1. **PURPOSE:** Structural works
2. **SCOPE:** Plant and jetty
3. **RESPONSIBILITY:** Engineer in charge and workmen at job
4. **PERFORMANCE INDICATORS:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Measure** | **Unit** | **Frequency** | **Acceptance Criteria** | **Responsibility** |
| **Quality** | | | | | |
| 1 |  |  |  |  |  |
| **Environment** | | | | | |
| 1 |  |  |  |  |  |
| **Safety** | | | | | |
| 1 |  |  |  |  |  |

1. **PROCEDURE:**

**PPEs to be Used:** Helmet, Safety shoes, safety hand gloves, dust mask, cutting goggle, welding shield and safety belt

**Aspect-Impact**

Dust Generation Air pollution

Heat generation Air pollution

Fumes generation, fire Air pollution

Scrap generation Land contamination

Used Hand Gloves Land contamination

Leakage, Used Steel Slings Resource depletion

Generation of hazardous waste Land contamination, Water and Air pollution

**Hazards Identified**

Mechanical hazard Trapping, falling, entanglement

Chemical hazard Fire, Fumes, leakage

Physical hazard: Electric shock from overhead lines, welding

Ergonomics Hazard: Improper handling

Human behaviour: Non-use of PPEs, Poor housekeeping, alcoholism, height phobia

**Procedure**

* Work permit should be taken from related dept. Like Electrical (Shutdown) & Production (Work Permit) after ensuring all the related safety as per indicated by the procedure and engineer at the site.

**Structural work includes the following**

1. **Erection**

· Refer system procedure SP 44Q & SP 44P.

· Ensure use of Relevant PPEs.

· While shifting of loose material such as bolts, spanners, always shift it in gunny bags.

· All signal instructions for crane and tackles to be given only by competent supervisor.

· Persons who are under influence of medicines and have fear of height should not do erection work at heights. Only trained personnel should do the erection work.

· Ensure safe staircase and platforms are made for access to height while erection.

· All columns which are erected should be properly secured by guys.

· Depending on load to be erected, select sling of higher capacity, while slinging the supervisor should find out the approx. centre of gravity and load sling at two points, also packing of gunny bag to be provided so that sling does not get cut. Also use tested slings.

· Wherever possible always use 'D' shackles.

· While handling any material always use hand gloves.

· In no case should the hoist be used to lift, support, or transport personnel.

· In no case should the load chain of hoist be used as a sling or wrapped around the load.

· After completion of job ensure that scrap is segregated & shifted to respective designated locations.

1. **Welding**

· Only welding machines certified by company's Electrical Dept should be used in the plants vicinity.

· Welding machine supply to be taken only from welding supply sockets provided. In case socket is not available, supply will be provided by electrical dept only. Under no circumstances, unauthorized person should tap the supply.

· Welding machine power cable shall be in one length and of proper rating and insulation. Use of cable with joints is prohibited. Cable size to be used is as follows

o 3 ph. Welding M/c up to 30 kva 4 core 2.5 sq.mm.

o 3 ph Welding M/c above 30 kva 4 core 4 sq.mm.

o 2 ph Welding M/c up to 30 kva 3 core 2.5 sq.mm.

o 2ph Welding M/c above 30 kva 3 core 4 sq.mm.

· Insulated welding cable shall be used.

· Welding cable should be checked for any damages. Damaged or jointed cable shall not be used for welding.

· Welding shall not be carried out in the vicinity of inflammable material.

· While working near combustible material such as coal, coke, electric cables, conveyors etc. Either remove the material or if it is not possible to remove combustible materials, cover it with welders blanket. Ensure availability of fire extinguisher and/or fire and service water supply near work places in such cases.

· During welding of bins and hoppers where polymer liners are fitted ensure that all polymer liners are dismantled and shifted to safe distance.

· During rainy season welding can be carried out only under proper rain shelter, taking care to ensure all bare electrical conductors are maintained dry.

