Cage Suspension Gear in Indian Coal mines

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SYNOPSIS

The paper reviews the various type of rope attachments including Friction Wedge Rope Cappel, White Metal Cappel, Safety Hook & C. S. Gear.

It describes the manufacture of these equipments including type of steel that are permitted by DGMS for manufacture Limits of permissible imperfections has been described.

Norms of discard, Inspection schedule & Installation instruction are detailed.

Finally the author has emphasized on the adoption of ISO 9001-2000 by manufacturer. Grit blasting of C.S. Components & use of Hydraulic Rope Cappel Banding Machine by the Industry has been advocated.

CAGE SUSPENSION GEAR IN INDIAN COAL MINES

Steel rope was introduced in our coal mines in the beginning of 20th century Prior to that Hemp rope or Flat chains were used for winding.

With the introduction of steel wire ropes, demand for rope end attachments arose.

If required collaborative efforts of manufacturers, users, mining officials of statutory authorities to envolve attachments which are safe and reliable.

CAGE SUSPENSION FOR DRUM WINDING

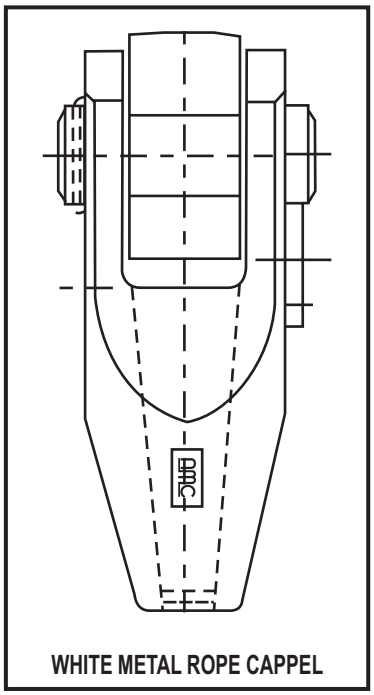
In Drum Winding general requirements can be taken as follows :-

- Method of connecting winding rope to suspension gear.
- Incroporation of a safety device.
- Four-point suspension of the cage.
- Free movement of the gear in two planes.

Method of connecting winding rope to suspension gear. White Metal Socket or Friction Wedge Rope cappel are usually used for this purpose.

White Metal Socket-solid machined with open jaws are widely used for connecting the winding rope to the suspension. The mouth of the socket is rounded to prevent the damage to the rope and short length of parallel bore is provided next to the mouth. After carefully preparing and securely binding the rope with soft iron, seizing wire, anti-friction bearing alloy is poured into the socket (IS 3937 Part 2). A properly carried out capping of the rope in the socket will withstand the breaking strength of the rope.

The length of taper of the socket is usually not less than six times and not more than eight times the diameter of the rope. The angle of the taper is between 3^0 and 6^0.



WHITE METAL ROPE CAPPEL

Fig - 1

FRICTION WEDGE ROPE CAPPEL

Friction Wedge Rope Capples

Fig - 2

Friction Wedge Rope Cappel was introduced by Mr. Becker in 1904. It was an interesting development. In this type of rope cappel, holding power of the cappel is more than the strength of the rope. A metal block is fitted at the end of the rope. If there is any movement of the rope between the two wedges, it can be checked by measuring the distance between the safety block and bottom of the wedges. It provides a warning to the operating supervisor and calls for remedial action.

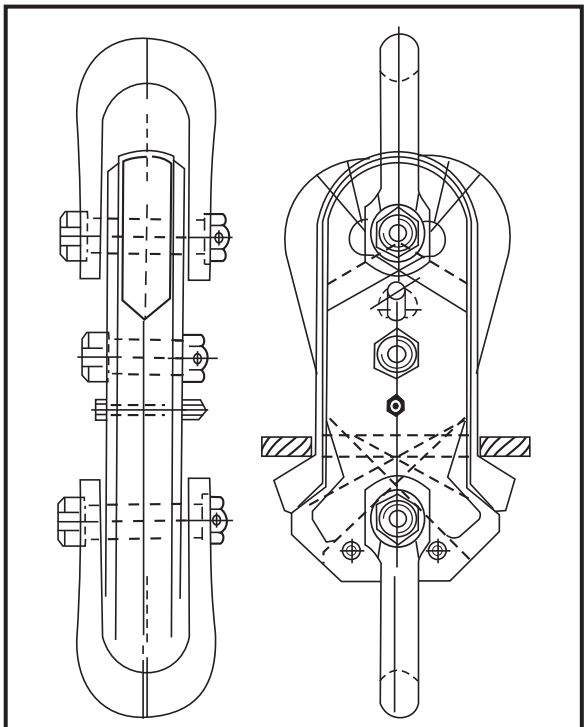
B. *Incorporation of a safety device. Safety Hook*

The use of a detaching hook is a basic requirement for safety in winding practice is demanded by law. The intention is to provide a safety device which will come into operation if the other protective equipment fails to prevent an over wind and the winding engine fails to stop at the end of the normal wind. In the absence of such a preventive device, the ascending cage would be taken up into the head frame to collide with the winding sheaves. This cage would then fall down the shaft with disastrous consequences. Detaching hooks must, therefore, be installed as part of the suspension of all cages and skips, except with the Koepe winding system.

The detaching hook operates in conjunction with a releasing device, the detaching plate, through which the winding rope travels and which is mounted some 1.8m to 3.6m below the winding sheaves. The equipment is designed to fulfill two functions, if the cage should be taken past the normal overwind trip position, first to release the winding rope from the cage and second to prevent the cage from falling back down the shaft when the rope is released. This is achieved by arranging the main members of the hook to rest on the detaching plate when the device is opened to release the rope and secure the cage.

There are several types of detaching hook in regular service, and the following description of Humble safety hook, which is mostly used in our Indian coal mines, will serve to illustrate the general principles of the design and operation of these devices.

The detaching hook consists of four plates; the two outer plates fixed together by rivets passing through a V-shaped spacing blocking at the lower and two inner plates shaped like a hook at their upper ends. The inner plates are connected together scissor-wise and to the outer plates by the hinge pin at the centre. The lower end of each inner Plate is shaped to provide the striking horn and the notched projection for resting on catch plate in the event of an overwind. The inner plates have an extra thickness of material in the hook region. With this type of hook, both the inner (hook) plates and the outer (containing) plates are load bearing. The inner plate transmit the load from the top connecting shackle pin to the hinge pin from which point the outer plates transmit the load to the lower shackle pin. The hook is prevented from opening during winding by a shear pin made of copper which is sheared as the hook is drawn through the catch plate.



'Humble' type safety Hook

Fig - 3

C. Four point suspension of the cage.

To achieve even suspension of the cage, distribution plate is fitted below the adjusting device and from the plate chains are attached by means of shackles. Four corner, chains, identical in length are fitted to the cage hangers by shackles and two safety chains are provided where safe working load is 8 tons or more. These being attached vertically from the distribution plate to the top of the cage. Sufficient slack is allowed to ensure that they do not carry the load.

