

四、起重机的安全及防护装置 Safety device

为了保证起重机的安全运行，在设计制造时已为起重机配置了相应的安全防护装置，且灵敏可靠，为用户的安全使用，提供了可靠保障。

To ensure safety traffic, the crane deploys relevant safe protection device when design and it is very flexible and reliable and provides reliable guarantee.

1.安全制动装置 Safety brake device

锥形制动器：锥形制动器是与锥形电动机融为一体的机构，其制动原理为（见图3）：当电动机接通电源时，电动机定子与转子之间产生电磁力 F ，由于定转子为圆锥形表面，所以 F 力相对于圆锥而可分解为径向分力和轴向分力；转子与定子之间气隙均匀且磁力对称，径向分力相互抵消。

Cone type brake: cone type brake and cone type motor is a merging mechanism. It has function of drive and brake on electric hoist. Its brake principle is: when motor puts through the power source. Electromagnetic force F gives birth between rotor and stator of motor. Because of the cone surface of rotor and stator, F force is divided into radial component force and axial component force. When the normal work space is uniform between rotor and stator and the electromagnetic force is very symmetrical, radial component force cancels out.

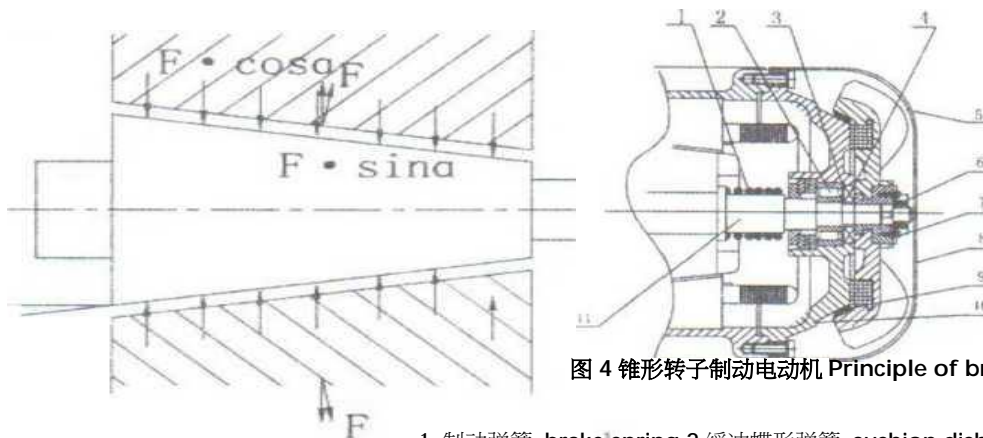


图3 制动原理
Principle of braking

图4 锥形转子制动电动机 Principle of braking

1. 制动弹簧 brake spring
2. 缓冲蝶形弹簧 cushion dish-spring
3. 支撑圈 support
4. 推力轴承 thrust bearing
5. 风扇制动轮 fan brake wheel
6. 调整螺母 adjust nut.
7. 螺钉 screw
8. 风扇罩 fan cover
9. 锥形制动环 conical brake wheel
10. 后端盖 back-end cover
11. 电动机轴 motor shaft

从图4可以看出，在轴向力的作用下，电动机轴11、轴端螺钉7、螺母6及风扇制动轮5一起向右移动，同时压缩弹簧1，此时制动摩擦环9与后端盖10的摩擦面脱离。当电动机断开电源时，磁力消失，轴向力也消失，弹簧1伸张，使电动机轴11向左移动，同时制动摩擦环9与后端盖10的摩擦面紧密接触，达到制动的目的。

It can be seen from diagram 4 that axis of motor 11, bolts of end of axis 7, nuts 6 and fan brake wheel 5 move right together under the action of axial component force, at the same time, compress the spring 1, brake friction ring 9 is removed from the friction surface of behind cover 10. When motor cuts off the power source, the electromagnetic force disappears and axial component force also disappears. The spring 1 promotes make axis of motor 11 move left. At the same time, brake friction ring 9 and the friction surface of behind cover 10 contact tightly to realize the object of brake.

制动器调整时,先将轴端螺钉 7 拆下,再旋转锁紧螺母 6,调整后要试车观察电动机轴的窜动量,一般 窜动量在 1.5mm 为宜。当反复调整,载荷下滑距离仍达不到要求时,应检查制动摩擦环是否已达到报废标准。当制动摩擦环磨损达原厚度的 50%或磨损量超过了电机轴允许的最大调整设时,即应更换锥形制动环 9。

When adjust the brake, first pull out bolts of end axis 7, then rotate and lock nuts 6,observe drunkenness of axis of motor. The drunkenness is generally 1.5mm. When adjust repeatedly, the glide range of load still does not meet the requirement, check the brake friction ring worn out more than 50% of former thickness or more than maxa adjustment quantity, the cone brake ring 9 should be replaced.

起重机运行机构的制动器及电动葫芦的运行小车,一般也都采用锥形制动电动机,其制动原现、使用调整均载荷制动器相同。

Brake of traveling mechanism and trolley of electric hoist generally adopts cone brake motor. And its brake principle and operation are as same as load brake.

2.轨道端部止档及缓冲器 Stopper at end of track and buffer



图 5 小车端部止档
Backstop at end of track of
trolley

轨道端部止档是为防止起重机从轨道两端出轨而设置的安全装置。轨道端部止档要求安装必须牢固可靠,能有效防止起重机的脱轨。

Stopper at end of track is a safety device protecting crane from deviating from two ends of track It is required that installation should be tight and reliable lo protect crane from deviating.

电动葫芦运行的工字钢轨道的两端也设有端部止档(见图 5),其位置、高度与电动葫芦的运行小车相适应。小车端部止档装有橡胶材料的缓冲器。

There are back stop at two ends of I type track which electric hoist travels on. (see diagram 5). Tts

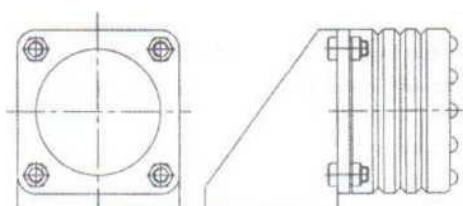


图 6 聚氨酯缓冲器 Polyurethane buffer

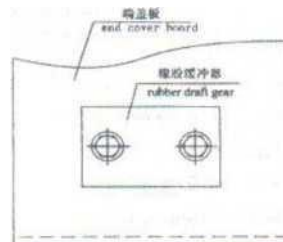


图 7 橡胶缓冲器 rubber draft gear

disipolion and height should be adapt to trolley of electric hoist.

大车端梁的两端装设有聚氨酯或橡胶缓冲器(见图 6、图 7),且端梁上设有行程开关(见图 8),保证大车在切断电源的情况下车挡相接触而停止运行。

There are polyurethane or rubber draft gear (see diagram 6, diagram 7) and travel, switch on the end carriage (see diagram 8) to ensure contact with bumping post to stop when the crano cuts off the power source.

