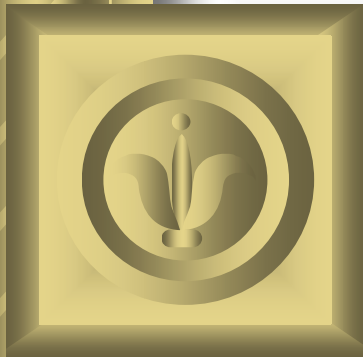


Crane Safety & Safe Work Procedures in Marine Industry, Singapore

Presented By: Alex Teo
Jurong Shipyard Pte Ltd
Singapore





SembCorp Marine
Your Marine Engineering Hub



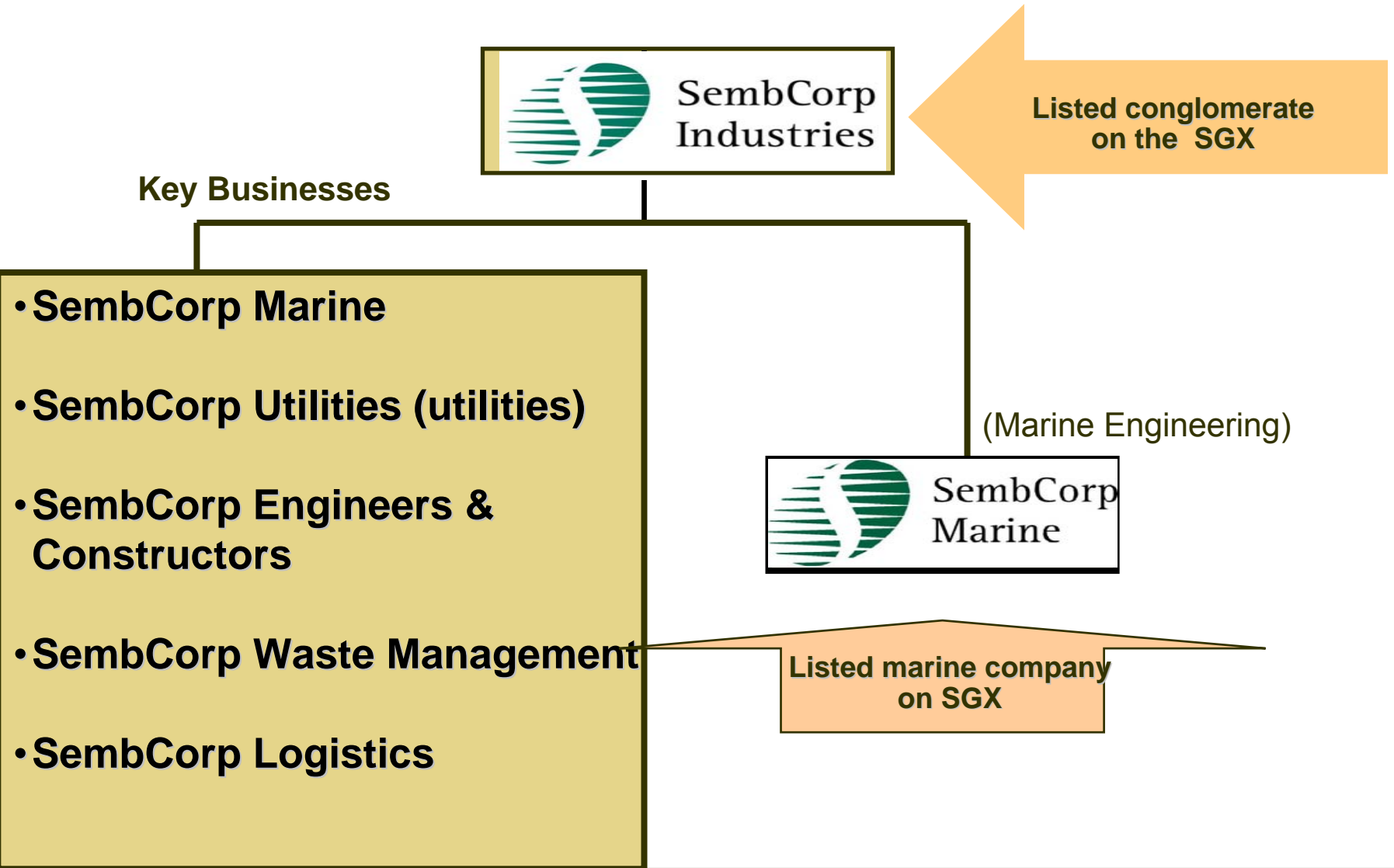
SembCorp
Marine

Jurong Shipyard Pte Ltd





STRUCTURE OF SEMBCORP MARINE IN RELATION TO PARENTAGE



SembCorp Marine Corporate Profile



SembCorp Marine is a leading global **marine-engineering** Group, specializing in **ship repair, shipbuilding, ship conversion and offshore engineering**. With a combined docking capacity of 2.3 million dwt, we offer one of the largest ship-repair and marine facilities in East Asia through seven established shipyards - four in Singapore , one in China and one each in Indonesia, Brazil and USA.

All our **shipyards operate as distinct brand names** focusing their expertise to fulfill the unique needs of their respective market niches.