D. Free movement of gear in two planes.

Free movement of the suspension gear in two planes is allowed by the connection used between the various component parts of the suspension gear.

In our system, rope cappel in directly connected to the top shackle of the safety hook. Bottom shackle of the safety hook is connected to the top shackle of the distribution plate. By this type of connection we can have free movement of cage suspension gears in two planes.

MANUFACTURE OF C. S. GEAR

- Manufacturer must have adequate manufacturing and forging facilities.
- All plate and section and bars shall be well and cleanly rolled to the dimensions specified and shall be sound and free from flaws, laminations, cracks or other defects.
- ***Material of construction :*** C.S. Gear shall be manufacture from any of the following type of steels.

	C%	Si%	Mn%	Ni%	Cr%	Mo%
20Mn2	.15 to	.15 to	1.3 to	—	—	—
	.25	.35	1.7	—	—	—
20Ni2Cr2Mo2 (SAE8620)	.18 to	.2 to	.7 to .9	.40 to	.40 to	.15 to
	.23	.35	—	.70	.60	.25

- ***Heat Treatment :*** All components of C.S. Gear after manufacture shall be heat treated to get optimum mechanical properties. The components shall be either normalized or normalized and tempered, or hardened and tempered, or refined and hardened and tempered.

- ***Testing and examination :*** the manufacturer shall have suitable arrangement for examination at every stage of manufacture to ensure quality of product. The tesing personnel for carrying out non-destructive testing such as particle flaw detection and ultrasonic flaw detection shall have NDT level II competency certificate issued by a trainning institute recognized by the statutory authority.

- ***Proof Load test :*** of each finished component of suspension gear separately or collectively, shall be subjected to tensile proof load three times the safe working load and it shall satisfactorily withstand the test without any permanent deformation or defects. Each component shall be examined for cracks after proof load test and visually by means of magnetic crack detection and ultrasonic tests. Permissible imperfection for magnetic particle inspection are given below.

1 .***Magnetic particle flaw detection shall be carried out as per IS 3703 :***

The type of defects and their limits are given in Fig. 4 to Fig. 12.

2. Imperfections in components may be in the form of :

A) Non-metallic inclusions which are inherent in steels, and

B) Cracks.

Note - Magentic particle inspection will reveal these imperfections when they are on or just below the surface.

3) ***Limits of Permissible Imperfections :***

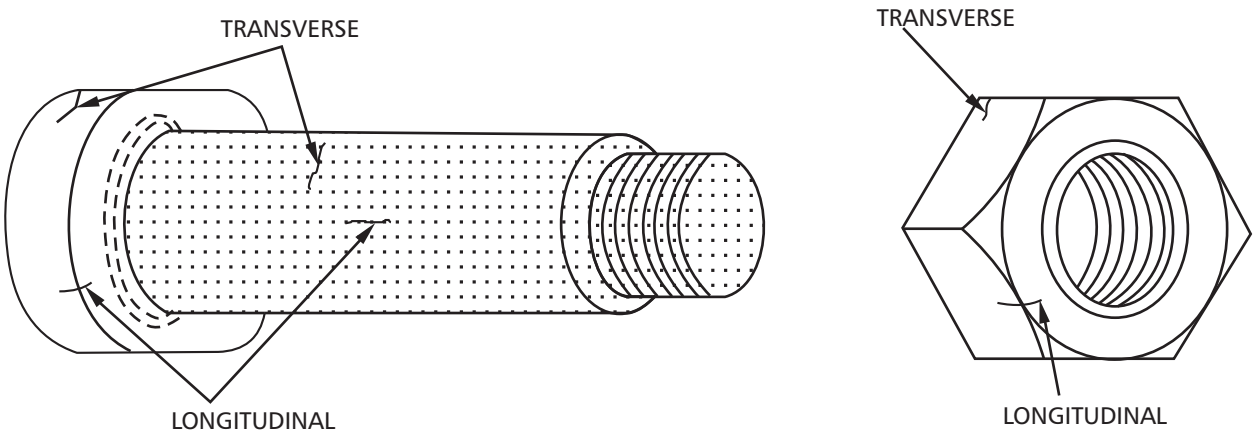
The Limits of Permissible inclusions shall be as given in Fig. Cracks shall not be permitted.

A) A Longitudinal imperfection is one which generally runs parallel to the major dimension of the component, a

transverse imperfection is one which runs at right angles to the line defined for a longitudinal imperfection.

B) Record : Imperfections which, although within the permissible limits, are of a large number, unusual pattern or direction, should be recorded on the component certificate.

PIN AND NUT

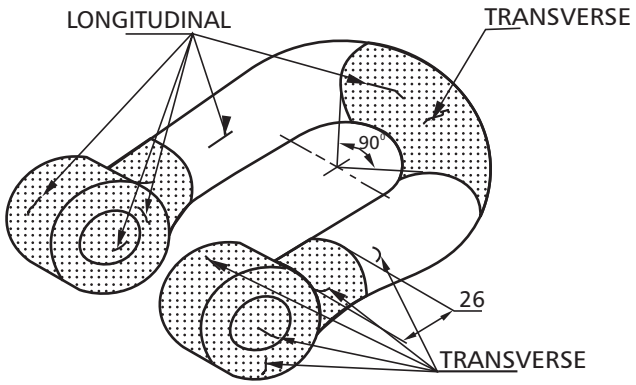


Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Pin, barrel and thread	Transverse	None
	Longitudinal	None>32 mm
	Unshaded Areas	
Pin head and nut	Transverse	None>10 mm
	Longitudinal	None>10 mm

All dimensions in millimeters.

FIG. 4 PIN AND NUT

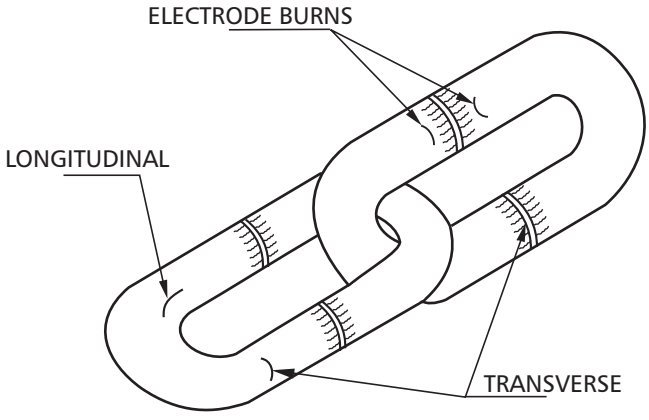
SHACKLE BODY



Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Shackle body	Transverse	None
	Longitudinal	None>10 mm
	Unshaded Areas	
Shackle body	Transverse	None
	Longitudinal	None>32 mm