3.限位器 Liminator

上升限位器是保证当吊具起升到上极限位置时，能自动切断起升电源，立即停止起升动作，然后只能向相反的方向运转。上升限位器对起重机的安全运行关系重大，它若失灵将会导致严重事故，所以月检、年检以及日常检查都必须认真检查该机构。检查时，以空载状态起升吊具至上极限位置，电动葫芦能自动停止起升动作即为良好状态。平时使用时绝对不能用上升位置限制器作为停车开关使用。

Upward limiter assures that when load is lifted to upper limit, it can cut off the power source automatically and stop the lifting action, then run at the opposite direction. Upward limiter is important for crane's safe traffic. If it has failure, may brings sever accident, so careful check is needed in each daily check, monthly check and annum examination .It is in good working order that electric hoist can stop lifting action automatically when load is lifted to upper limit with empty load. It is forbidden using upward limiter as shut down switch.

4.安全 Safety

(1)司机室操纵的起重机，进入司机室的门和司机室到桥架上的门设有电气联锁保护装置当其中任何

一个门打开时，开关触头也打开，起重机断电停车。

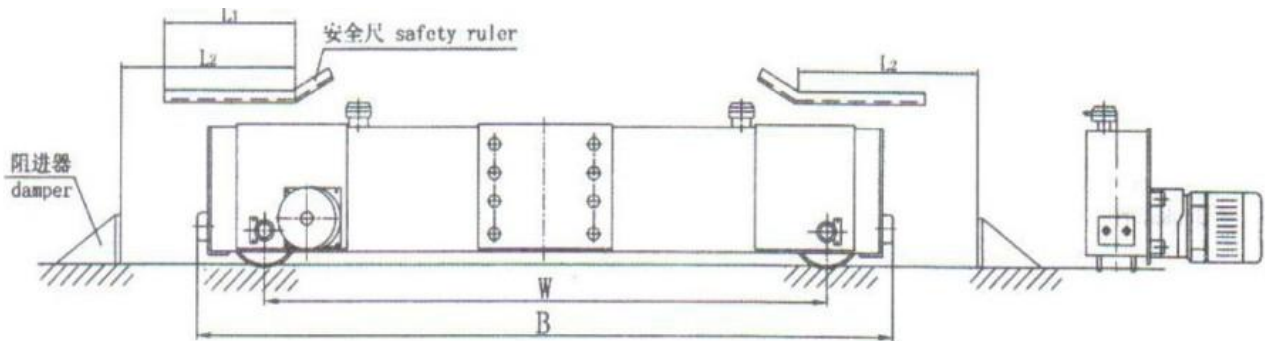


图 8 阻进器和安全尺 damper and safety ruler

Crane with Cab control, there are electric chain protection device at door of Cab and door from Cab to loading bridge. When any one of doors is open the switch contact is also open, at this time, the crane cut off the power source and stop.

(2)司机室内设有电铃或警报器

There are electric bell or siren in Cab

(3)当采用联动控制台时，零挡位明显且备有零位自锁，其手柄的操纵方向与起重机和小车的运行方向一致。

When adopt linkage control operation, position of zero is obvious. Its operation direction of handle is the same as crane and trolley run direction.

5.运行极限限制器 Run limit limiter

运行极限位置限制器是由行程开关与安全尺组成(见图 8),行程限位开关安装在起重机上(大车行程开关安装在端梁上),安全尺则安装在承轨梁(主梁)或墙壁上且不妨碍起重机运行。当起重机运行到离轨道端部止档一定距离时,如果因某种原因没有断电制动,则安全尺碰上行程开关的触头,起重机会自行断电制动。

Run limit limiter consists of travel switch and safety ruler (see diagram 8). Travel switch is installed on crane, safety ruler is installed on main beam or wall. When the crane travels at some distance from backstop of the end of rail, the ruler will be up against contact of travel switch and the crane will cut off power source automatically if the crane does not cut off power source for some reason.

运行极限位置限制器是保证起重机安全运行的重要装置，不得自行拆除，必须保持其动作灵敏可靠。

Run limit limiter is an important device assuring safety traffic of crane. It is forbidden to dismantle at random and should keep action flexible and reliable.

表 2 安全尺寸表 safety ruler dimension table

操纵型式 operation typo	地面操纵 Ground control								司机室操纵 Cab control			
V 运行 Traveling(m/min)	20				30				45 60 75			
W(mra)	2000	2500	3000	3500	2000	2500	3000	3500	2000	2500	3000	3500
B(mm)	2500	3000	3500	4000	2500	3000	3500	4000	2500	3000	3500	4000
L1	350	350	350	350	500	500	500	500	1200	1200	1200	1200
L2	900	900	900	900	1050	1050	1050	1050	1750	1750	1750	1750

6. 电动机安全保护 Safety protection of motor

起重机的起升、运行电动机是采用带有法兰盘的鼠笼式全封闭电动机，大车运行电动机多数也采用鼠笼式电动机，在运行速度大于 45m/min 时，选用绕线式电动机。通过按动按钮开关，使接触器的触点接通或切断电动机的电源。其主回路与控制回路电气元件少，线路简单，使用和维护也简单方便。操纵按钮开关具有机械连锁保护，保证按动起升时，不能按动下降开关，而控制回路的接线也有电气连锁，即保证不能同时接通上升和下降。由于有这样的连锁保护措施，电动机只能接通一个方向的旋转，从而是安全的。

The lifting motor, traveling motor adopt squirrel cage whole sealing motor. Crane traveling motors also adopt squirrel cage motor. Only if the run speed is more than 45m / min, we can adopt winding thread type. The electric contacts put through or cut off the power source through pressing buttons. Operation button switch has mechanism chain protection to ensure that when press rising button, falling button is forbidden. And control circuit also has electric chain assuring that cannot put through rising and falling. Because of this kind of protection method, motor can only put through only one direction rotation, it is very safe.

7. 失压保护 No-voltage protection

起重机所使用的电动机均不能在电源电压低于额定电压值的 90% 以下使用。因电动机的转矩与电压的平方成正比，当电压稍有下降，则转矩就降低很多。如果负载不变，电动机即是在超负荷情况下运转，时间一长有可能烧坏电动机。因此电动机电源的接通与切断都要通过接触器来实现。接触器具有失压保护的作用，当遇有停电或电压过低时，接触器铁芯磁力过小，接触器合不上闸（或掉闸），从而达到自动停车。当电源电压恢复正常时，电动机不能自行启动，仍需按动按钮开关使接触器触点闭合才能启动电机。接触器的失压保护作用可防止意外事故的发生。

All the motors of crane cannot be used below 90% of rating voltage. Torque of motor is proportional

to square of voltage, so when voltage falls slightly, torque fall a great many. If the load is constant, motor runs under the condition of overloading and can be ruined for the long time. So to put through or cut off power source of motor all should be through connection. Connection has no voltage protection function. And its function can avoid occurrence of accident.