Type of Cranes Commonly Used in Marine Industry

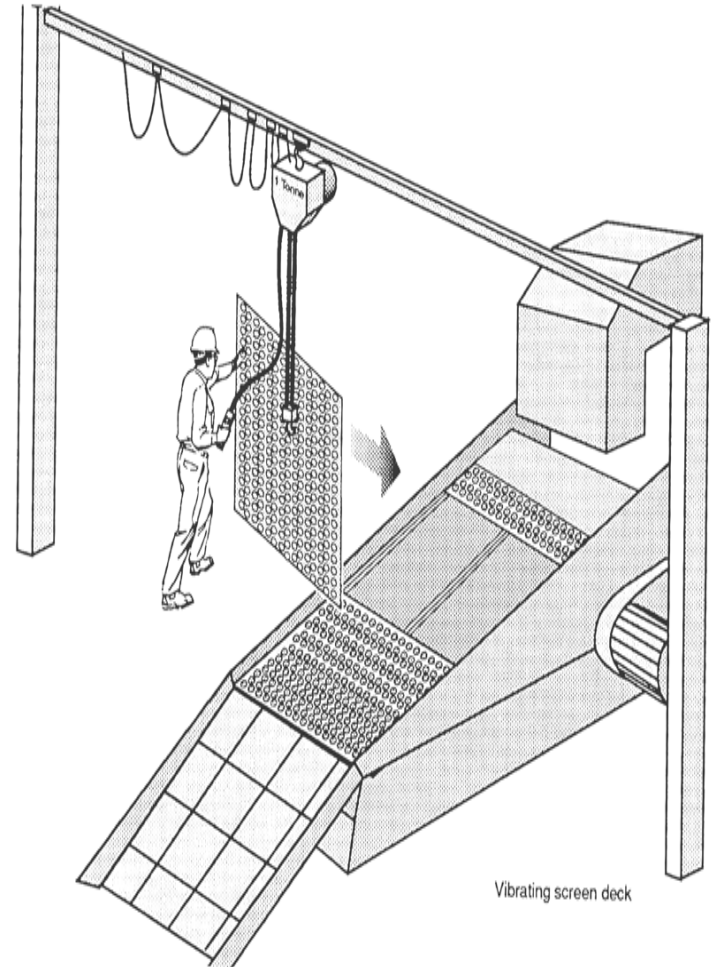
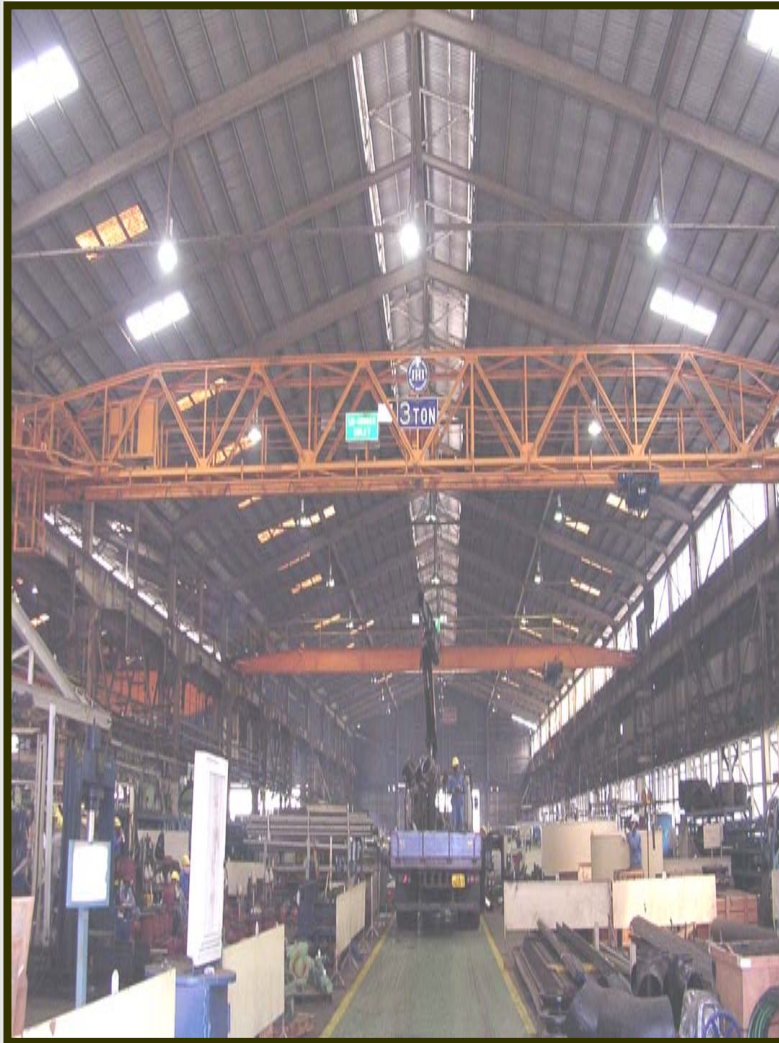
- **Gantry Crane**
- **Over-head crane**
- **Shore crane**
- **Crawler crane**
- **Floating crane**
- **Mobile crane**
- **Lorry crane**



GANTRY CRANE



Overhead Crane



Crawler Crane



Mobile Crane



Floating Crane



Lorry Crane



Shore Crane; Lever Luffing Crane



Safety Aspects of Crane



- Check the traveling limit switch is in good working condition



- Check and ensure tripping device for limiting switch is positioned in place

Safety Aspects of Crane



- **Ensure there is no obstruction in way of the crane rail.**

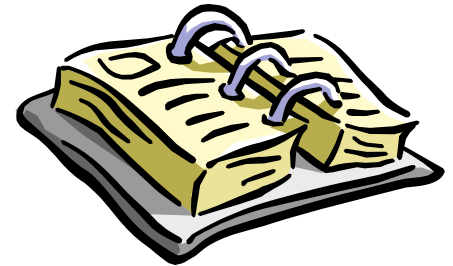


- **Check for proper seating of the rope in the sheaves and on the drum and condition of wire rope for kinks or broken strand**