All dimensions in millimeters.
FIG. 5 SHACKLE BODY

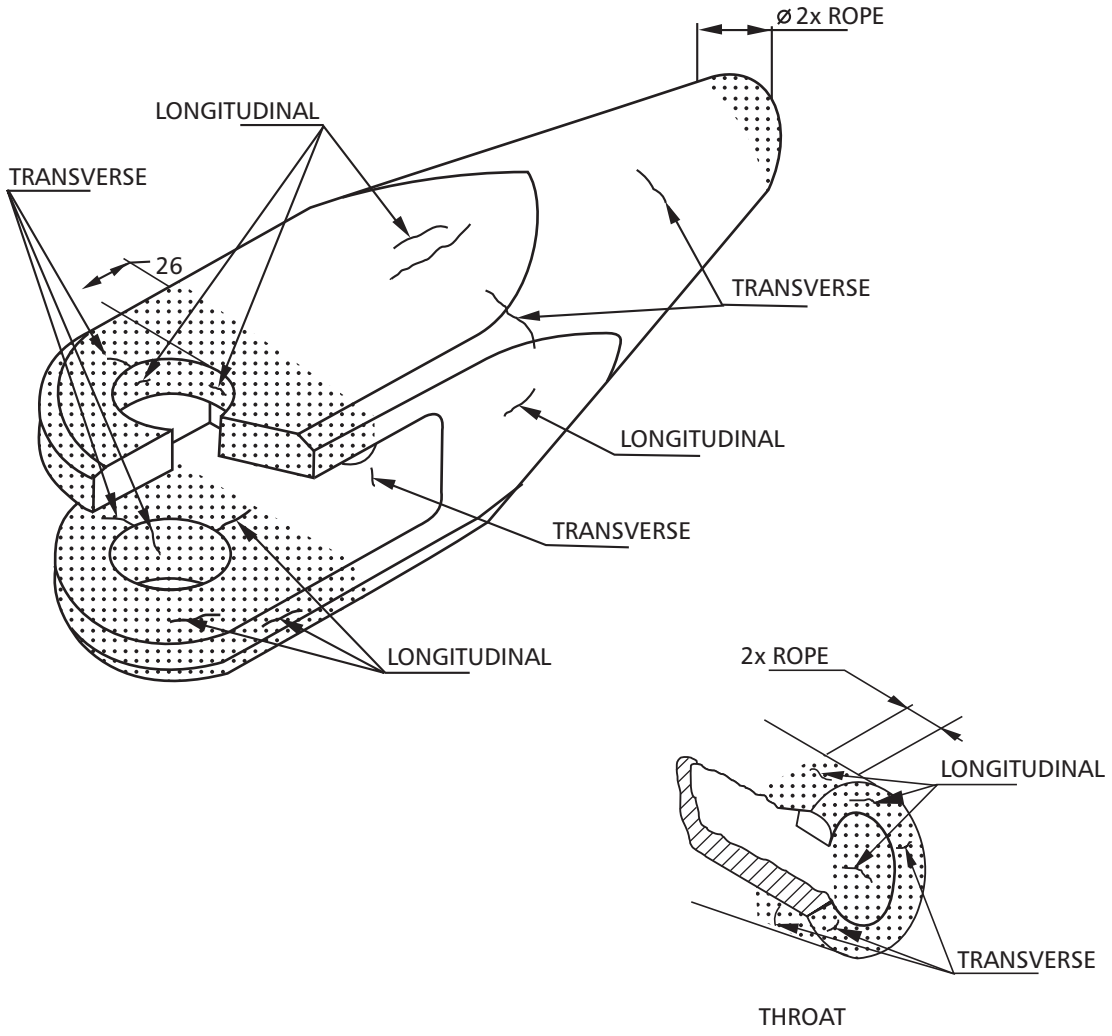
CHAIN LINKS



Part	*Type of Imperfection*	*Permissible Imperfections*
	All Areas	
Chain link	Transverse	None
	Longitudinal	None>10 mm
	Electrode Burns	None

All dimensions in millimeters.
FIG. 6 CHAIN LINKS

WHITE METAL SOCKET

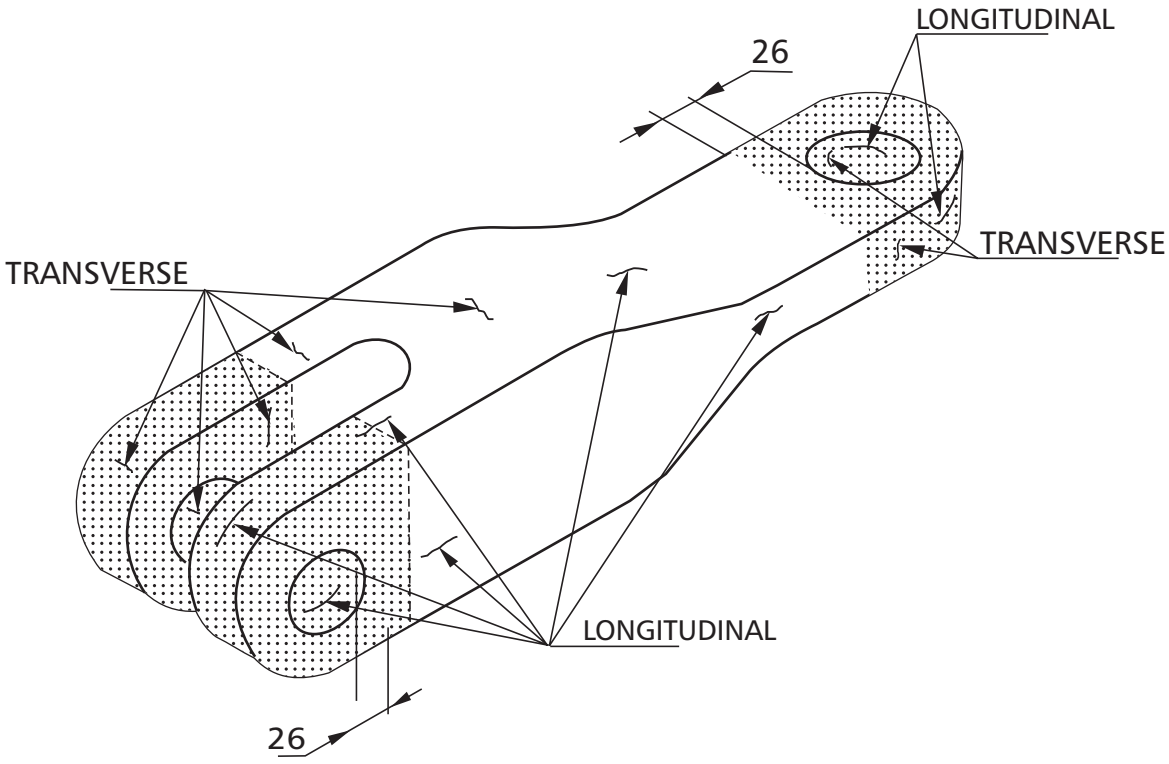


Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Surfaces and throat	Transverse	None
	Longitudinal	None>10 mm
Holes and edges	Transverse	None
	Longitudinal	None>16 mm
	Unshaded Areas	
Body and edges	Transverse	None
	Longitudinal	None>32 mm

All dimensions in millimeters.