8.错相保护 Alternate phase protection

根据用户要求，为了避免电动葫芦因维修后重新接线时错相相接，发生意外和事故，而增加了综合保护器，提示重新改变相序。

According to the ropuirment of user, to avoid wrong phase to connect, add electromotor protector to prompt to change phase sequence.

9.紧急断电保护（紧急开关） Emergent power off protection

起重机紧急断电保护，是利用装设在司机室内操作位置方便的紧急开关来实现的。其作用主要是在事故发生或紧急情况下用来切断连锁保护电路，因此不允许用紧急开关代替正常操作和断电开关使用。

Emergent power off protection is realized through emergent switch installed in operation room. Its function is to cut. off circuit at emergency, so it is forbidden using emergent switch instead of normal operation and power off switch.

10.过电流保护和零位保护 Over current protection and zero position protection

过电流保护中包括短路和过载保护，主要采用自动开关和电磁式过电流继电器动作等保护形式。零位保护是指空操起重机各控制手柄不在零位时，各电动机均不能开始工作。

Over current protection consists of short circuit and overload protection, mainly adopts protection type such as fuse and electromagnetic ralay. Zero position protection is referred that every handle is not at. zero position;every motor does not start to work.

十、起重机的检修与维护 Examination and maintenance of crane

为了保证起重机能安全、可靠、正常使用，就必须合理地使用和及时的进行检修、维护和保养，才能达到延长零部件、元器件及起重机的使用寿命，为此应坚持日检、月检和年检的三检制度，使起重机始终保持完好状态。

To ensure that the crane can be used safely and reliably, appropriate use and well-timed maintenance is requisite. So stick to three check system including daily check, monthly check and annual check to keep good order.

1. 日检 Daily check

单梁起重机的特点是很少为同一人整天操作使用（尤其是地操起重机），几个作业人员交替操作使用的情况很多，为此应对每台起重机记出各自的现场负责人进行日常检查。日常检查是在每日开始工作之前，现场负责人应做空车运转并确认以下事项：

The characteristic of single beam crane is that it is rarely operated by same people all day, but some people operate it alternately, so assign someone in charge of respective locale for each crane to execute daily check is essential. The people in charge of local should operate the crane with no load and affirm the following:

(1) 地面操作的起重机，为了安全运转，应注意确认操作者步行范围内有无障碍物，确认步行的安全。

For ground control crane, check whether there are obstacles within walking distance of operator to affirm safety of walking.

(2) 由地面观察运行轨道是否有异常。

Observe whether the rail has abnormal phenomena from ground.

(3) 按动手电门按钮，检查起重机各动作是否与操作按钮所示动作方向一致。

Press the pendant control button: check whether each action of crane is the same as the direction of operation button.

(4) 检查制动器的动作是否灵敏、安全可靠。

Check whether the arrester action is flexible, safe and reliable.

(5) 检查起升限位开关能否准确限位。

Check whether the lifting limit, switch can limit the position accurately.

(6) 检查起重机有无异常声响和振动。

Do examine whether there are abnormal noise and unusual libration.

(7) 检查吊钩、滑轮能否灵敏地回转，有无缺油现象，吊钩螺母防松装置有无异常。

Do examine whether there are abnormal phenomena like lacking of oil, acting inflexibly and loosening of bolts.

(8) 检查钢丝绳是否正确地缠绕在卷筒上，有无跳槽和乱绳缠绕，有无从滑轮槽内脱落。

Check whether the wire rope winding on the winding drum correctly.

(9) 检查钢丝绳上是否缺油。

Check whether the steel wire rope lacks of oil.

(10) 检查吊装吊具有无异常。

Do examine load lifting device whether there are abnormal phenomena.

2.月检 Monthly check

月检是由工程技术人员和专职负责安全技术人员，根据使用者提供的情况进行检查，检查记录应予以存档。在月检中主要是依靠目测、听觉和手感等直观方法进行检查。因此在检查中必须取下外罩检查，随时确定安全程度、磨损状况和运转状态，确定进行必要的检修、维护和保养。月检项目与内容见表 6。检查内容的分类要求如下：

Monthly check mainly is that engineer and technicians check crane according to the information supplied by operator and keep in the archives. Monthly check mainly depends on range estimation, sense of hearing and hand feeling etc, to keep a view method to carry on a check. Therefore dismantle the outside cover to check, make sure the safe degree and wear away condition and run appearance at any time to assure essential maintenance is inevitable. See table 6 for the monthly check item and contents. The classification of check content is as follows:

A 类：是与保证起重机安全可靠性的项目，是月检中的重点检查内容，每个月必须至少检查一次。

Type A: The item relevant to assuring the safety and reliability of crane is one of essential check content. Check once a month at least.

B 类：是与保证起重机能无故障正常运转使用的重点检查项目，主要是机械、电气方面重点维护内容，可以每三个检查一次。

Type B: The essential check item relevant to assuring that the crane can run orderly mainly includes mechanism examination and electric aspect. Check once every three months.

C 类：是与起重机各部分磨损破坏有关的一般检查项目，可以每六个月检查一次。

Type C: General check item relevant to each wearing part can be check once every six months.

