a time.

Do not use water on fires of electrical equipment. Do arrange to put off the supply in case of electrical fire. Use only Carbon Dioxide or DCP (Dry chemical powder) extinguishers.

After using carbon dioxide or DCP extinguisher in a confined room, come out immediately for fresh air.

Inform Safety Department about the total number of fire extinguishers used for fire fighting and fill up the fire report form immediately so that used fire extinguishers will be refilled by the Safety Department immediately.
**FIRE PROTECTION ARRANGEMENT**

**EXTINGUISHERS**

Suitable portable (handy) fire extinguishers are installed on all shop floors, offices, stores and warehouses adequately. Incipient fire can be extinguished promptly by operating these extinguishers. Total number of these portable extinguishers are about 1500

**WATER SUPPLY FOR FIRE HYDRANTS AT POWAI WEST & EAST**

Two water storage tanks of 58,000 gallons and 1,00,000 gallons capacity are located at top hill and 55 psi pressure is constantly available at any fire hydrant outlet by gravity. A booster pump of 75 HP motor and 1,000 GPM at 100 psi capacity is installed at opposite lunch cottage. Each fire hose cabinet is equipped with two lengths of CP hose of 50 ft. length each and a short branch pipe. 100 ft. length of hose can be made by joining instantaneous couplings of hoses and branch pipe is to be fitted at far end to throw the water jet of 100 ft. Fire hydrant and hose cabinets are provided all over Powai West and East as a second line of defence.

Similarly two water storage tanks of 55,000 gallons capacity are located on hill at Powai East (near PTR) With 150H.P. motor and pump 1000gmp at 7kg/cm² pressure.Fire Hydrant system in East is similar to West. Both the systems are approved by TAC.

UNDER NO CIRCUMSTANCES SHOULD FIRE HOSES BE USED FOR ANY JOB OTHER THAN FIGHTING FIRE NOT EVEN FOR HYDROTESTING OF ANY JOBS

---

**Ask SAFETY DEPARTMENT**

(Ext.2604) for requirement of hoses for using other than fire fighting purpose.

LPG tanks at Powai East and West are provided with water sprinkler. Valve on water line near LPG tanks should be opened immediately in case of fire for cooling down the surface and surroundings. Water monitors are additional protection for LPG.

**IMPORTANT TELEPHONE NUMBERS**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>SAFETY</td>
<td>SECURITY</td>
</tr>
<tr>
<td>2211</td>
<td>2604/2041</td>
<td>2480</td>
</tr>
<tr>
<td>MAINTENANCE</td>
<td>ELECTRICAL</td>
<td>AMBULANCE</td>
</tr>
<tr>
<td>2610</td>
<td>2627</td>
<td>.2450/2607</td>
</tr>
<tr>
<td>DISPENSARY (WEST)</td>
<td>2728</td>
<td>DISPENSARY (EAST)</td>
</tr>
</tbody>
</table>

---

... 316
Avoid contact of oils, grease or paints with oxygen cylinders. There may be an explosion due to oxidisation.

Compressed gas cylinders must be stored in a separate shed having protection from sun and heat. Full and empty cylinders must be stored vertically and separately.

Make sure that items like cotton waste, thinner, acetone etc. are not stored on the shop floor beyond a requirement of two days. Leakage or spillage of flammable materials must be promptly dealt with and such items must be stored and handled in a proper container with lid.

Put out lighted bidi/cigarette or any smouldering fire before leaving work place.

Never check LPG / Acetylene / Gas leakage with a lighted match or other flame.

Use only non ferrous tools while opening the cans/drums containing flammable liquids or other explosive substance.

Use flame proof torch in places where highly flammable solvents, dangerous petroleum products and volatile liquids are present. All flammable materials should be stored in an isolated place with flame proof electrical fittings.

Empty petrol and solvent containers should be securely fitted with proper lids. Disposal of such empties must be carefully planned.

Work permit must be obtained and certified by Safety Department for carrying out hot jobs in workshop / hazardous area / flammable and dangerous petroleum products storage area before starting work. Make sure that the operator thoroughly understands about fire hazards in the workplace and that he knows what to do in case of fire. Cool all hot jobs before leaving the workplace.

Never keep kerosene, acetone or any flammable liquid near or during grinding, welding operations or any source of heat.

Do not store unwanted materials in electrical cabin, A.C. plant room or air handling unit room.

Check all electrical tools before using them.

Do not stack materials up to the ceiling, material should be stored below three feet from electrical points.

Check before and after using blow lamps, welding and cutting equipment.

Switch off the mains when any electrical equipment is not in use.
<table>
<thead>
<tr>
<th>CLASS</th>
<th>DESCRIPTION OF FIRE</th>
<th>SUITABLE FIRE EXTINGUISHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ORDINARY COMBUSTIBLES Wood, Paper, Cotton, Jute, Grass etc.</td>
<td>YES</td>
</tr>
<tr>
<td>B</td>
<td>FLAMMABLE LIQUIDS Petrol, Oil, Lubricants, Paints, Grease etc.</td>
<td>NO</td>
</tr>
<tr>
<td>C</td>
<td>GASES Acetylene, Hydrogen, Methane, Butane - LPG etc.</td>
<td>YES</td>
</tr>
<tr>
<td>D</td>
<td>METALS &amp; REACTIVE CHEMICALS Aluminium, Magnesium, Zinc, Calcium, Sodium etc.</td>
<td>NO</td>
</tr>
</tbody>
</table>

**Operating Procedure**

<table>
<thead>
<tr>
<th>OPERATING PROCEDURE</th>
<th>SUITABLE FIRE EXTINGUISHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRIVE IN PLUNGER BY STRIKING AGAINST FLOOR</td>
<td>CARBON DI OXIDE</td>
</tr>
<tr>
<td>RELEACE THE KNOB BY TURNING RIGHT</td>
<td>REMOVE LOCKING PIN</td>
</tr>
<tr>
<td>TURN IT UPSIDE DOWN</td>
<td>REMOVE SAFETY CLIP</td>
</tr>
<tr>
<td>TURN VALVE ANTI-CLOCKWISE</td>
<td>PRESS KNOB BY HAND</td>
</tr>
<tr>
<td>DIRECT HORN ON SEAT OF FIRE</td>
<td>SQUEEZE CONTROL</td>
</tr>
<tr>
<td>NOZZLE</td>
<td></td>
</tr>
</tbody>
</table>

**Discharge Performance**

<table>
<thead>
<tr>
<th>DISCHARGE PERFORMANCE</th>
<th>SUITABLE FIRE EXTINGUISHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISTANCE</td>
<td>COOKING</td>
</tr>
<tr>
<td>TIME</td>
<td>SMOTHERING</td>
</tr>
<tr>
<td>EFFECT</td>
<td>COOLING &amp; SMOTHERING</td>
</tr>
</tbody>
</table>

- 5-20 Feets
- 30-60 Seconds