FIG. 7 WHITE METAL SOCKET

CHASE BLOCK

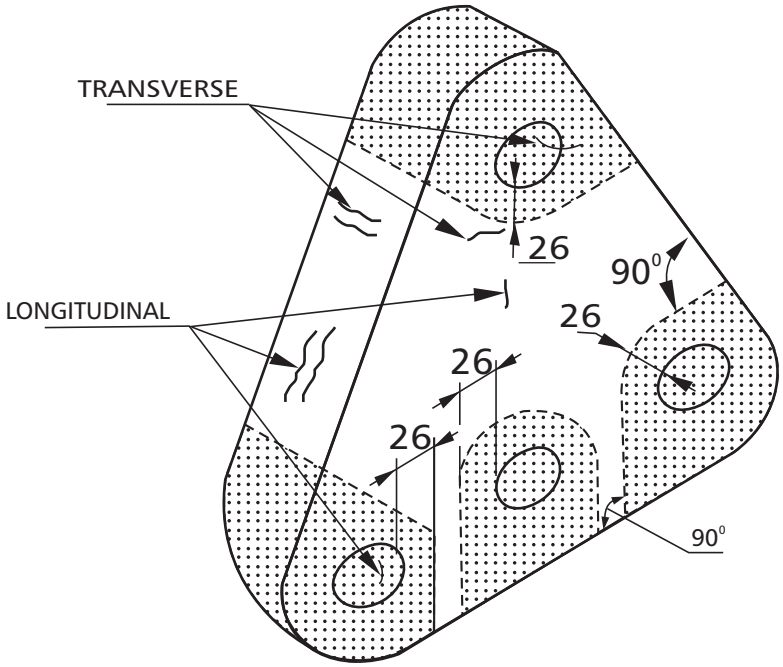


Part	Type of Imperfection	Permissible Imperfections
	Shaded Areas	
Surfaces	Transverse	None
	Longitudinal	None > 10 mm
Holes and edges	Transverse	None
	Longitudinal	None >16 mm
	Unshaded Areas	
Body and edges	Transverse	None
	Longitudinal	None >32 mm

All dimensions in millimeters.

FIG. 8 CHASE BLOCK

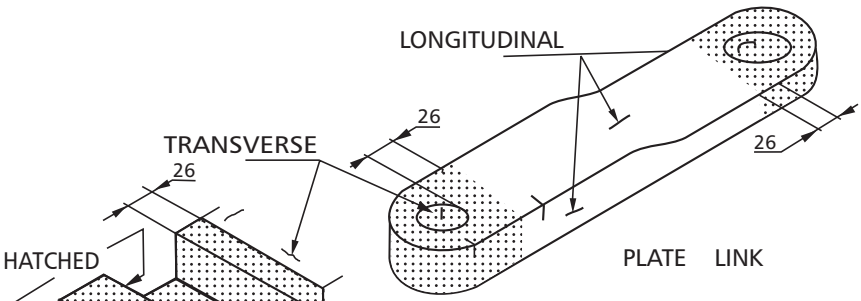
DISTRIBUTION PLATE



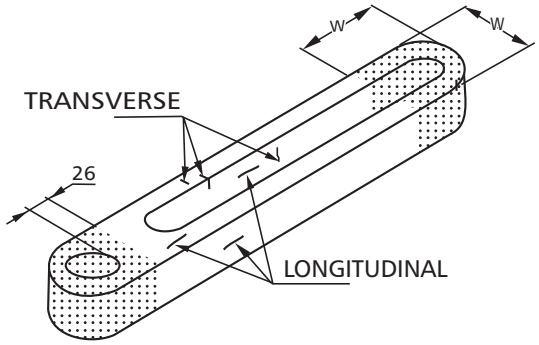
Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Plate surfaces	Transverse	None
	Longitudinal	None > 10 mm
Plate edges	Transverse	None
	Longitudinal	None >32 mm
Holes	Transverse	None
	Longitudinal	None >16 mm
	Unshaded Areas	
Plate surfaces	Transverse	None
	Longitudinal	None >32 mm
Plate edges	Transverse	None
	Longitudinal	None >64 mm

All dimensions in millimeters.
FIG. 9 DISTRIBUTION PLATE

PLATE AND SLOTTED LINKS



FRICTION WINDER BOTTOM LINK



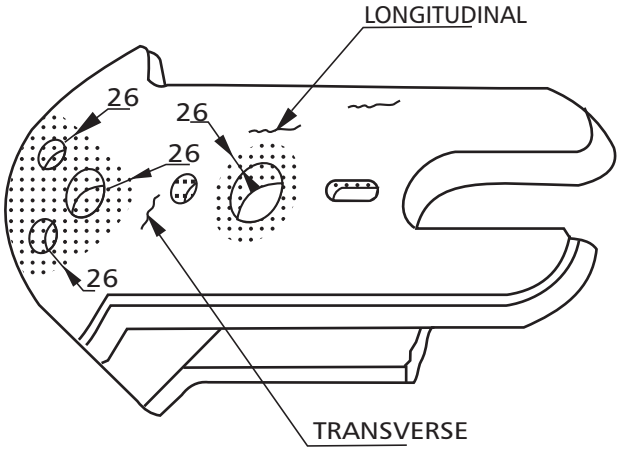
SLOTTED LINK

Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Plate Surfaces	Transverse	None
	Longitudinal	None > 10 mm
Plate edges	Transverse	None
	Longitudinal	None >32 mm
Holes and slot end	Transverse	None
	Longitudinal	None >16 mm
	Unshaded Areas	
Surfaces	Transverse	None
	Longitudinal	None >32 mm
Plate edges and slots	Transverse	None
	Longitudinal	None >64 mm
Cantilever faces	Transverse or Longitudinal	None

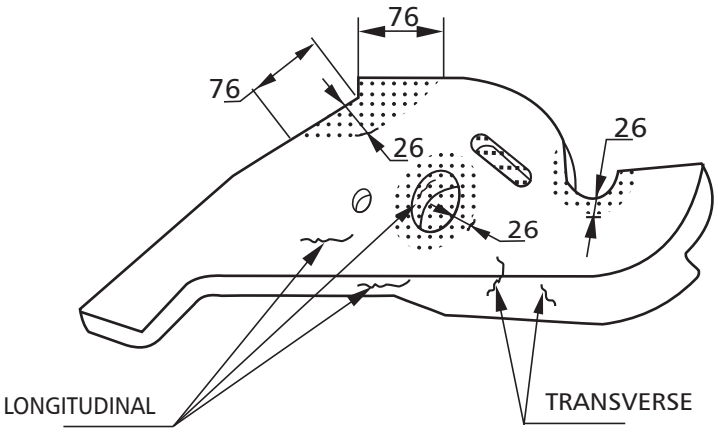
All dimensions in millimeters.