表 6 月检项目与内容 Table 6 Items, contents for monthly check

序号 No.	分类 Class	月检项目 Ttem	月检内容 4要求 Content and requirement
1	B	起升异常检查 Lifting ahnormity inspection	在满载起升时，目测主梁或吊载是否有异常振动，倾听各机构是否有异常声响，在可能时手触各齿轮箱、电机是否有异常发热，分析这些异常的原因，并排除这些异常现象。 Observe whether main beam or loading has abnormal librations and hear whether there are abnormal sounds of each mechanism. If possible touch each gear box with hand to check whether the motor si heating. Analyze the reason and remove the abnormal phenomena.
2	B	下降下滑检查 Descending inspection	满载下降中停车，如果下滑量过大，应及时调整起升制动器间隙，直至刹车正常 Stop when descend with full load. If the slide-down distance is loo large, adjust the clearance of lifting brake until it brakes normally.
3	A	小车运行检查 Trolley traveling inspection	观察葫芦运行小车是否爬坡吃力、运行打滑、车轮悬空、啃轨、轮缘爬轨等现象。如有上述现象，应检查主梁是否刚性太差，轨道而上是否有油污，运行小车制造装配精度是否太差等。 Observe whether electric hoist climb incline difficultly,skid,wheel hung in the air and so on. If there are above phenomena, check whether the rigidity of main beam is too bad and whether there is oil on the surface of track and so on.
4	A	大车起、制动检查 Startand stop of crane inspection	检查起重机在起、制动时，是否有明显的不同步现象，如果有应及时调整大车运行制动间隙，最好由同一人调整分别驱动的两个 制动器。 Check crane whether there is obviously absent of synchronism. If has, adjust the brake clearance on time and it is better to adiust the two separated drive brake by same people.
5	A	起重机运行中的检查 Traveling of crane inspection	察看起重机作运行中是否有异常蛇形、扭动、侧向滑移、歪斜跑偏、啃道、异常声响等现象，做好标记,查找原因。 Check crane whether there are such phenomena like twist., slippage, abnormal sound. Mark correctly and find out the reason
6	B	起重机运行中的刹车检查 Brake inspection	检查运行制动器刹车动作是否灵敏，是否有刹不住车滑行距离太大的现象。 Check whether the traveling brake acts flexibly and whether there is unreliable brake or the slide-down distance is too long.
7	B	检查起重机车轮的着力情况 Wheel under pressure inspection	检查起重机的四个车轮中是否有悬空现象，运行中是否有个别车轮似转非转，出现“三条腿”现象。 Check four wheels of crane whether there is phenomenon1 ike hovering and whether there is only three legs.
8	B	渗漏检查 Leaking inspection	检查起升减速器、大小车运行减速器是否有渗、漏油现象。 Check lifting reduce and traveling reducers whether there are phenomena like leaking of oil.
9	A	检查整机绝缘性能 Insulation performance of complete machine inspection	用500V兆欧表分别检查各机构主回路、控制回路(低压控制除外)对地的绝缘电阻在一般环境中 $\geq 0.8M\Omega$ ，在潮湿环境中 $\geq 0.4M\Omega$ 。 Check main circuit and control circuit separately with 500V mogohmmeter. Insulated resistor of circuit is more than 0. 8MQ. It should be more than 0.4 MQ in moist circumstance.

10	C	整机性能 Complete machinoper for mance	表面外观检查 Appearance inspection	检查起重机各部分表面是否有锈蚀、脱漆、损伤等缺陷。 Check each surface of crane whether there are phenomena like tarnishing, depainting or damage.
11	A	运行机构 Traveling mechanism	运行止档(阻进器)检查 Travel stop-gear inspect in	运行止档是否有变形、损伤、脱落的危险，采用螺栓固定时，螺栓是否有松动，采用焊接固定时，焊缝是否有开裂。 Check whether travel stop-gear has deformation or damage, whether joint bolt is tight and whether the welding line has
12	C		轨道安装检查 Rail installation inspection	检查轨道接缝处是否有变形，固定螺栓是否有松动，轨道是否有侧向移动，焊缝是否有龟裂，垫板、连接板是否有松动。 Check seaming of rail whether there is deformationf whether fixed bolts have been loosened, rail has moved side and tie
13	C		轨道磨损检查 Wear and tear of rail inspection	运行轨道踏面和侧面，工字钢轨道翼缘踏面和翼缘端部是否有局部严重磨损或出现剥落和变形现象。 Check whether thread and end of flange of I style rail has severe wearand tear,flaking ordeforraation.
14	c	上梁及端梁 Main beam and end carriage	主、端梁焊缝检查 Welding line of main beam and end carriage inspection	检查主梁、端梁上的焊缝是否有裂纹 Check whether there are crackles of welding line of main beam or end carriage.
15	c		主梁磨损与变形检查 Wear and tear and deformation of main beam inspection	检查主梁工字钢轨道翼缘踏面和侧面始否有严重磨损，翼缘是否有塑性变形（翼缘下塌）。 Check whether thread and end of flange of I style rail has severe wear and tear and whether flange has plastic deformation.
16	c		主、端梁连接检合 Connection of main beam and end carriage inspection	主、端梁之间采用螺栓连接时，检查螺栓是否有松动。 Check whether bolts have been loosened when main beam and end carriage adopt bolts to connect..
17	c		主梁上轨道检查 Rail of main beam inspection	主梁上采用支承形轨道时，检查轨道是否有异常弯曲变形，轨道压板、连接螺栓是否有松动，焊缝是否有裂纹。 When main beam adopts supporting type rail, check whether there is abnormal deformation, whether joint bolts has been loosened and sealing has crackles.
18	B		检查主梁上运行止档 Stop-gear on the main beam inspection	检查主梁上的小车运行止档是否出现变形、损伤、脱落危险，连接螺栓是否有松动，焊缝是否有裂纹。 Check whether the trolley stop-gear of main beam has deformation or damage, whether joint bolt is tight and whether the welding line has slight crackle.
19	c	检查主、端梁上的缓冲器 Buffer of main beam and end carriage inspection	安装在主梁止档上和端梁端部上的抗撞击的缓冲器，连接螺栓不得有松动，缓冲器不得有龟裂、破损、裂纹等。 Joint bolts of knocking protection buffer that installs on stop-gear of main beam and end of end carriage should not has been loosened and crackles of buffer are not allowed.	

20	B	电动机 Motor	电动机发热检查 Motor heating inspection	检查起升、运行电动机是否有发热现象，如有应分析原因，是超载过多还是电压降过大，或者是制动过于频繁，制动器间隙太小、制动轮与制动环之间有摩擦等。 Check whether the motor has heating phenomenon. If there is such phenomenon, analyze the reason as that it is overloading, the voltage is too low or to brake too often and so on.
21	B		电动机异常检查 Motor abnormality inspection	检查起升、运行电动机是否起动勉强、噪声太大或有异常声响，此时应分析是否超载过多，电源电压过低，制动器未完全脱开或是电源线有虚接、断线等原因。 The start of motor should not be too grudging. Too noisy and abnormal sounds are forbidden. If there are above phenomena, analyze the reason as that it is overloading, the voltage is too low and so on.
22	C	制动器 Brake	磨损状态检查 Worn condition inspection	对于锥形制动电动机，应打开电机罩检查锥形制动环或平面制动环的磨损状态，可以用手轴向推动风扇轮看窜动量是否过大，窜动量大证明磨损严重，窜动量不得大于4mm，应能将窜动量调整到1.5mm否则应报废更换。 对于平面制动器，当磨损量达到原厚度的50%时应报废更换。 For cone type motor, check worn condition of cone type brake ring and drive fan wheel axially with hand to find whether the running distance is too large. Check the running distance of the main conic motor axis to 1.5mm or it will be replaced. For plane brake, the worn proportions amounting to 50% of original thickness should be rejected.
23	C		刹车性能检查 Brake performance inspection	检查起升制动器在重物下降时是否刹不住车，下滑太大；检查运行机构制动器在运行中是否刹不住车，滑行距离太大。有上述情况时，应及时调整制动器的性能。 Check lifting brake whether there is unreliable brake or the slide-down distance exceeds the specifications; check brake of traveling mechanism whether there is unreliable brake or the slide-down distance exceeds the specifications; If exists above phenomena, adjust the performance of brake.
24	C		异常检查 Abnormity inspection	检查各锥形制动器锁紧螺母是否有松动，如果制动时有尖叫声，应检查制动环或制动片之间是否相对摩擦或接触不良等缺陷。 Check each cone type brake whether the nuts has been loosened. When brake, there is scream, check whether there are defects like relative friction between brake ring and brake piece or bad contact.
25	C	减速器 Reducer	检查齿轮传动的声响 Gear drive sound inspection	检查各机构齿轮传动的声响是否有异常，分析异常声响是否因缺油润滑不良、齿轮轴承磨损严重、齿面有磕碰损伤或齿轮加工和装配精度不良造成的。 Check whether gear drive sound is abnormal and analyze the reasons that lie in bad lubrication or severe wear and so on.
26	C		异常检查 Abnormity inspection	检查各减速器连接和固定螺栓是否有松动，是否有漏油现象。 Check whether each reducer connection and fixed bolts has been loosened and whether there is a phenomenon like leaking of oil

