

Overhead Crane Risk Assessment: Equipment Section

Serial Number	Inspection Items	Risk Sources	Possible Accident Characteristics and Consequences	Control Measures	Possibility (P)	Severity (S)	Risk (R)	Risk Level	Risk Color Code	Remarks
1	Main Load-Bearing Structural Components	Main Girder: Cracks in the main girder. Weld seam cracking. Severe corrosion (e.g., when handling corrosive materials). Plastic deformation. Overall instability.	Equipment damage and casualties.	Regularly inspect primary load-bearing components; repair or scrap them as needed.	4	5	20	1	Red	
2	Wire Rope Damage	Wire Rope: Broken strands at splice points, rope strands sunken, protruding, overlapping, or knotted. Damage reaching scrap criteria: continuous fatigue breaks in the wire rope.	Premature wear, suspension of operation, bridge crane collapse causing casualties.	Inspect wire ropes monthly; conduct regular non-destructive testing; if issues are detected, follow standards for evaluation by professional technical institutions to decide on scrapping and replace with new wire ropes.	4	5	20	1	Red	
3	Wire Rope End Fixation	Wire Rope End Fixation: Unsecure fixation. Loose fastening bolts. Wedge sockets cracked. Clamp plates broken. Fixing bolts fallen off. Lack of regular inspection of the end fixation point.	Wire rope end detachment causing casualties.	Regularly inspect wire rope end fixtures; focus on end areas during monthly inspections; perform non-destructive testing periodically; if issues are found, follow standards for professional evaluation and replace the wire ropes.	4	4	16	2	Orange	
4	Chain	Cracks or severe corrosion. Severe rust or non-removable debris. Excessive wear and elongation.	Falling incidents causing casualties or failures.	Inspect chain appearance daily; measure chain wear and elongation monthly.	4	4	16	2	Orange	
5	Lifting Devices	Hooks: Excessive wear. Cracks. Repaired forged or laminated hooks. Illegible markings. Grabs: Missing or broken anti-slip devices. Missing anti-rotation devices. Malfunctioning safety limiters. Electromagnets: Power cable broken or detached, leading to demagnetization.	Falling, collision, crushing, or electric shock resulting in casualties or failures.	Inspect lifting equipment appearance and operation daily; check functionality monthly; conduct regular maintenance monthly.	4	5	20	1	Red	
6	Drum	Cracks, weld seam cracking, or other performance-affecting surface defects. Excessive wear on drum walls.	Falling or crushing causing casualties or failures.	Inspect drum appearance monthly; check drum functionality monthly; conduct regular maintenance monthly.	3	4	16	2	Orange	

7	Pulley	<p>Pulleys Damaged or cracked pulleys. Excessive wear on the groove wall and bottom. Uneven wear. Poor lubrication, leading to unsmooth rolling.</p>	Equipment damage and suspension of bridge crane operations.	Inspect pulley operation dynamically monthly; check pulley functionality monthly; perform regular maintenance monthly.	2	4	8	4	Blue
8	Track	Damaged rails. Abnormal rail vibration. Loose, displaced, or detached rail accessories. Track gauge or height deviation exceeding standards.	Slipping stops in lifting machinery, wheel damage, derailment, or tipping of lifting machinery.	Inspect tracks for looseness, displacement, or detachment; measure gauge and level annually and rectify issues promptly.	2	2	4	4	Blue
9	Wheels	Surface defects like cracks. Excessive wear on flanges and treads. Deformed wheel flanges. Out-of-roundness exceeding standards.	Derailment or tipping of the main crane; derailment of the trolley; falling or crushing causing casualties or failures.	Regularly inspect wheel appearance; measure wear regularly; repair or replace wheels as needed.	4	4	16	2	Orange
10	Main Motor	Abnormal operating temperature. Vibrations or noises. Overheated or noisy bearings. Lubrication oil leakage. Foreign objects or noise in the fan or filter. Insulation resistance between windings or casing below 500 MΩ. Loose connections, abnormal grounding, or bolt fastening issues. Irregular coupling operation.	Equipment failure leading to operator entrapment.	Inspect motor operation daily; check bearings and cooling systems monthly, clearing dust as needed; test motor insulation annually; perform non-destructive testing or replace bearings periodically.	2	4	8	4	Blue
11	Brake (for General Bridge Cranes)	Single brake set unable to stop the crane. Brake pads contaminated with oil or water. Uneven gap between brake blocks. Abnormal brake clearance or pad thickness. Rust or cracks in the butterfly springs of emergency brakes. Damaged brake pads. Preload travel not within normal range.	Brake failure causing bridge crane runaway; equipment failure causing casualties.	Check brake functionality daily; inspect brake pad gaps and thickness monthly; clean oil and dust from brake discs promptly; test braking distance for each brake annually.	4	5	20	1	Red
12	Reducer (for General Bridge Cranes)	Abnormal noise or vibration during operation. Insufficient lubrication or oil temperature exceeding 90°C. Noisy bearings or gears. Output shaft displacement. Noises or leaks in cooling oil pumps or fans.	Prolonged equipment failure leading to operator entrapment.	Monitor gearbox temperature and noise daily, and check oil levels; inspect oil level and color monthly, clearing oil and dust from the gearbox and cooling device; replace lubrication oil annually; dismantle for inspection every six years or 22,500 hours.	3	4	12	3	Yellow
13	Coupling (for General Bridge Cranes)	Uneven operation, unusual noise, or wear. Abnormal lubrication.	Equipment failure causing operator entrapment.	Inspect chain coupling operation daily; inspect its appearance monthly; dismantle and reapply lubrication oil annually.	2	4	8	4	Blue