FIG. 10 PLATE AND SLOTTED LINKS

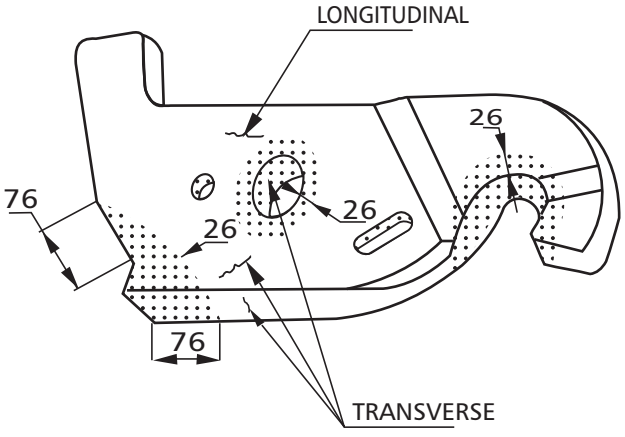
HUMBLE DETACHING HOOK



SIDE PLATE



CENTRE PLATE



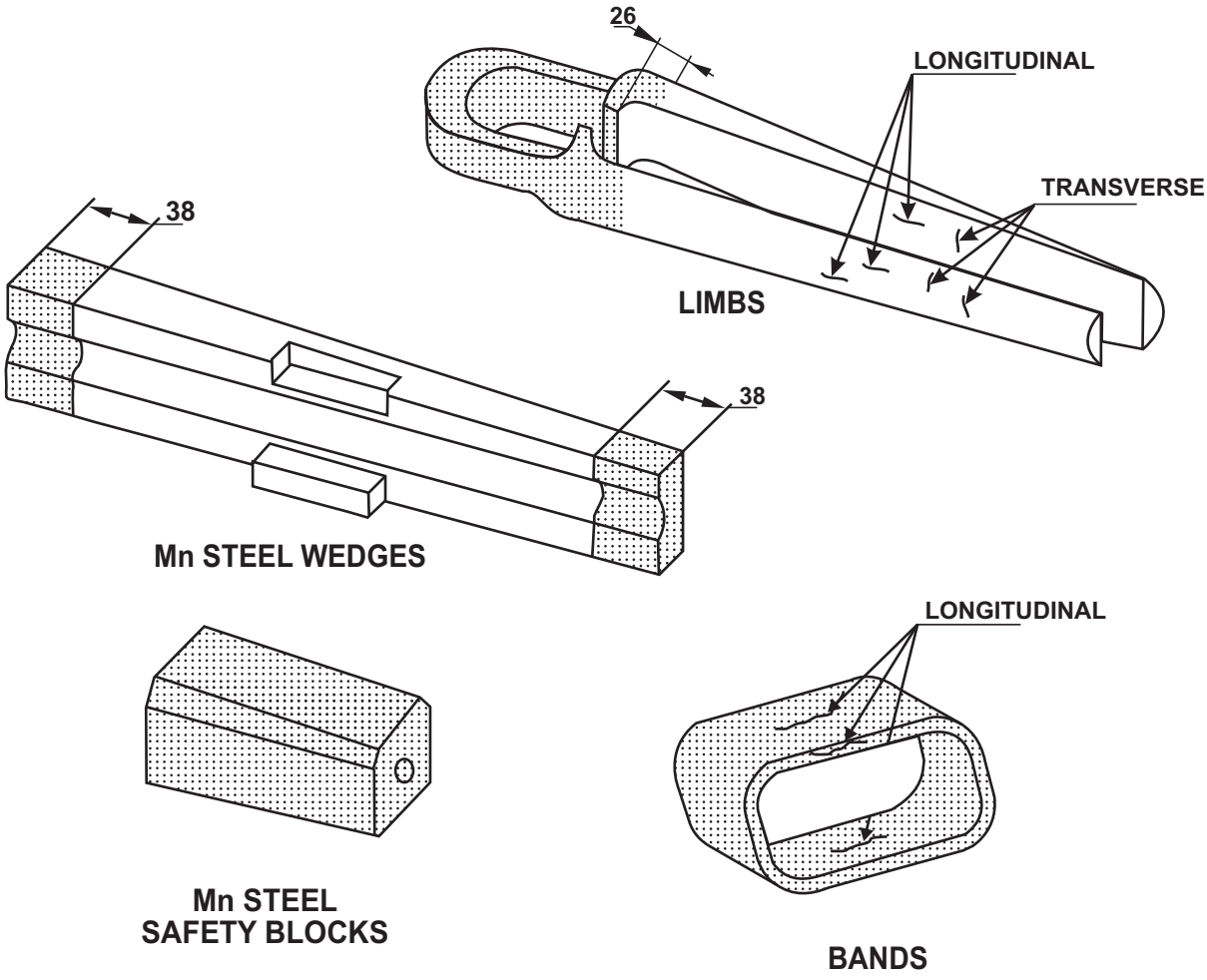
CENTRE PLATE

Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Plate Surfaces	Transverse	None
	Longitudinal	None > 10 mm
Plate edges	Transverse	None
	Longitudinal	None >32 mm
Holes and slots	Transverse	None
	Longitudinal	None >16 mm
	Unshaded Areas	
Plate surfaces and slots	Transverse	None
	Longitudinal	None >32 mm
Plate edges and slots	Transverse	None
	Longitudinal	None >64 mm

All dimensions in millimeters.

FIG. 11 HUMBLE DETACHING HOOK

ROPE - CAPPEL



Part	*Type of Imperfection*	*Permissible Imperfections*
	Shaded Areas	
Bands, safety block and wedges	Transverse	None
	Longitudinal	None > 10 mm
Limbs	Transverse	None
	Longitudinal	None >16 mm
	Unshaded Areas	
Wedges	Transverse	None
	Longitudinal	None >32 mm
Limbs	Transverse	None
	Longitudinal	None >64 mm

All dimensions in millimeters.

FIG. 12 ROPE CAPPEL

Steps for making White Metal Rope Cappel

1. Before cutting off the old cappel or rope end, fit sufficient temporary seizing or clamps to prevent the rope from ' kicking' when cut through. With locked coil ropes clamps are absolutely necessary and about four clamps for every 25mm of rope diameter should be used.
2. Thread the socket on to the rope and push it along out of way.