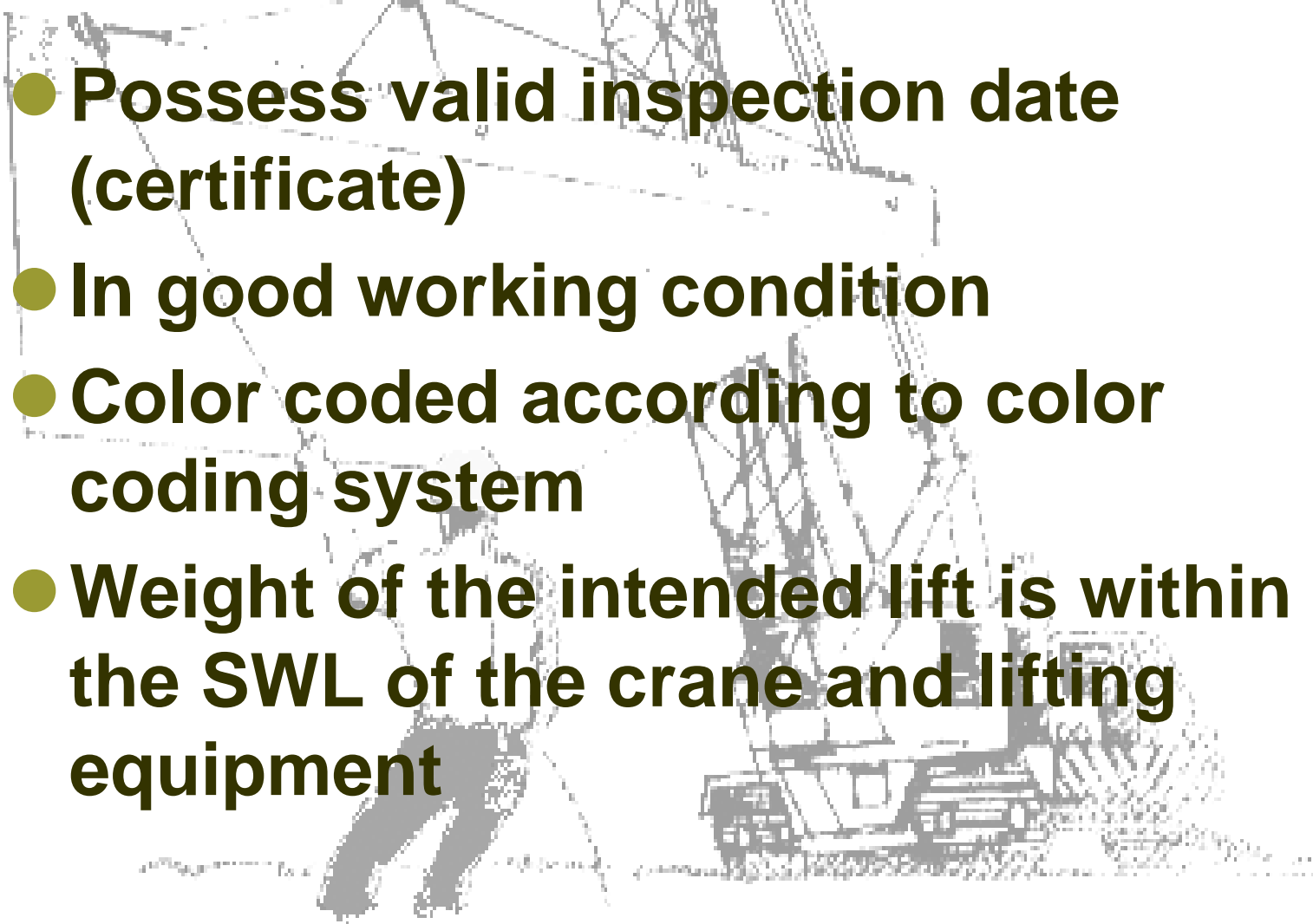
General (Factories Act)

● Section 28

- No person shall be employed at any machine unless he has been fully instructed to the dangers likely to arise
- Has received sufficient training in work at the machine
- under adequate supervision by a person who has thorough knowledge and experience of the machine



Preliminary requirements to be fulfilled for cranes and lifting equipments usage

- **Possess valid inspection date (certificate)**
 - **In good working condition**
 - **Color coded according to color coding system**
 - **Weight of the intended lift is within the SWL of the crane and lifting equipment**
- 
- A faded, grayscale background image showing a crane on the right and a person in a hard hat and safety vest on the left, possibly inspecting or operating the crane. The image is semi-transparent and serves as a backdrop for the text.

Permit and Checklist

- Grade “A” Heavy Lifting Checklist

- Weight exceeding 20 ton & more.
- Using of Floating Crane
- Lifting of Load less than 20 tons but exceeding 95% of crane capacity
- Assembly/ erection block exceeding 80 tons
- Crane Checklist prior to usage
- Operator Checklist
- Maintenance Checklist

Criterion to be fulfilled for signalman, rigger
and crane operator

- ✓ **Required to obtain marine signaling and rigging pass to become qualified signalman and rigger**
- ✓ **Required to pass crane operator training course to become qualified tower crane operator**

Note: Only approved personnel with valid pass issued by MOM is eligible for the operation.