27	C	卷筒装置、 钢丝绳 Winding drum steel wire rope	磨损状态检查 Worn condition inspection	检查卷筒绳槽足否有异常磨损 Check whether there is wear and tear of rove groove of winding drum
28	C		卷筒外壳检查 Shell of winding drum inspection	检查卷筒外壳是否有损伤(当起升限位器失灵最易造成吊钩滑轮顶伤外壳) Check shell of winding drum whether there is damage.
29	C		导绳器检查 Rope guider inspection	检查导绳器是否有破裂,空钩下降时钢丝绳能否顺利地由导绳器出绳口排出 Check whether the wire rope has breach and whether the steel wire rope can successfully be ejected from rope guide when empty hook is descending.
30	C		异常检查 Abnormity inspection	检查卷筒上压绳板是否松动,卷筒连接螺栓、导绳器连接螺栓是否松动,导绳器的导向滑块移动是否顺利。 Check whether the plywood and joint bolts of winding drum and joint bolts of rope guide have been loosened and whether the slipper of rope guide moves successfully.
31	A		断丝检查 Broken wires inspection	检查钢丝绳是否有断丝现象,当在一个导程之内断丝数超过钢丝总数应报废 Check steel wire rope whether there is phenomenon like broken wires. When the numbers of broken wires are more than total numbers of steel wires, the steel wire rope should be rejected.
32	A		磨损状态检查 Worn condition inspection	钢丝绳磨损后的直径减少量不得超过公称直径的7%,否则应报废。 The diameter of the wire rope wear after reduction shall not exceed 7% of the nominal diameter, otherwise should be scrapped.
33	A		变形检查 Deformation inspection	因斜吊造成的挤伤变形或扭结的钢丝绳应报废 Steel wire rope distorted or twisted because of lifting slant should be rejected.
34	B		腐蚀检查 Corrosion inspection	检查钢丝外表不得有锈蚀现象,外表皮有定量的润滑油,但不得有过多的污物。 Surface of steel wire should not have tarnishing phenomenon and should be covered with lubricant oil but not too much dirt.
35	B		空中打花 Twist in the air	察看钢丝绳在空中是否有打花现象(尤其是四绳以上者),其主要是由于缠绳时钢丝绳未能在放松状态进行造成的。 Observe whether wire rope has been twisted, because the steel wire-rope has not been slackened when binding the rope.
36	A		异常检查 Abnormity inspection	对钢丝绳工作的重要部位和安全环节必须做到经常检查,如钢丝绳的各固定部位是否有松动的危险,与滑轮平衡轮接触部位不得有缺油、啃绳、脱槽等故障。 Check critical area and safety circulation of steel wire rope frequently such as loosened dangerous of each fixed part of

37	A	吊钩与滑 轮 Hook and block	裂纹检查 Crackles inspection	吊钩、滑轮和滑轮外壳均不得存在有害的裂纹。 There should be no harmful crackles of hook, block or shell of block.
38	A		磨损状态检 查 Worn condition	吊钩钩口及滑轮槽均不得有异常的磨损。 There should not be unusual wear and tear of mouth of hook or block groove.
39	A		异常检查 Abnormity inspection	检查滑轮是否有破损,出钩螺母是否锁紧,外壳连接螺栓和档轴板固定螺栓是否松动等。 Check whether the block has damage, bolts of hook are tight and the joint bolts are loosened.
40	A		变形检查 Deformation inspection	吊钩钩口不得有异常变形。 Mouth of hook should not have abnormal deformation.
41	C		回转检查 Rotation inspection	检查滑轮能否灵活转动。 Check whether the block can rotate flexibly.
42	C	车轮 Wheel	磨损检查 Worn condition	车轮踏面及轮缘内侧表面均不得有异常磨损。 Abnormal wear and tear of wheel thread and inside surface of wheel rim are not allowed.
43	c		裂纹检查 Crackles inspection	车轮表面不得出现异常裂纹。 Unusual crackles are not allowed on surface of wheel.
44	c	司机室 Operation room	固定状态检 查 Fixed condition inspection	检查司机室固定连接螺栓是否松动,焊接连接的焊缝是否有裂纹 Check whether the joint bolts of Cab have been loosened and welding line have crackles.
45	c		工作固定状 态 Fixed condition of working	通风、照明、取暖等是否正常合理,司机室是否晃动严重等 Check whether aeration, illumination or warming is reasonable and Cab shakes severely.
46	B	电源引入 装置 Power source device	馈电裸滑线 安全检查 Bare slide- wire safety inspection	检查馈电裸滑线与周围设备的安全距离是否符合有关规定要求,是否有相应的安全保护措施 Check whether the distance between bare wire and other devices around is according with the relevant regulation requirement, and whether there is relevant safety protection measure.
47	B		滑触面检查 Surface of slide-wire inspection	检查滑触线的滑触面是否有腐蚀、锈蚀缺陷,应及时用钢刷、砂纸打磨,以保证导电性能。 Check whether there are defects like corrosion; burnish it with steel brush or sand paper to guarantee the electrical conductivity.
48	B		绝缘装置检 查 Insulation device inspection	滑线的支承绝缘子不得有破损,连接部位不得有松动。 Damage of supporting insulator of slide wire is not allowed and connection part should not be loosened.
49	C		软缆引入装 置检查 Cable introducing device inspection	当采用软缆引入装置时,应检查支承软缆的拉紧钢丝绳的磨损状态和张紧状态。 Check the worn state and tight state of strained steel wire rope supporting cable when adopts cable introducing device.
50	C		滑触线安全 标志检查 Slide wire safety mark inspection	检查电源滑触线在非导电侧接触面是否涂有安全标记,在适当位置是否安装有安全标志,是否安装表示带电的指示灯。 Check whether there is safety mark on non-conductor side connection surface of slide-wire and whether there is indicator light with electricity.