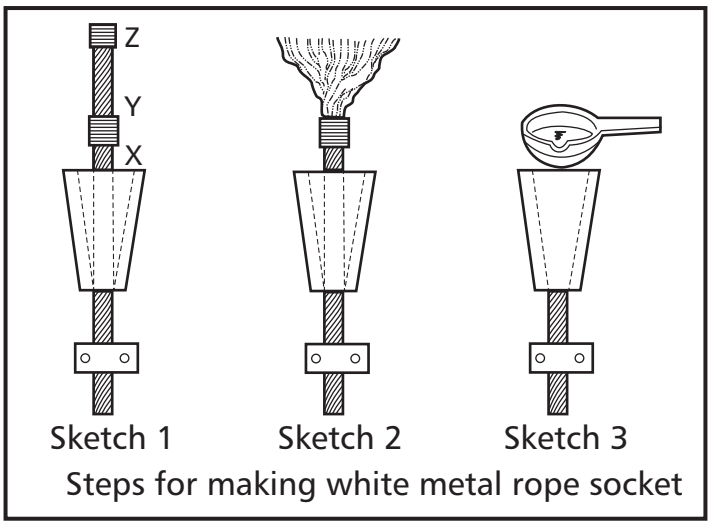
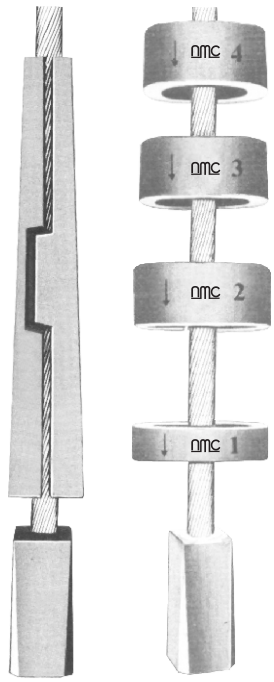


Fig - 13

3. Seize the rope with soft iron wire for a length XY (Fig.13) equal to twice the diameter of the rope, leaving the rope end free of this seizing YZ equal to the length of the socket barrel less half a rope diameter.
4. Unlay the rope end beyond the seizing, separate all the wires out into a brush, but do not bend any of them too sharply at the seizing and do straighten the wires. Cut out the fibre core or cut as deep into the brush as possible (Sketch 2).
5. Clean all the wires carefully with petrol, emery cloth etc, and remove all dirt and grease before going any further. This cleaning is most important. Do not let the petrol run into the unopened rope or it will wash out the lubricant and allow corrosion to occur next to the cappel.
6. Pull the brush of opened wires into the socket and fix the socket upright in a soft jawed vice or clamps with the large end up, ready for pouring the metal. See that the rope hangs straight down under the socket for a length of at least 36 rope diameter (Sketch 3).
7. Make a dry string binding round the rope at the small end of the socket to prevent the molten metal from escaping (Sketch 3). Do not use damp clay for this purpose as it will give off steam and may cause blow holes in the metal.
8. Heat the socket evenly with blow lamp to a temperature of 100^0-200^0c temperature more than boiling water. At this temperature drops of water placed on the socket will fly off.
9. Dust powdered rosin among the wires in the socket. This acts as a flux and help grip the wires.
10. Heat the standard white metal to a temperature of 350^0C and pour it, in one ladleful if possible, while it is at this temperature or 13^0C above or below. The pouring temperature should be measured with a thermometer. If the metal is poured too hot it may affect the rope wires, whereas if it is poured too cold it may not flow or grip the wires properly. (See Coal Mines Regulation 1957:83 (5) (d). Metaliferous Mines Regulation 1961: 88(5) (d).
11. Allow the cappel to cool before using it. If there is not enough time for natural cooling, let the metal become solid and then apply wet sacking or direct a current of cold air on to the socket. Do not dip the socket in cold water or use it until it has cooled to air temperature.
12. Finally lubricate part of the rope which is near the socket.

INSTRUCTION FOR FITTING FRICTION WEDGE CAPPEL



Step 1 for fitting F.W.R.C.

Fig - 14

White Metal Safety Block is fitted as detailed in W.M. Cappel Installation.After fitting the White Metal Block, the cappel should now be fitted as follows :

Note : Prior to assembly, remove any portective paint, grease or backing strip from cappel limbs and wedges. Remove any trace of of rust which may have accumulated on the wedge back and grooves, and also on the inside of the limbs over the area on which the wedges operate. Emery cloth only should be used for this purpose. Remove any burrs or damage on wedges and limb section particularly the area over which the wedges operate which may have occurred in handling, storage or transit, (if left they may interfere with the movement of the wedges.)

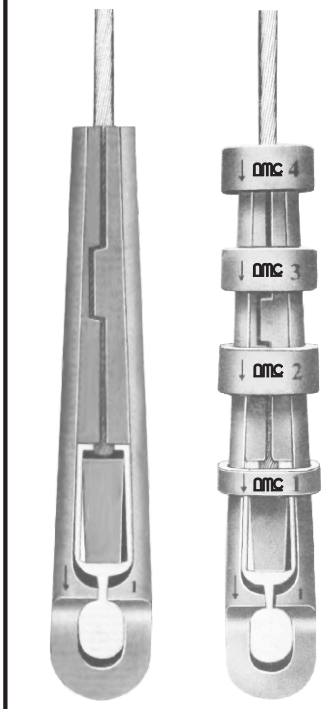
Thread cappel bands on rope in reverse number order i.e. No. 1 is threaded onlast. Make sure that the taper of the inner sides of the bands accords with the outside taper of the cappel limbs. This is shown by an arrow stamped on the limbs.

Thoroughly clean any grease and lubricant from that portion of the rope which will be gripped by the wedges and ensure that the rope is straight, clean and dry, Clean also the *Backs* of the wedges and the inner sides of the cappel limbs. Then apply a light smearing of grease to the *Backs (not The Grooves)* of the wedges and the inside of the limbs. *The Groove Of The Wedges Must Be Clean And Dry*. Place the wedges around the rope approximately in the position they will take up when in the cappel.

Fit the cappel limbs over the wedges and draw downwards until the ends of the limbs are flush with the thin end of the wedges. The rope should then be drawn through the wedges until the safety block is approximately 20mm from the bottom of the wedges.

The bands should now be drawn over and tapped down on the cappel limbs. The band numbered 1 should be fitted adjacent to and encircling the safety block.

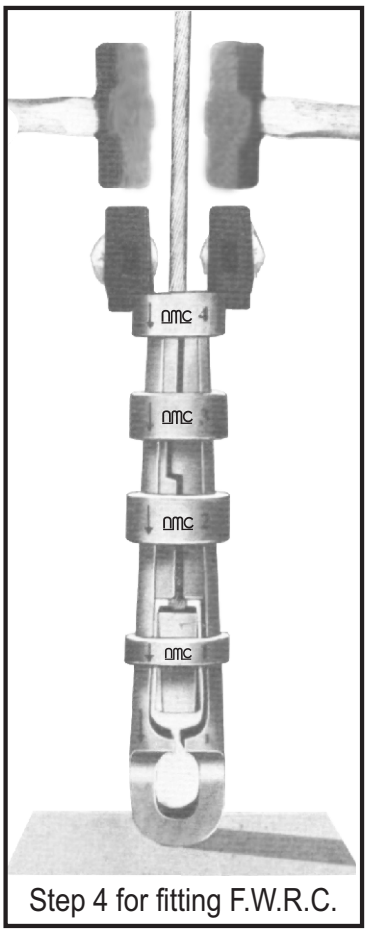
Using drifts which should fit snugly on the edges of the bands adjacent to the cappel limbs (starting with No. 2) should be driven down until they sound tight and solid. The driving down should be on alternative bands so that all the bands are driven down progressively. Preferably two strikers should be employed to facilitate uniform tightening. The sides of each band adjacent to the wedges should never be struck, as otherwise burrs can be caused which may foul the wedges and retard their movement.