· Welder should not wear wet hand gloves while welding. Ensure that the surface is dry before welding.

· Earthing shall be provided using a cable along with holder and will be close to the welding area. Earthing using rod etc. is prohibited.

· It should be ensured that the main supply switches and on/off switch of the machine are in good condition.

· Welding connections should be checked and loose connections, if any, should be tightened.

· Proper insulation of welding holder should be ensured.

· Proper ventilation at work place should be ensured.

· While working on heights ensure proper platform & use of safety belts.

· Welding rods should always be stored in closed plastic container to avoid absorption of moisture.

· Welding rod butts to be collected separately for disposal.

1. **Gas cutting**

· All the cutting sets used in MCD either by Contractor or by Company workmen’s are to be identified by distinguished numbering.

· Gas cutting sets are certified initially before use & then after every three months on the criteria mentioned in this work instruction.

· All the user of the gas cutting sets should ensure that the cylinders used for the Gas Cutting sets have proper colour coding.

· No person should use uncertified gas cutting sets in MCD premise.

· Person who is certifying the cutting sets should ensure following things.

· Gas cutting hose should be in good condition free of any cracks.

· Gauges of the cutting sets are in good working condition.

· Cylinder should be mounted on trolley & properly secured with Chain

· There should not be any joint in the hose.(one joint for long hose above 25 metres)

· The joint should be made with proper hose connector & hose clamp to prevent any leakage.

· The cutting sets should bear distinguished number & displayed on the cutting sets.

· This number should be entered in the register kept for the purpose against the particular contractor.

· The entry in the register should clearly mentioned about the date of inspection & next due date.

· The condition of the torch should be checked for insulation cover.

· The cutting torch should be free from any visual mechanical damage.

· Flash back arrestors must be provided on both sides of DA & Oxygen cylinder and torch.

· For pug cutting machine also flash back arrestor is to be provided on both sides of hoses.

· The user of the gas cutting set should ensure that the cylinder is provided with cap & the cap is not damaged.

· The damaged gas hoses should be seized & make them unusable & dispose them according to the system.

· Use safety goggles / welders helmet and other PPE's while cutting or welding.

· Clean regulator seat (free from grit particles) before mounting regulator with compressed air or wire brush.

· Remove all explosive/ inflammable material from work area before starting the work.

· Ensure proper cleaning of job on both sides before starting cutting.

· Ensure use of correct size nozzle for cutting as per plate thickness.(As per Manufactures Recommendation)

· Ensure cleaning of nozzles and purging of hose before starting of cutting to ensure all gas passage are clear.

· Open flames, lights, lighting of fires, grinding of structures welding and smoking shall be prohibited in close proximity to any cylinder containing flammable gases except those whole in use for welding, cutting or heating.

· While working near combustible material such as coal, coke, electric cables, conveyors etc. either remove the material or if it is not possible to remove combustible materials, cover it with wet gunny bags. Ensure that the bags are maintained wet while working. Ensure availability of fire extinguisher and / or fire and service water supply near work places in such cases.

· Do not shift the cylinders without trolley. The trolley should be kept at least 5 meters away from the cutting / welding activity at height.

· Do not carry cylinders on shoulders or lower through stair cases / slopes

· Ignite the torch only at the cutting place and do not shift the torch unless the flame is extinguished.

· After completion of work close the regulators before closing the valves on cutting torch.

· Ensure that all regulators, valves, cylinders are fully closed and removed at the end of the work.

· Always roll and coil the cutting apparatus in a neat manner at the end of the work.

· Keep the D.A. cylinder covered with wet gunny bag while the cylinder is in use.

· Ensure use of safety belts while working on heights.

· Do follow the housekeeping procedure as per [SP](http://amona.sesagoa.com/sil_quality/Mech.html/Activity%20WI/WIMAINT91%20HOUSE%20KEEPING.htm) 44 D

**1.** **Reference:** Gas Cutting Sets Certification Register

1. **Material shifting**

· For material shifting refer system procedure SP 44Q.