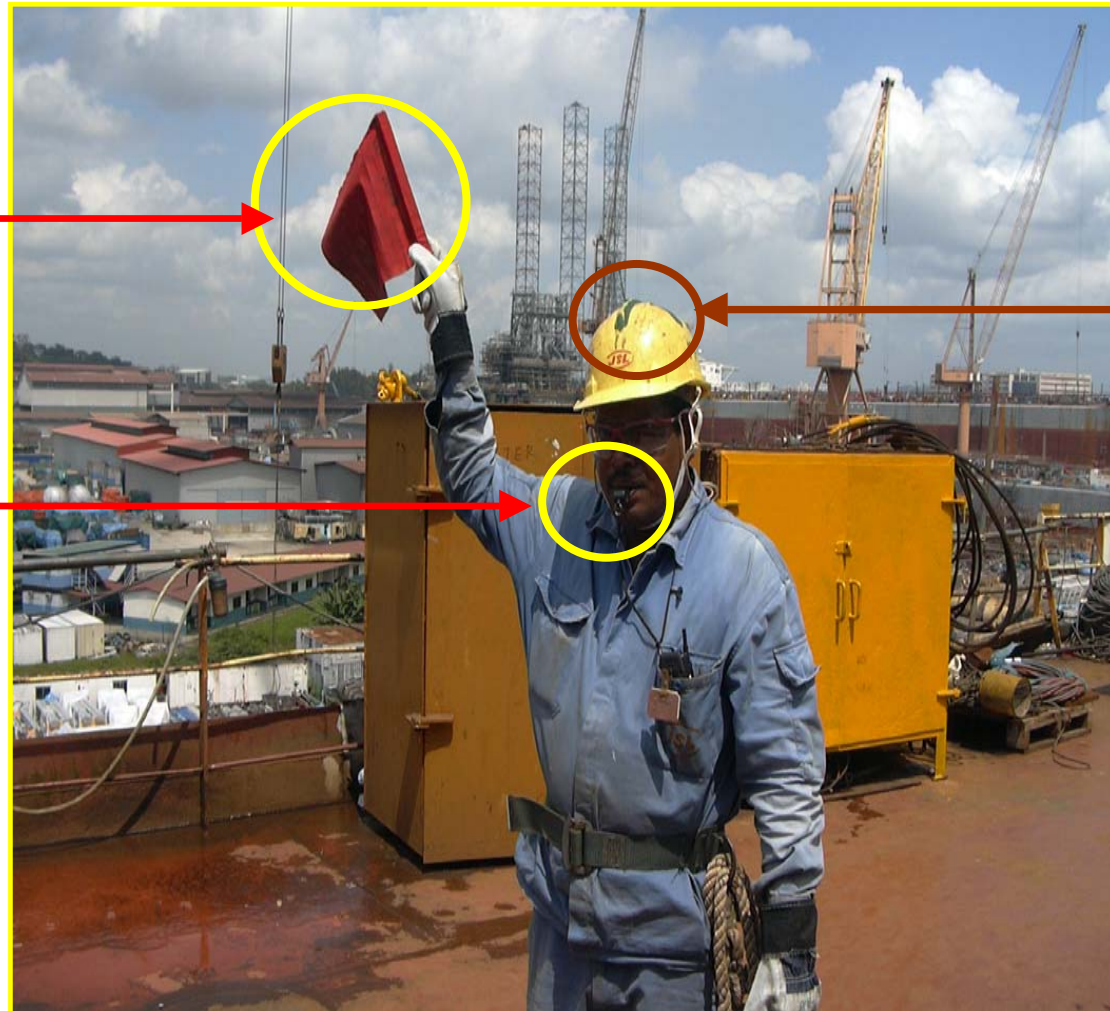
Physical Identification of a Tamakake

- **A cross will be painted on helmet to indicate the competency of marine signaling and rigging pass holder**
- **Flag and whistle are necessities for signaling during lifting operation**