Step 2 & 3 for fitting F.W.R.C.

Fig - 15

Band No.1 is intended only as a protection for the safety block and need not be driven on to a very tight fit. It is not a “working” band and its position on the limbs is not critical. The top (”point”) band at the cappel mouth (No. 4



Step 4 for fitting F.W.R.C.

Fig - 16

in the illustration) being the last and easiest to drive on may receive the hardest blows.

This Must Be Avoided. It needs to be tight, but not excessively so.

The "Working" bands (Nos. 2, 3 and 4) in the illustration properly driven on, should be spaced about equally along the cappel limbs, the top ("point") band being slightly short of the end of the cappel.

Notes On Safety Hook :

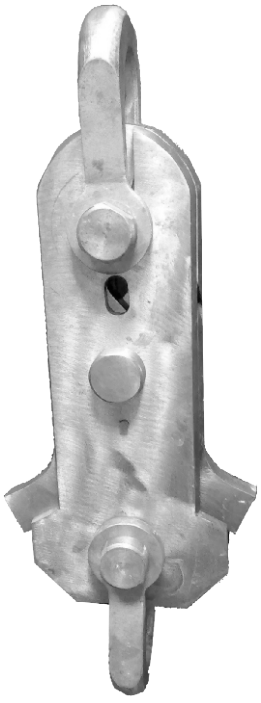
Inspection : Coal Mines Regulation 1957 No. 81 (2) (a) requires inspection of all parts of Suspension Gear including safety hook every six months and if necessary at shorter interval.

Maintenance :

1. Check all nuts and split pins for wear of safety Hook and slackness. Renew split pins at regular intervals.
2. Check outer plates for wear and cracks around shackle eye positions. Do not weld up.
3. Check the copper pin for wear and partial shear which may be due to wear and slackness in platework and pivot pin. Pivot pin must be good fit in platework.
4. Check all plates for flatness by means of straight edge.
5. Ensure that hooks are always well lubricated and as clean as possible. Avoid excessive accumulation of grease and coal dust. Ensure that the locking bolt slot is free from grease and other matter which may hinder the action of the bolt in an overwind.
6. Ensure that the Lifting shackle (for release of hook after overwind) is maintained in a clean and corrosion-free condition.Ensure that it is the correct one for the hooks in use and always ensure that several persons are certain where the shackle is located.

Precaution :

1. Ensure that the catch plate position is such that sufficient clearance exists to allow complete detachment of the hook before the cappel makes contact with the sheave in an overwind.
2. Ensure that adequate clearance exists between catch plate hole and all attachments including rope cappel so that unrestricted passage through the catch plate is possible.

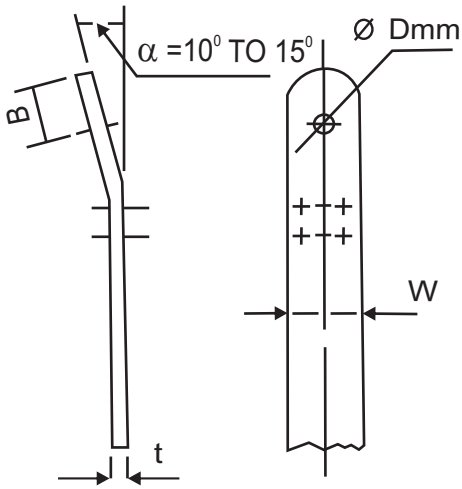


Humble Safety Hook

Fig - 17

NOTES ON INSTALLATION OF SHACKLE & SLINGS

1. Check that the jaws of shackles are parallel.
2. Check that the safety chains are slack after installation in case of six-legged C.S. Gear.
3. Ensure that the length of the slings are 2230mm for four legged CS gear & 2725mm for corner chains and 2575mm for safety chains in case of six-legged C.S. Gear.
4. Ensure that there is not much slackness between jaws for shackle and the cage hangers. DGMS (tech.) circular No. 7 of 1987 has given the following guidelines to the industry which must be followed.



DETAILS OF CAGE HANGER
Attachment for Bridle Chain

Fig - 17

Safe Working load		Bore dia D mm	Thickness 't' of hanger in mm	Width of hanger W mm	B
k N	Tonne				
50	5	30	25	100	90
80	8	39	25	150	120
100	10	39	25	150	120

Installation

- Inspections of attachment of bridle chains to cage hangers have revealed that at some of the installations the fitment between D-shackle pins and cage hangers was not proper causing excessive wear. This happens mainly due to abnormal clearance between shackle pins and cage hanger hole as well as improper inclination, width and thickness of cage hangers.
- To deal with the above difficulties, guidelines given above must be followed.

Inspection

Coal mine regulation lays down following periodicity for inspection

Coal Mine Regulation 83-

1. Daily Inspection :

Every part of cage suspension gear shall be examined carefully for its proper and safe working.

2. Monthly Inspection :

Every detaching plate of safety hook shall be examined and its opening dimension shall be measured and recorded once in at least thirty days.

3. Half Yearly Inspection :

For proper maintenance, it is required that all cage chains in general use and other parts of suspension gear between rope and the cage including the detaching hook, shall be taken apart, cleaned and carefully examined as to wear and tear by gauging and for rust and cracks once atleast every six months or if necessary at shorter intervals.

4. It is suggested that where the conditions are severe, the present visual method of detection of cracks and flaws always does not indicate the correct health of Cage Suspension Gear or its components. In such case magnetic and ultrasonic tests or any other N.D. Test can be done, to detect any crack or flaw in the suspension gear or its components which are regular in service.

PROPER STORAGE OF CAGE SUSPENSION GEAR & ITS PARTS.

- C.S. Gears and it's components must be stored in shelves above floor level.
- They must not be exposed to direct sunlight.
- Proper labeling of components identifying the manufacturer must be done.
- If storage is likely to be more than one year then anti-rust lubricant must be used.
- Principal of first-in first-out must be implemented.

NORMS OF DISCARD OF CAGE SUSPENSION GEAR COMPONENTS.

-Rope Cappels (Wedge Cappels)

1. Tightening bands being damaged, becoming out of shape due to mishandling or any other reason.
2. Marked pitting/corrosion appearing on the bands and the body.
3. Deformation in the body or excessive were on the outer or inner surface.
4. Whether the last tightening band could be tightened up to 6mm or less measured from the bottom of the tapered wedge.
5. Wear to an extent of 5% to 6% or more on the eye portion of the cappel.

Safety Hook

1. Wear on the centre pin exceeding 10% in top and bottom shackles and pins.
2. Wear exceeding 1% in top and bottom shackles and pins.
3. In the top portion of the safety hook if slackness in the pin in more than 1.6mm.