1. **Material handling**

· **Handling the material with Monorail trolley**.

a) Always use tested trolley, chain blocks for lifting or shifting materials.

b) Check the safe working load (SWL) of trolley and chain block.

c) Ensure the load which needs to be lifted is 75% of SWL of trolley or chain block or D-shackle or sling whichever is lower

d) Keep the crane in the parking area once the job is completed.

e) Keep the chains in hanging position one over the other on hook to avoid chain lying on ground.

· **Handling the material with the chain block**.

a) Access the condition of the hook where chain block will be hooked. If required strengthen the same using welding.

b) Check for the Safe working load of the chain block and its certification label.

c) Visually inspect the chain block and hook.

d) Check for proper slinging of the material.

e) Carry out the desire job.

f) Chain pulley block is design to lift loads vertically and should not be used for pulling horizontally or at any angle.

· **Handling the material by hand.**

a) Analyze the condition of the object to be handled by hand for easiness in shifting.

b) Use proper hand gloves for shifting any material by hand.

c) Do not handle the material with weight more than the 50 kg.

d) Do not handle long overhung material by hand.

1. **Working at heights**

· For structural works at heights refer work instruction SP 44P.

1. **Working in the vicinity of high voltage lines**

· For working near high voltage lines refer system procedure SP 44R.

1. **Sheeting**

· Take proper work permit from concerned engineer before commencement of work.

· Engineer in-charge should ensure the following

a) Use of safety belts and full body safety harness which are hooked to rigid support at place of working.

b) Use of relevant PPE such as safety helmets, safety shoes, hand gloves and dust masks.

c) Barricading of area below where such sheeting work is in progress by red flags/work in progress tags.

d) Use of crawling ladder to be identified and used if available.

· While working on roof sheets safety belt should be tied to a rigid support using a long rope.

· While dismantling existing sheets, they should be gently lowered to the ground and not thrown down from top.

· Ensure that all sheets are shifted to the required area through designated walkways only.

· All holes for sheet fixing should be drilled/punched to appropriate size. Secure all sheets with J bolts of proper size with correct overlapping distance.

· After completion of work remove all dismantled sheets, J hooks and tools from site and release the work permit after informing shift in-charge.

· Asbestos sheets removed & broken pieces to collected & shifted to hazardous waste scrap yard.

**Do’s**

· Use tested power tools like grinding machine and drilling machine.

· Always use cutting wheels from SGL MCD stores.

· Carry out the housekeeping after the completion of job.

· Do oil the load chain after the use before storage of the chain pulley block.

· Do use dust mask while working in dusty area.

· Do check/refer the weight of the lifting material in case weight is unknown.

· Load Sling from the center of the hook.

· Use D Shackle to attach more slings.

· Use chain block in excess of safe working load marked on the block.

**Don’ts**

· Cutting of sheets at heights.

· Twist the chain while handling material.

· Directly bind the load with the load chain.

· Allow extreme slant slinging.

· Overload the chain pulley block.

· Over lift the material.

· Overload any crane/hoist/lifting tool/trolley above 75% of the SWL.

· Manually lift the material whose weight is more than 50 kgs.

· Shift the material of length more than 6 meters through trucks.

1. **REFERENCES:**
2. **RECORDS:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Record No.** | **Record Title** | **Maintained by** | **Soft/Hard form** | **Retention Time** |
| 1. |  |  |  |  |  |
| 2. |  |  |  |  |  |
| 3. |  |  |  |  |  |
| 4. |  |  |  |  |  |
| 5. |  |  |  |  |  |
| 6. |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
| 13-08-2022 | Header | Company logo & Document no. | 02 |
|  |  |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Prepared By:**  Head Mechanical Maintenance, Battery 1- MCD | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Head Mechanical Maintenance MCD |
| **Signature:** | **Signature:** | **Signature:** |
| **Review Date: 13.08.2022** | **Review Date: 13.08.2022** | **Review Date: 13.08.2022** |