RIGGER & SIGNALLER

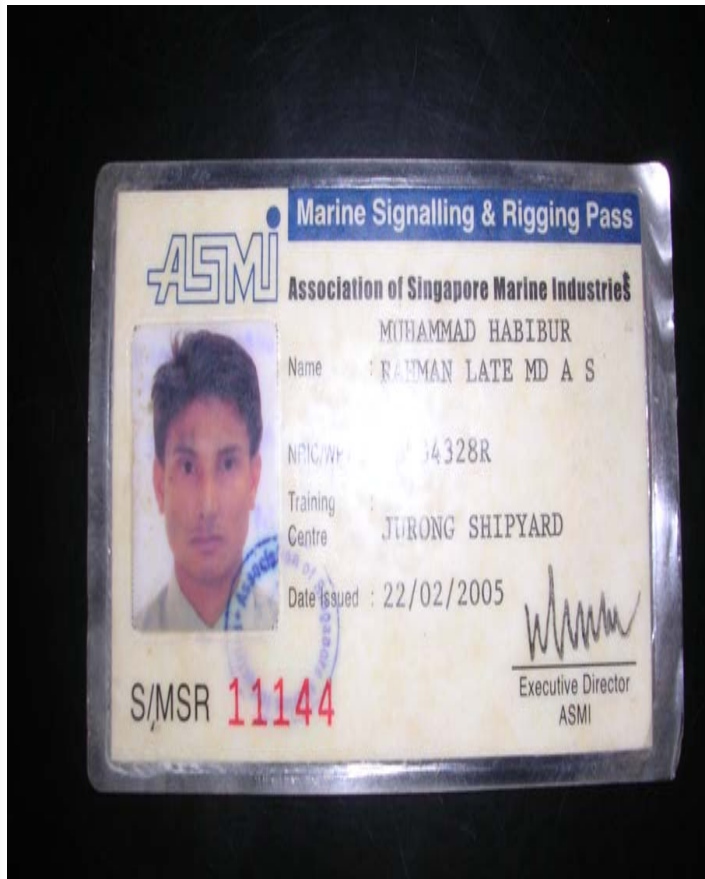
Red Flag

Whistle

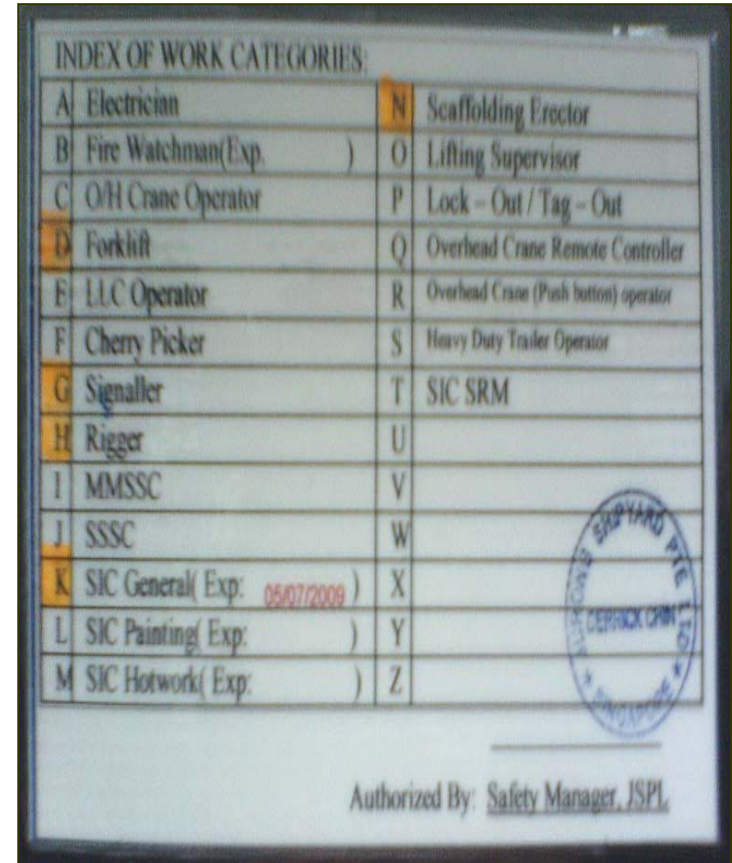


Cross

Authorized pass



ASMI Training Pass



JSPL Pass

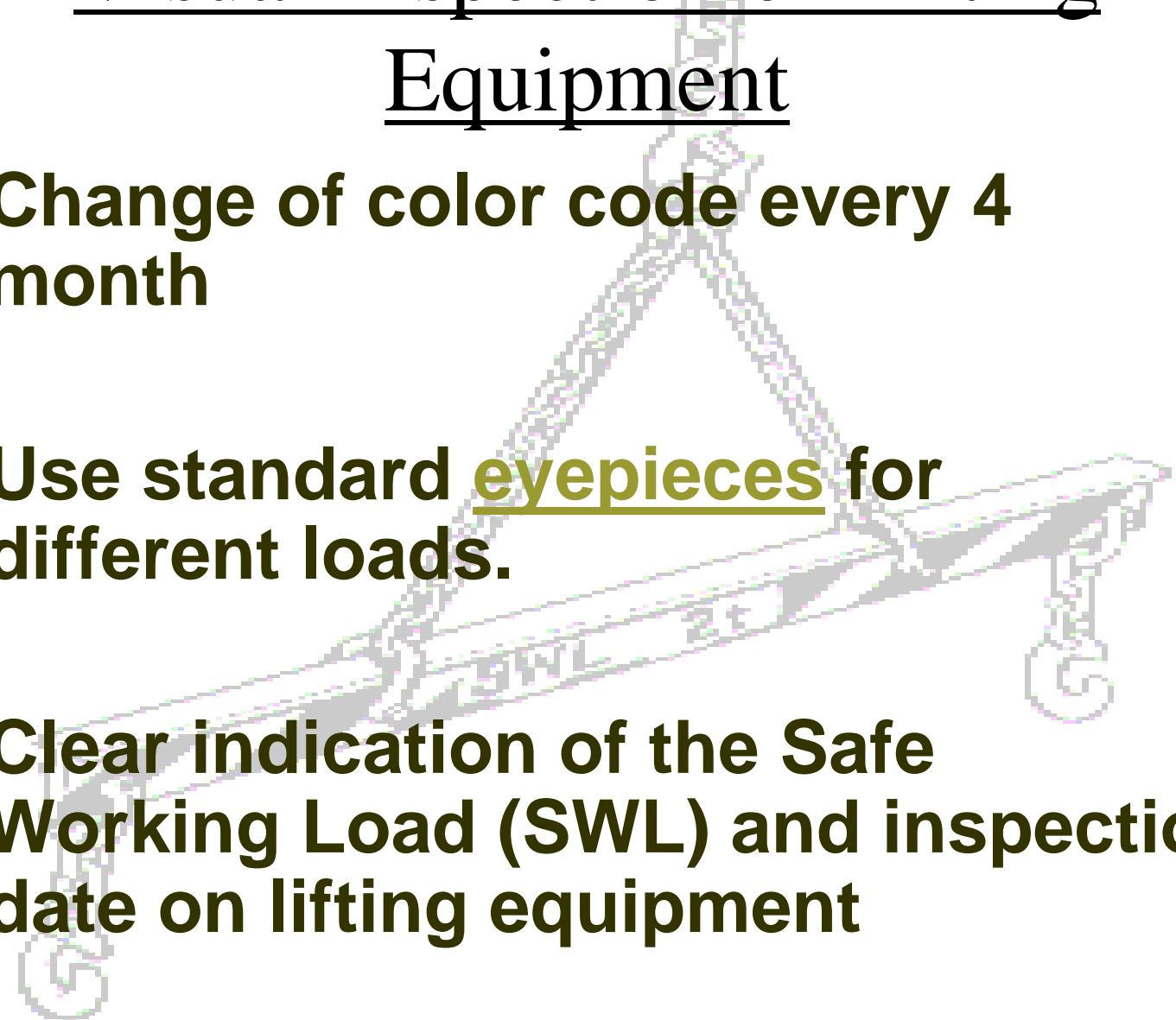
Safety Checklist for Rigger

SAFETY CHECKLIST FOR RIGGER (SLINGING, SIGNALING AND LIFTING)		Yes	No
1. Before lifting the load,			
1.1	Are you appointed as a rigger to carry out rigging and signaling activities in your yard.	<input type="checkbox"/>	<input type="checkbox"/>
1.2	Have you successfully undergone the training in rigging?	<input type="checkbox"/>	<input type="checkbox"/>
1.3	Have you checked that the lifting gears or appliances such as chain blocks, wire ropes, shackles, eyebolts, and others, for		
	i) visible defects	<input type="checkbox"/>	<input type="checkbox"/>
	ii) maximum safety working load	<input type="checkbox"/>	<input type="checkbox"/>
	iii) date of last test	<input type="checkbox"/>	<input type="checkbox"/>
	iv) current colour coding	<input type="checkbox"/>	<input type="checkbox"/>
1.4	Have you checked to ensure that the welded eye piece or lifting lug of the load has no visible defects?	<input type="checkbox"/>	<input type="checkbox"/>
1.5	Have you checked:		
	i) the weight of the load to be carried and confirmed that this is below the safe working load of your lifting gear or appliances?	<input type="checkbox"/>	<input type="checkbox"/>
	ii) the load including all loose items and all lifting attachments are properly secured?	<input type="checkbox"/>	<input type="checkbox"/>
	iii) the pads are placed in areas where the wire ropes are bent around the sharp edges?	<input type="checkbox"/>	<input type="checkbox"/>
	iv) there is one trained person around to give the signal?	<input type="checkbox"/>	<input type="checkbox"/>
1.6	Have you ensured that all the appropriate tag line is attached to the load?	<input type="checkbox"/>	<input type="checkbox"/>
1.7	Have you ascertained the weight of the load which is to be lifted and informed the crane operator of the weight of the load?	<input type="checkbox"/>	<input type="checkbox"/>
2. During lifting the load,			
2.1	Have you ensured that the load is properly balanced?	<input type="checkbox"/>	<input type="checkbox"/>
2.2	Has the load been prevented from swinging?	<input type="checkbox"/>	<input type="checkbox"/>
2.3	Are the loose chain or wire rope slings properly secured?	<input type="checkbox"/>	<input type="checkbox"/>
2.4	Are other workers in the vicinity warned of the potential danger?	<input type="checkbox"/>	<input type="checkbox"/>
2.5	Have the workers standing or working below the suspended load being cleared away?	<input type="checkbox"/>	<input type="checkbox"/>
3. When lowering the load,			
3.1	Have you ensured that the resting place for the load is suitable, and upon resting, that the load is stable ?	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Have you ensured that the chain or wire rope sling is slackened before attempting to remove it?	<input type="checkbox"/>	<input type="checkbox"/>
3.3	After removing the chain or wire rope sling, have you ensured that the shackled pins are properly secured?	<input type="checkbox"/>	<input type="checkbox"/>
<p>Note : Upon completion of work, please ensure that all lifting gears or appliances are kept properly. : Do not start work unless the above questions are answered YES. If in doubt, please check with your supervisors.</p>			