14	Travel Limit Switch	Missing or damaged travel limit switches.	Falling, collision, or crushing causing casualties or failures.	Test travel limit functionality daily; conduct regular repairs monthly.	4	4	16	2	Orange
15	Buffers and End Stops	Damaged, detached, or malfunctioning buffers. Deformed, broken, or insecure end stops.	Collision or crushing causing casualties or failures.	Check buffer and end stop functionality daily; perform regular repairs monthly.	4	4	16	2	Orange
16	Height Limiter	Damaged or malfunctioning height limiters. Dual height limiters malfunctioning (e.g., electric hoists).	Falling, collision, or crushing causing casualties or failures.	Inspect height limiter functionality daily; conduct regular maintenance monthly.	4	4	16	2	Orange
17	Load Limiter	Malfunctioning or inaccurate readings.	Falling incidents causing casualties or failures.	Inspect load limiter functionality daily; conduct regular maintenance monthly.	4	4	16	2	Orange
18	Interlocking Protection Devices	Missing or malfunctioning devices.	Falling, collision, or crushing causing casualties or failures.	Inspect interlock protection device functionality daily; conduct regular maintenance monthly.	4	4	16	2	Orange
19	Rail Sweeper	Deformed or malfunctioning.	Jamming, misalignment, derailment, or failure.	Check the appearance of rail cleaners daily; perform regular maintenance monthly.	4	2	10	3	Yellow
20	Conductor Rail Safety Protection	Detached or missing components.	Electric shock causing casualties or failures.	Inspect the appearance of the conductor rail safety protection device daily; conduct regular maintenance monthly.	4	5	10	3	Yellow
21	Anti-Collision Devices	Missing or malfunctioning devices.	Collision or crushing causing casualties or failures.	Inspect anti-collision device functionality daily; conduct regular maintenance monthly.	4	2	10	3	Yellow
22	Alarm Devices	Missing or malfunctioning devices.	Collision or crushing causing casualties or failures.	Check alarm functionality daily; perform regular maintenance monthly.	4	2	10	3	Yellow
23	Emergency Stop Button	Crane fails to stop quickly when pressed. Inaccessible or poorly positioned. Not a red button. Ineffective functionality.	Falling, collision, crushing, or failure.	Inspect emergency stop buttons and braking functions daily; test all button functions monthly; inspect performance and wiring annually.	1	5	5	4	Blue

24	High and Low Voltage Distribution Cabinet	Lack of safety isolation facilities. Missing protective equipment (e.g., insulating mats, boots, gloves). Potential rodent intrusion causing short circuits. Risk of leaks. No dual-circuit power supply. Voltage fluctuation exceeding $\pm 7\%$. Poor connection contacts. Abnormal insulation, leakage, or resistance. Transformer or fan malfunction. Abnormal circuit switching or indicators in high-voltage cabinets. Low-voltage switchgear functionality issues.	Electric shock, entrapment, or failure.	Ensure equipment and facilities are in good condition daily; repair power supply equipment monthly and maintain good condition; strictly follow safety protocols during repair or switching operations; wear electrical safety protective gear correctly.	2	5	10	3	Yellow
25	Electrical Protection	Disconnection of terminals or wiring faults leading to equipment failure.	Falling, collision, or crushing causing casualties or failures.	Inspect electrical protection functionality daily; conduct regular maintenance monthly.	4	4	20	1	Red
26	Grounding and Lightning Protection	Loose or missing grounding wires. Grounding resistance exceeding limits: Protective grounding $> 10\Omega$. Protective earthing $> 4\Omega$.	Falling, collision, or crushing causing casualties or failures.	Inspect grounding and lightning protection functions daily; perform regular maintenance and testing monthly.	4	4	16	2	Orange
27	Insulation Resistance	Damaged insulation layers. Insulation resistance $< 1M\Omega$ for circuits with voltage $\leq 1000V$ under 500V test conditions.	Electric shock causing casualties or failures.	Regularly inspect insulation layers of wires; perform insulation tests periodically.	4	4	16	2	Orange
28	Maintenance Tools	Tools not within the inspection validity period or not regularly calibrated. Tools being used beyond their specified limits. Lack of lifting operation procedures or failure to follow them. Operators have not received proper safety education and training.	Falling, electric shock, collision, crushing, or failure.	Regularly calibrate measuring tools; establish and follow operation protocols for tools; confirm lifting equipment functionality before use, avoid overloading, and wear personal protective equipment correctly.	2	5	10	3	Yellow
29	Safety Equipment	Purchasing substandard safety equipment. Equipment is beyond its shelf life. No pre-use inspection to confirm compliance. No regular testing or timely updates of safety gear.	Falling, electric shock, collision, crushing, or failure.	Use only qualified safety tools; store safety equipment properly; establish a registry, conduct regular inspections, and use only within the validity period; immediately discontinue or scrap abnormal tools.	1	5	5	4	Blue

30	Flammable, Explosive, and Toxic Materials	<p>Improper classification and storage or unclear labeling of materials.</p> <p>Defective storage containers.</p> <p>No explosion-proof lighting in storage areas for hazardous materials.</p> <p>Improper configuration of fire-fighting equipment.</p>	<p>Fire, explosion, environmental pollution, equipment damage or failure, and casualties.</p>	<p>Establish and implement safety management regulations for warehouses storing flammable, explosive, or toxic materials; develop emergency response and fire contingency plans; promptly transport hazardous waste; technical operations department responsible for management.</p>	3	4	12	3	Yellow	
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