4.(a) Wear on the outer plate shall to be not more than 0.3 mm.

(b) Pitting/corrosion on the inner/working plates.

5.(a) Obliquity in the hole for the copper pin.

(b) Obliquity of holes in the top and bottom shackles (outer) limited to 10%

6. Where the shackle eye has rubbed on the plates and the wear due to such rubbing exceeds 1.6mm.
7. Any deformation, pitting/corrosion or any other defect on the projected fins of the working plates as well as the protion which rests on the catch plate.

Note : The detaching plate or safety hook is considered as a part of the hook. In case of any notch/groove due to rubbing of rope or otherwise on the circumference of the plate hole, the plate should be rejected. If there is no defect like corrosion, groove in the hole of the plate and obliquity in the holes of the tightening bolts, the plate can be allowed further use after proper heat treatment and tests for cracks etc.

Distribution Plates :

1. Marked pitting and corrosion.
2. Obliquity in the holes exceeding 10% of the original dia.
3. Where the shackle eye has rubbed on the distribution plate and wear due to rubbing exceeds 1.6mm.

Shackles and Pins :

1. Wear on shackle eye sides exceeds 1.6mm.
2. Wear on the shackle eye hole exceeds 10% of the original diameter.
3. Obliquity in the hole exceeds 10% of the original diameter.
4. Wear on pin exceeds 10% of the original diameter.

Suspension Chain Slings :

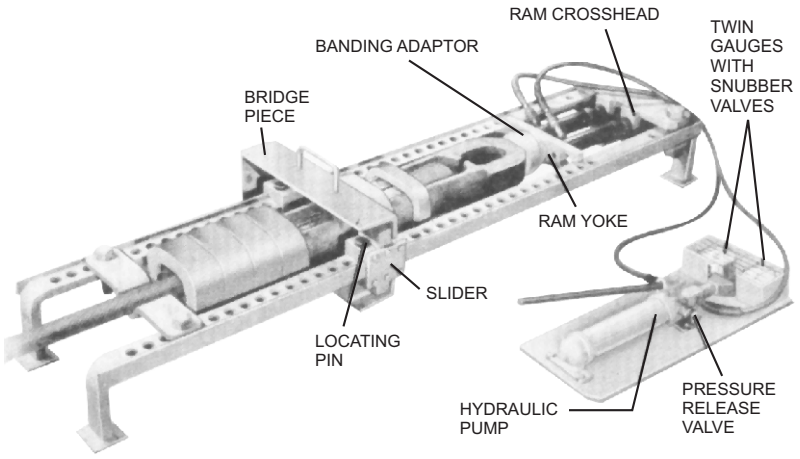
1. Marked pitting and corrosion.
2. The wear on the contact surface of the links exceeds 10% to 12% of the nominal diameter of the link.

POINTS TO PONDER

1. No rusting used to appear on the imported C.S. Gear, Humble safety hook or Reliance Friction Wedge Rope Cappel even after long storage & exposure to adverse environment.Indigenous C.S. Gear & Components gets rusted much earlier.

   Suggestion : Grit Blasing of components is advocated to prevent earlier rusting.

2. During the installation of friction wedge rope cappel, bands get deformed and damaged due to sledge hammering. Availability of expert strikers is decreasing. Mining industry is not attractive to the present generation.



Hydraulic Rope Cappel Banding Machine

Fig - 19

Suggestion : Adopt Hydraulic Rope Cappel Banding. Fig. 18

It ensures consistent and specified pressure on all bands.

3. Avoidance of repeat testing-CS Gear & components are tested 100% at CMFRI for proof load & NDT including magnetic particle test, ECL repeats these tests in their own work shop.

   Due to this procedure acceptance of material is delayed.

   Suggestion : Testing may be carried out at either National testing house or at ECL Testing House.

4. DGMS has specified inspection of CS Gear & components every six months by the manufacturer. This obligation is for six years. As per the present purchase norms and porocedures the vendor is supposed to carry out these inspections without any further pecuniary benefits.

   Suggestion : Just like AMC, inspection contract should be separate from the purchase of the materials. It will ensure better co-ordination between the manufacturer and user and compliance of the statutory requirement.

5. ISO 9001-2000 - DGMS has advised the manufacturer 3 years earlier to obtain ISO certification, This may be followed up. It will ensure better products for the industry. In case of any undesirable happening traceability of the cause & reasons are easier.

6. Re-introduction of five ton safety hook.

   In the industry about 80% installation are of 5 ton capacity. In some of these installations industry feels the desirability & necessity of installing 5 tons safety hook instead of 8 tons. DGMS may permit use of 5 tons. Hook on the merit of case to case basis.

7. Under utilized shaft capacity. — At present total annual coal production in India is about 430 MT, (2007) of which 10% ie. 43 MT comes from underground coal mines. About 50% of which comes from shaft. At the time of nationalization from under ground coal mines the poroduction was 60 MT which was 84% of the total production.

   In most of the pits no of winding cycle per day is much less than it's actual rated capacity and accordingly utilization of CS Gear & winding rope is much less.

   With projected higher production of underground coal utilisation of C. S. Gear equipments is likely to be better.

QUESTION AND ANSWER SESSION

Delegate : Is drilling & welding of Cage-Hanger is permissible.

Sri G. N. Venkatesh. *D. M. S. (Mech.)* : Ensure there is no slackness between jaws of cage shackle & hangers. To achieve the above objective and at the same time, if strength of cage hangars, are not impaired, drilling & welding may be carried out.

Delegate : At what frequency, the copper shear pin is to be changed.

Author :

After i) Every six months during half yearly detailed examination (C.M.R. 83) of Safety Hook.

ii) At shorter interval, if there is any slackness, wear, pitting on pin, or any doubt about the strength of pin.

Delegate : Why DGMS has introduced 8 tons Safety Hook for 5 tons C. S. Gear installation.

Author : DGMS has introduces 8 tons Safety Hook for 5 tons installation for better Safety. 5 tons Safety Hook-detaching plate has hole dia of 155mm. Maximum width of 5 tons. F.W.R.C. Band is 150mm leaving a gap of 5mm. Any unusual swinging of rope used to cause detachment of bands of F.W.R.C. Detaching Plate hole dia for 8 tons Safety Hook is 180mm & there is no chance of fouling of 5 tons F.W.R.C. Bands against hole of detaching plate.

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BIO - DATA OF AUTHOR

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  Distinguished alumnus of Indian School of Mines of 1961 - Mining batch.
- He has represented MGMI at Dusseldorf Mining Congress and world Mining Congress.
- He has been the Hony. Secy. of M.G.M.I. for many years.
- Convenor of 1st Asian Mining Exhibition in 1991.
- Recepient of John Dunn Medal & Sukumar Rakshit medal from MGMI
- He started his career as first class manager in Turner - Morrison group of collieries & at present the CEO of Nanda Millar Co., engaged in export and manufacture of mining machinery and engineering products.
- Representing 'ROSCH' group of companies, Germany.
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