Mandatory Requirements for lifting equipment

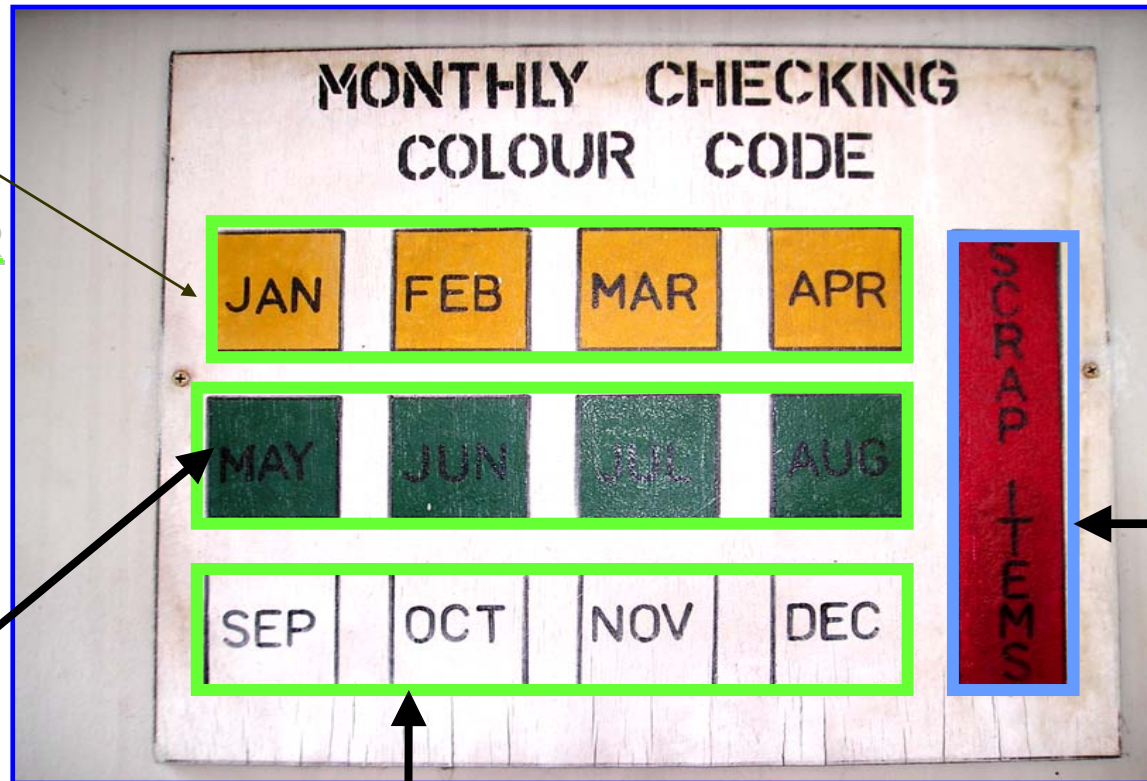
Lifting Equipment Classification	Frequency of inspection by AP (At least once in)	4 Yearly Load Test	Colour coding (every 4 months)	Identification Tag		
				Section Abbrev.	Serial No.	SWL
Wire Slings	12 months (Diameter ≥16mm)	Yes (Diameter ≥12mm)	Yes	Yes	Yes	Yes
Chain Slings	12 months	Yes	Yes	Yes	Yes	Yes
Chain Blocks	12 months	Yes (for SWL > 1 ton)	No	Yes	Yes	Yes
Sheave Blocks	12 months	Yes (for SWL > 1 ton)	Yes	Yes	Yes	Yes
Shackles	12 months	Yes	Yes	Yes	Yes	Yes
Cargo Nets / Web Slings	12 months	Yes	Yes	Yes	Yes	Yes
Eye Pads/Pieces	-----	No	Yes	No	No	No
Pallets (Materials)	12 months	Yes	Yes	Yes	Yes	Yes
Lifting platform (Personnel work platform)	6 months	Yes	Yes	Yes	Yes	Yes
Winches (SWL>150kg)	12 months	Yes (for SWL > 1 ton)	Yes (only for eye pads)	Yes	Yes	Yes
*Lifting Machines	12 months	Yes	Yes (only for eye pads)	Yes	Yes	Yes

Visual Inspection of Lifting Equipment

- **Change of color code every 4 month**
 - **Use standard eyepieces for different loads.**
 - **Clear indication of the Safe Working Load (SWL) and inspection date on lifting equipment**
- 

Colour code

Colour Coding (Yellow)
JAN - APR



Colour Coding (Red)
Scrap Items

Colour Coding (Green)
MAY - AUG

Colour Coding (White)
SEP - DEC

Various Types of Lifting Gears



Check for Inspection Date

Shackle

Serial No:
SWL:
Inspection Date:

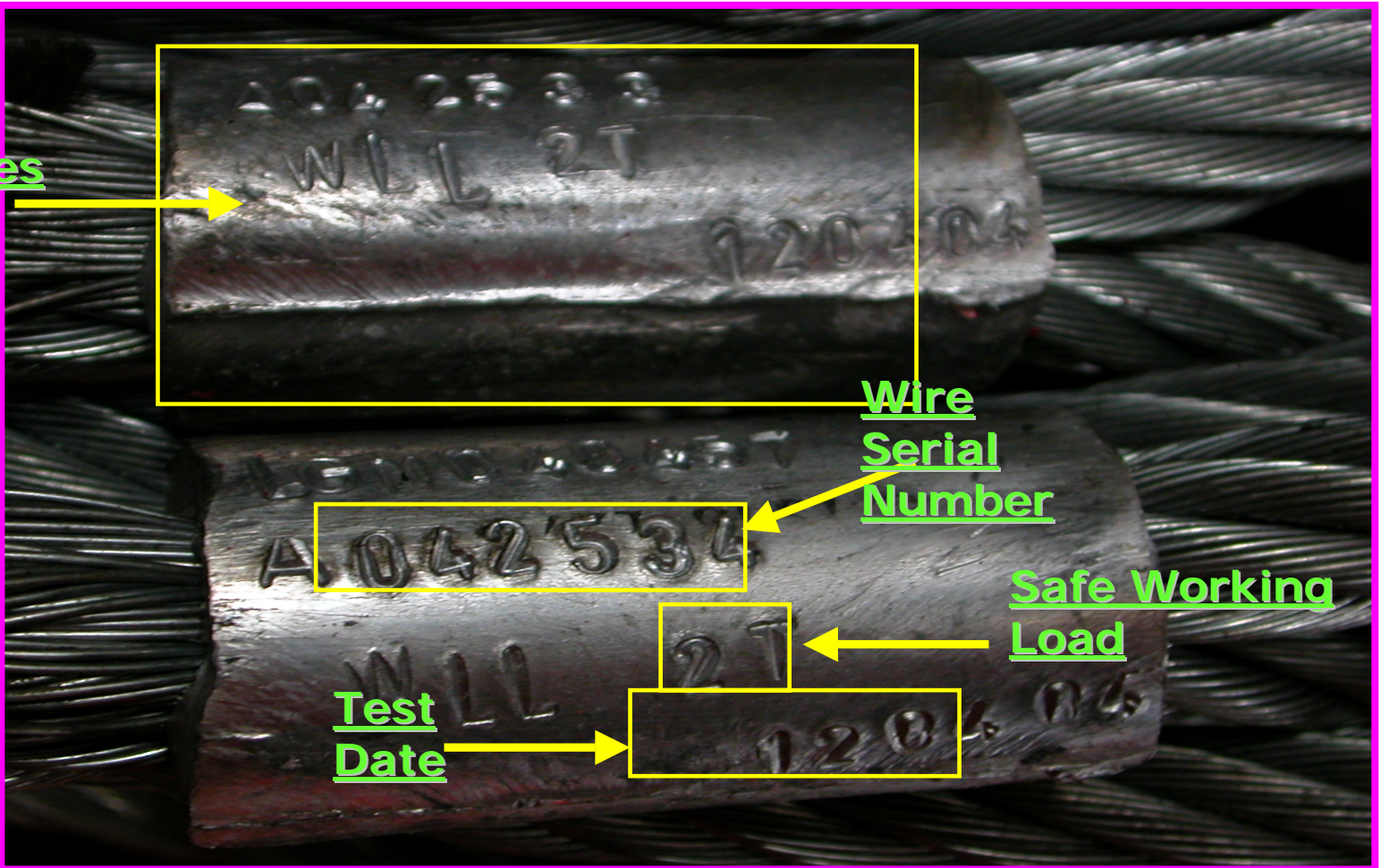


Lifting Belt



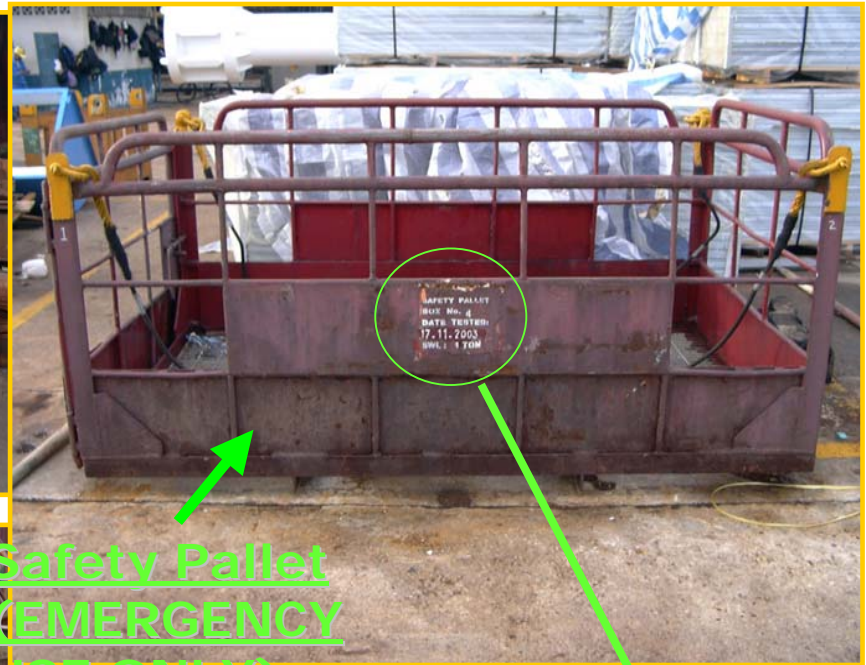
Lifting Wire

Sleeves



Types Of Lifting Pallets

Personal working platform (MAX. TWO PERSONS ONLY)



Lifting Pallet (FOR OIL & PAINT DRUM ONLY)



Safety Pallet (EMERGENCY USE ONLY)

Clear indications of test date and SWL.