51	C	集电器 Current collector	磨损状态检查 Worn condition inspection	检查集电器滑轮、销轴或吊线环不得有异常磨损。 The unusual wear and tear of block of current collector, pins or bridle ring is forbidden.
52	C		固定状态检查 Fixed state inspection	集电器与电缆的连接螺栓不得松动，集电器的绝缘体固定应安全可靠。 Joint bolts of current collector and cable should not be loosened and insulation of current collector should be fixed safely and reliably.
53	B		集电滑轮回转状态检查 Block turning state inspection of current collector	集电器滑轮应能灵活而平稳的回转，如有摩擦声响或回转困难应及时注油润滑。 Block of current collector should turn flexibly and smoothly. Inject lubricant oil if there is fricative sound or it turns difficultly.
54	C		集电器弹簧检查 Spring of current collector inspection	集电器的弹簧不得因生锈或疲劳而丧失弹力。 Spring of current collector should not lack bounce because of rusting or fatiguing.
55	B	机内接线 Wiring	机内接线外表检查 Wiring surface inspection	机内接线包括橡胶软缆和电线配线，不得有外伤。 Wiring includes rubber cable and electrical wire. Outer damage is forbidden.
56	C		固定连接检查 Fixed Connection inspection	所有电器固定连接螺栓、机内配线固定连接螺钉不得有松动，配线管在机体上的固定要牢固。 All joint bolts should be tight.
57	B		软缆移动检查 Cable remove inspection	检查软缆在移动中是否打异常弯曲和扭转。 Check whether there are draw backs like unusual bending or trauma in cables.
58	B	电磁接触器 Rheostat	触点及铁芯检查 Contact and slug inspection	打开电磁开关箱，察看触点和铁芯是否行异常磨损、损伤，铁芯端面是否平整清洁。 Open up the electro magnetism and observe whether contact and slug have abnormal wear and tear and the end surface of slug is smooth and clean.
59	C		配线固定检查 Wiring fixed state inspection	检查各配线固定螺钉是否松动。 Check whether each wiring fixed bolt is loosened.
60	A		接触器动作检查 Connection action inspection	动作座灵敏可靠、触点接触紧密、无粘连、卡阻故障 The act should be flexible and reliable and contact should be tight without block and adhesion.
61	A	手电门 Pendant control	外观检查 Appearance inspection	按钮标志应明显，手电门开关盒无外伤。 Button mark should be obviotis and there is no damage out of the pendant switch.
62	A		故障异常检查 Troubles abnormity inspection	手电门悬挂软缆下端连接部位附近不得出现破损，联锁应无故障，内部绝缘应安全可靠，不得有断线等故障。 Connection part between pendant control and end of cable should not have damage and there should not have trouble like broken wire.

63	A	起升限位 开关 Limit switch	动作检查 Action inspection	检查起升限位开关动作是否灵敏安全可靠。 Check whether the lifting position-limiter act flexibly, safely and reliably.
64	B		触点检查 Contact inspection	检查开关的触点是否有损伤和磨损状况，损伤、磨损严重时应及时更换，以保证安全使用。 Check whether the contact of switch has damages or worn condition. When damage is very severe, replace it on time.
65	C		配线固定检查 Wiring fixed state inspection	检查接线固定连接螺钉是否有松动。 Check whether the wiring fixed, joint bolts has been loosen.
66	A		限位位置检查 Spacing position inspection	吊钩滑轮组起升至上极限位置，起升限位开关应能立即动作，此时吊钩滑轮组最高点距卷筒最低点应保证有50mm以上距离。 Lifting position-limiter switch can stop action immediately when hook block group ascend to the limited position. The distance from highest position of hook block group to lowest position of winding drum should be more than 50mm.

3.年检 Annual examination

年检是由专业维护人员或起重机保全工以年为周期的定期检查与维护，在日检和月检维护的基础上，根据起重机故障的具体情况，酌情自行确定年检周期为一年或两年。年检的部分项目要求会与月检相同，但年检绝不同于日检和月检只是外观检查和观察，年检是一次全面性检查、试车，对主要机械部分要进行拆检，对出现有较严重的磨损、变形要进行具体检测，对于达到报废标准或预计到下一次年检日期有可能达到报废使用极限危险的部分必须及时更换或修理，同时做好必要的维护。

Annual examination mainly is that professional attendant, check crane annually on basis of daily check and monthly check. Part requirement of annual examination is the same as monthly check. But annual examination is different from monthly check that only check and observe the appearance of crane. It is a general check that needs to check severe wear and tear and deformation concretely. For the crane amounting to rejection standard, replace or repair it timely.

年检的具体检查项目见表 7。

Item of annual examination to see table 7.

检查项目 Items			检修标准 Requirements
运行 轨道 Crane rail	运行 轨道 状态 Traveling rail condition	1	轨道踏面清洁状态 Clearance state of rail thread 不得积聚灰尘、铁屑，也不得附着油污和污水。 No attached greasy dirt or amount of dirt.
		2	轨道跨度检测 Rail span inspection 支承形轨道 Bearing type rail; $S \leq 10m, \Delta S = \pm 3mm$ $S > 10m, \Delta S = \pm [3 + 0.1(S - 10)]mm$ 注：S-跨度， ΔS -跨度公差 Note: S-span, ΔS -tolerance of span
		3	轨道倾斜度 Rail inclination $\leq 1/10000$

运行轨道 Traveling rail	运行轨道状态 Traveling rail condition	4	同一截面两轨道标高差 Difference of two rails elevation of same section	$\leq S/10000$
		5	同一侧轨道支承点标高差 Difference of same side rail bearing elevation	$\leq 1/1000(1\text{-支承点间距 Bearing point spacing})$
		6	轨道接缝间距 Rail juncture distance	$\leq 2\text{mm}$
		7	轨道接缝错位 Rail juncture displacement	踏面上下、左右相错 $\leq 1\text{mm}$
		8	轨道裂纹与变形检查 Crackles and deformation of rail inspection	不得有裂纹与变形(塑性)。Crackles and plastic deformation are not allowed.
		9	轨道踏面疲劳检查 Rail that makes contact with the road inspection	轨道踏面不得有剥落、疲劳破坏。Rail that makes contact with the road should not flake and should not have fatigued damage.
		10	轨道磨损 wear and tear of rail	支承形轨道，磨损量 \leq 原尺寸10% Worn proportions of bearing rail is no more than 10% of original dimension.
		11	轨道固定安装检查 Fixed installation of rail inspection	螺栓不得有松动，焊缝不得有裂纹。Joint bolt should be tight and defects like crackles in welding line are forbidden.
起重桥架 Crane bridge	主梁 Main beam	12	主梁外观质量检查 Appearance quality of main beam inspection	不得有外伤和异常变形；锈蚀量 \leq 原板材厚度的10%；涂漆层不得有剥落。Damage or unusual deformation is not allowed; the corrosion proportions should be not more than 10% of original dimension.
		13	焊缝质量检查 Welding line quality inspection	焊缝不得有裂纹。Defects like crackles in welding line are forbidden.
		14	主梁跨中上拱度检查 Tip-tilted angle of main beam inspection	$\Delta F=(1/1000-1.4/1000)S$
		15	主梁旁弯检查 Bending of main beam inspection	Bending value旁弯值 $\Delta F_p\leq S/2000$
		16	葫芦运行轨道的磨损状态检查 Worn condition inspection of electric hoist traveling rail	对于工字钢轨道，踏面磨损量不大于原尺寸的10%，宽度磨损量不大于原尺寸的5%。Worn thread proportions should be no greater than 10%, and the worn width proportions should be greater than 5% for I style rail
	17	工字钢轨道翼缘局部弯曲变形 Deformation of I style steel flange	工字钢承载翼缘不得有明显的下塌变形(塑性变形)。Flange of I style steel should not have obvious plastic deformation.	
	端梁 End carriage	18	端梁外观质量检查 Appearance quality inspection of end carriage	不得有外伤和异常变形；锈蚀量 \leq 原板材厚度的10%；涂漆层不得有剥落。Damage or unusual deformation is not allowed; the corrosion proportions should be not more than 10% of original dimension:coat of paint should not flake.
19		焊缝质量检查 Welding line quality inspection	焊缝不得有裂纹。Defects like crackles in welding line are forbiddent.	

起重 机桥 架 Crane bridge	端梁 End carriage	20	轮距偏差 The deviation degree of wheel distance	$K \leq 3m, \Delta K = \pm 3mm$ $K > 3m, \Delta K = \pm K/1000mm$ 注: K-轮距, ΔK -轮距偏差。 Note: K-wheel base, ΔK -Wheelbase deviation	
		21	运行电动机检查 Traveling motor inspection	电动机启动不得勉强、噪声过大或有异常声响。 The start of motor should not be too grudging. Too noisy and abnormal sound are forbidden.	
	运行 机构 Traveling mechanism		22	运行制动器检查 Traveling brake inspection	制动器应安全、可靠、灵敏。 Brake should be safe, reliable and nexible. 当气制动器零部件出现下列情况应报废更换: Reject when any of the following has occurred: 裂纹; crackles 制动环或制动片等材料磨损量达原厚度的 50%; The worn proportions of brake ring amounts to 50% of original thickness. 弹簧出现塑性变形; The spring appears plastic deformation. 小轴或轴孔立径磨损达原直径的5 %时。 The worn proportions of shaft hole diameter amounts to 5% of original diameter.
			23	运行减速器安装 Installation of traveling reducer	固定连接螺栓不得有松动。 Joint bolt should he tight.
			24	运行减速器外观 Appearance of traveling reducer	外壳不得有外伤、破损。 The shell should be no damage.
			25	运行传动齿轮质量检查 Gear quality inspection	检查齿轮出现下列情况之一时应报废: Reject when any of the following has occurred: 齿轮出现裂纹; There have been crackles on the gear teeth. 齿轮出现断齿; The gear teeth have broken; 齿面点蚀损坏达啮合面的30%,且深度达原齿厚 的 10%; The corrosive-pitting surface amount to 30% of the mating surface and the depth amounts to 10% of the ongin. 起升第一级啮合齿轮厚磨损达原齿厚的10%,其 它级啮合齿轮齿厚磨损达原齿厚的20%, 开式 齿轮达30%。 The permitted worn proportion of first.-level gear amounts to 10%of the origin, and others amounts to 20%. The exposed gear amounts to 30%.
			26	运行减速器密封检查 Traveling reducer sealing inspectin	不得有渗、漏油现象。 Leaking of oil is forbidden.
			27	键联接检查 Key connection inspection	键及键槽不得有松动、变形。 Any loosening, distortion or unusual wear are all banned to the connection between key and keyslot.
			28	轴的磨损状态 Worn condition of shaft	磨损量 \leq 原轴颈的2%。 The worn proportion should be less than 2% of the original shaft journal.

起重 机桥 架 Crane bridge	运行 机构 Traveling mechanism	29	轴承的检查 Bearing inspection	是否涂有油脂；不得有破损、损伤；安装不得有松动。Check whether there is oil grease. Damage is not allowed.
		30	油封的检查 Oil-tight devices inspection	不得有老化变质；与轴或孔的接触面不得有有害的损伤。Aging and metamorphosis are forbidden; seamless on the matching surfaces are forbidden.
		31	车轮表面质量检查 Surface of wheel quality inspection	出现下列情况之一时报废： Reject when any of the following has occurred： 轮缘厚度磨损达原厚度的50%； The worn wheel rim thickness amounts to 50% of the original thickness. 踏面厚度磨损达原厚度的15%； Wheel thread thickness proportions amounts to 15% of original thickness.
		32	两侧车轮直径差 Difference of two side wheels diameters	踏面直径差≤1%。 Diameter difference of wheel thread is no more than 1%.
		33	车轮轴的磨损状态 Worn condition of wheel shaft	磨损量≤原轴颈的2%。 The worn proportion should be less than 2% of the original shaft journal.
		34	轴承检查 Bearing inspection	不得有破损或裂纹。 There should be no damage or crackle.
	桥架 Bridge	35	跨度偏差 ΔS The deviation degree of span ΔS	$S \leq 10m, \Delta S = \pm 2mm$ 。 $S > 10m, \Delta S = \pm [2 + 0.1(S - 10)]mm$, 且 ΔS_{max} 在 $\pm 10mm$
		36	桥架对角线差 Diagonal difference of loading bridge	$K \leq 3m, S_1 - S_2 \leq 5mm$, $K > 3m, S_1 - S_2 \leq 6mm$, (S_1, S_2 -对角车轮距离 Diagonal wheel distance)
		37	车轮着力点高度差 Height difference of wheel forced on	$S < 10m, \Delta h = \pm 2-5mm$ $10 < S \leq 15m, \Delta h = \pm 3.5mm$ $15 < S \leq 20m, \Delta h = \pm 4.5mm$ $20 < S \leq 25m, \Delta h = \pm 5.5mm$
	电动 葫芦 Electric Hoist	电机 Motor	38	电动机温升检查 The rising temperature of motor inspection
39			电动机异常检查 Abnormity inspection of motor	检查电动机是否有启动勉强或有异常声响。 Check whether the motor starts grudgingly or whether there is abnormal sound.
制动 器 Brake		40	制动性能检查 Brake performance inspection	制动性能应安全可靠、刹车灵敏。 Brake performance should be safe and reliable and act flexibly.
		41	制动器零件质量检查 Component of brake quality inspection	制动器出现下列情况之一应报废： Reject, when any of the following has occurred： 制或制动片等材料磨损达原厚度的50%； Worn proportions of brake ring amounts to 50% of original thickness. 弹簧出现塑性变形；The spring has plastic deformation. 小轴或轴孔直径磨损达原直径的5%时。Worn proportions of axis hole diameter amounts to 5% of original diameter.