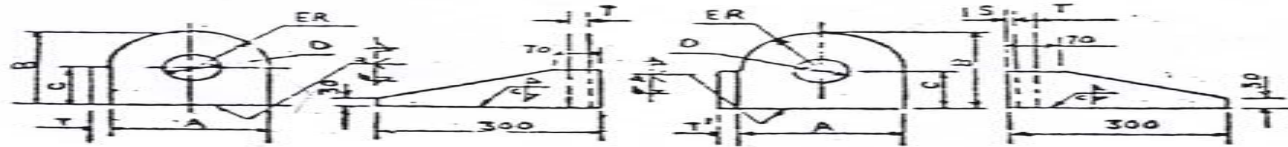




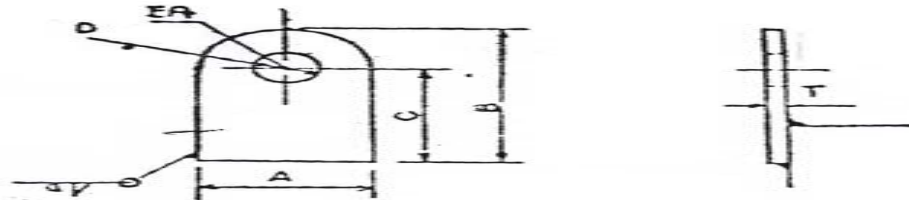
End of Presentation

Standard eyepieces

EYE PIECE



All. Wt.	SIZE								L. Length		
	TON	A ^{±0}	B ^{±0}	C ^{±0}	D ^{±0}	E ^{±0}	T ^{±0}	S ^{±0}	WT. kg.	a	b
20	234	234	117	74	117	25	25	13.6	11	10	13
30	262	252	121	82	131	25	28	16.7	13	12	13
40	280	345	155	108	190	25	32	32.9	15	12	13
50	430	395	180	120	215	25	36	46.2	17	12	13



All. Wt.	SIZE								WT. kg.	L. Length	
	TON	A ^{±0}	B ^{±0}	C ^{±0}	D ^{±0}	E ^{±0}	F ^{±0}	T ^{±0}		a	b
3	100	170	120	40	50	40	14	1.74	3	3	
10	194	304	207	74	92	80	20	8.53	7	7	
20	234	364	247	74	117	130	25	15.6	9	9	
30	262	382	251	82	131	130	28	20.2	16	16	
40	380	484	294	108	190	150	32	41.7	16	16	
50	430	515	300	120	215	150	36	56.0	20	20	

FIG - 4(a)

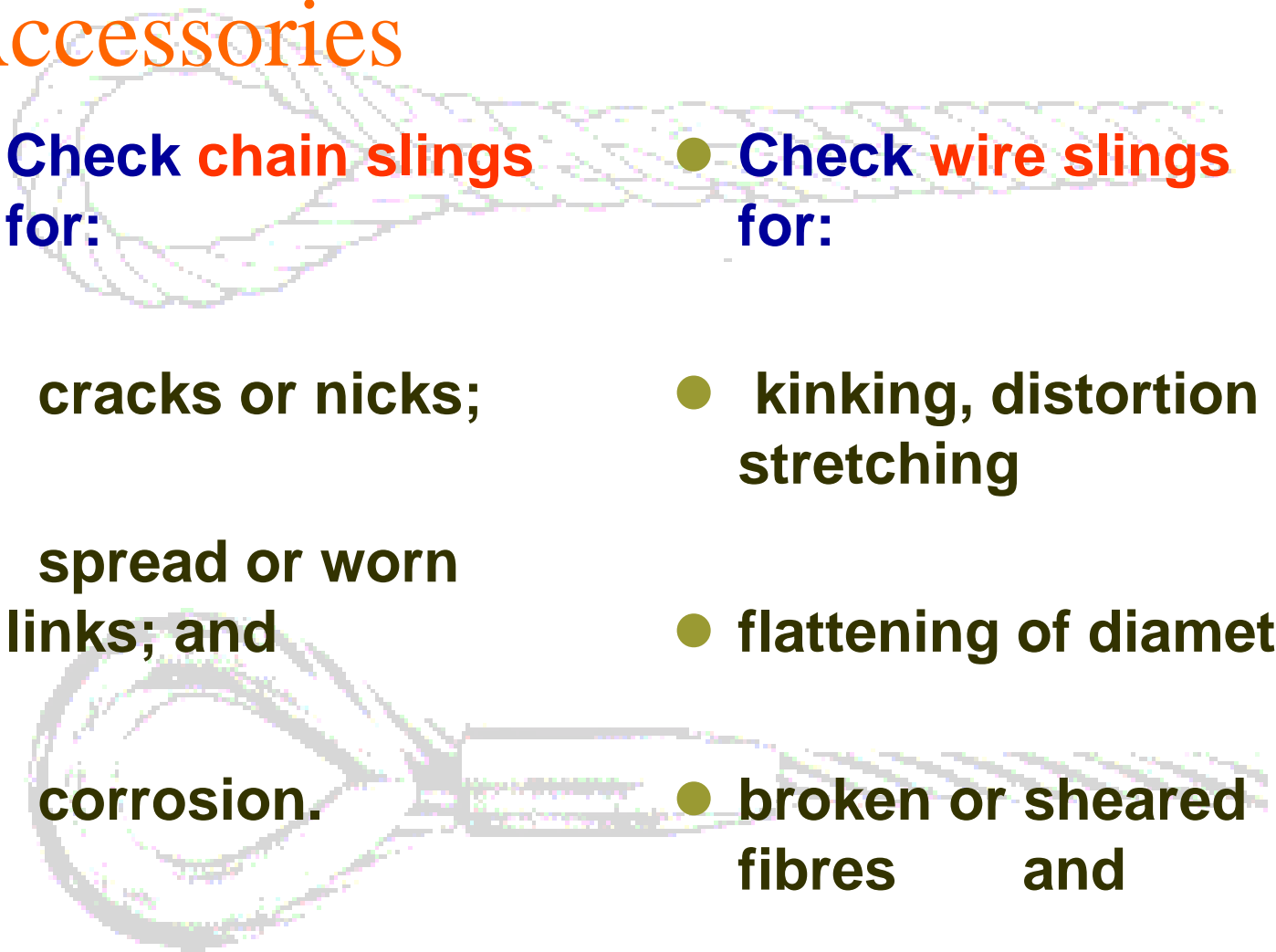
Visual Inspection on Lifting Accessories

- **Check chain slings for:**

- **cracks or nicks;**
- **spread or worn links; and**
- **corrosion.**

- **Check wire slings for:**

- **kinking, distortion or stretching**
- **flattening of diameter**
- **broken or sheared fibres and**
- **bird caging.**



Cont'd

- Check **synthetic fibre slings** for:

- broken stitching;
- stretching;
- frayed fabric; and
- chemical damage.

- Check **shackles and eye-bolts** for:

- stretching or distortion; and
- excessive crown or pin wear on shackles.