电动葫芦 Electric Hoist	减速器 Reducer	42	安装状态检查 Installation state inspection	连接螺栓不得有松动。 Joint bolt should be tight
		43	减速器外观检查 Apperance inspection of reducer	不得有破损缺陷。 The defect like damage is not allowed.
		44	密封质量检查 Sealing quality inspection	不得有渗、漏油现象。 Leaking of oil is forbidden.
		45	异常检查 Abnormity inspection	不得有异常声响,异常发热。Abnormal sound and abnormal heating are forbidden.
		46	齿轮质量检查 Gear quality inspection	检查齿轮出现下列情况之一时应报废: Reject when any of the following has occurred: 齿轮出现裂纹; There have been crackles on the gear teeth. 齿轮出现断齿; The gear teeth have broken. 齿面点蚀损坏达啮合面的30%,且深度达原齿厚的10%; The corrosive-pitting surface amount to 30% of the mating surface and the depth amounts to 10% of the origin. 起升第一级啮合齿轮齿厚磨损达原齿厚的10%,其它级啮合齿轮齿厚磨损达原齿厚的20%,开式说齿轮达30%。 The permitted worn proportion of first-level gear amounts to 10%of the origin, and others amounts to 20%. The exposed gear amounts to 30%.
	47	减速器其它零件检查 Reducer inspection	键联接不得松动、变形; Any loosening, distortion or unusual wear are all banned to the connection between key and key slot. 齿轮轴的磨损量 ≤原轴颈的1%; The worn proportion of gear shaft, should be less than 1 % the original shaft journal. 其它轴的磨损量≤原轴颈的2%; The worn proportion of other shafts should be less than 2% the original shaft neck. 轴承不得裂纹和破损: Bearing are forbidden to have damage or crackles. 油封不得老化变质,与轴孔的接触面不得有有害的损伤。Aging and metantionihosis are forbidden; seamless on the matching surfaces are forbidden.	
	卷筒装置 Wire rope drum device	48	钢丝绳尾端固定状态检查 Fixed condition at the end of steel wire rope inspection	卷筒上的钢丝绳尾端压板不得有松动和异常,塞块不得有裂纹和异常。 Pressing plate at the end of steel wire rope should not be loosened.
		49	异绳器工作状态检查 Rope guider working state inspection	当空钩下降时,钢丝绳应能顺利的从导绳器的出绳口排出。The steel wire rode should successfully be let out from rope guide when empty hook is descending:
		50	卷筒报废标准 Winding drum rejection standards	卷筒出现下列情况之一时应报废: Reiect when any or the following has occurred: 裂纹: crackles 筒壁磨损达原壁厚的20%。 Worn prooortion of drum wall amounts to 20% of the original thickness.

电动葫芦 Electric Hoist	滑轮 Pulley sheaves	51	滑轮槽外观检查 Exterior inspection of block groove	滑轮槽应光洁平滑，不得有损伤钢丝绳的缺陷。 Block groove should be smooth and there should be no limitation
			铸造滑轮报废标准 Block rejection standards	出现下列情况之一时应报废： Reject when any of the following has occurred: 裂纹；crackles 轮槽不均匀磨损达3mm： Uneven wear of block groove amounts to 3mm. 轮槽壁厚磨损达原带厚的20% Wear of groove wall amounts to 20% of the origin. 因磨损使轮槽底部直径减少量达钢丝绳直径的50%； The worn of the bottom of block groove proportion amounts to 50% of the wire-rope diameter. 其它损害钢丝绳的缺陷。 Any defects damage the wire rope
			钢丝绳润滑状态检查 Steel wire-rope lubrication state inspection	钢丝绳应保证良好的润滑状态 Steel wire-rope should keep perfect lubricating state.
	钢丝绳 Wire rope	52	钢丝绳报废标准 Wire-rope rejection standards	见钢丝绳报废标准。其安全程度与报废内容主要有以下几个方面： See wire-rope rejection standards. Its safety degree and rejection contents include several aspects as follows: 断丝的性质和数量； Property and quantity of broken wires 绳端断丝； Broken wires at the end of rope 断丝的局部聚集； Broken wires get together partly 弹性减小； The bounce is reduced. 外部和局部磨损； Exterior and interior wear and tear 外部和内部腐蚀； Exterior and interior corrosion 变形； Deformation 由于热和电弧造成的损坏。 Damage because of heating and arc.
	吊钩 Hook blocks	53	吊钩报废标准 Hook rejection standards	出现下述情况之一应报废： Reject when any of the following has occurred: 裂纹；crackles 危险断面磨损达原尺寸的10%； Wear and tear of dangerous section is more than 10% of original dimension. 开口度比原尺寸增加15%； Open degree is more than 5% of the original dimension. 扭转变形超过10%； Twist-steel-deformation is more than 10% the original dimension. 危险断面或吊钩颈部产生塑性变形。 Dangerous section or neck of hook occurs plastic deformation.

	葫芦运行车轮 Electric hoist traveling wheel	54	葫芦运行小车车轮报废标准 Traveling trolley wheel of electric hoist rejection standards	出现下述情况之一应报废： Reject when any of the following has occurred: 裂纹；crackles 轮缘厚度磨损达原厚度的50%； The worn wheel rim thickness should be no greater than 50% the original thickness； 踏面磨损达原踏面最大直径的5%。 The worn width proportions should be greater than 5% of max diameter of original wheel.
		55	轮缘与工字钢翼缘的间隙极限 Clearance limit between wheel rim and rim of I steel	最大间隙不得大于车轮踏面宽度的50%。 Max clearance should be not more than 50% of the wheel thread width.
电气部分 Electrics	电气部分 Electrics	56	同月检项目 The same as monthly check item	同月检内容要求。 The same as monthly check contents.
	空载试车 Run test with no load	57	空载试运转 Run test with no load	作大车前后运行，小車左右运行、葫芦起升、下降动作，检查是否有异常，动作是否符合按钮标志。 Drive crane to travel forward and backward and electric hoist to go up and down. Check whether there are abnormal phenomena and action is according with button mark.
		58	安全装置检查 Safety device inspection	检查起升限位开关、运行行程开关等安全装置动作是否灵敏、安全可靠。 Check whether lifting limit switch and travel switch act flexibly, safely and reliably.
	负载试车 Run test with load	59	额定负荷试验 rated loading test	主梁垂直下挠不得超过标准中的规定值。 The flexivity of main beam should be no more than regulation of standard.
		60	超载试验 Overloading test	超载25%起吊载荷，卸载后主梁不得有永久变形、裂纹、油漆剥落、松动、损坏等现象。 Add 1.25 times the rated load. When unload, there should be no abnormal phenomena like crackles or permanent distortion.
		61	动载试验 Dynamic loading test	起吊1.1倍额定载荷中，只作起升、下降和大车运行，在规定时间内各机构动作应灵活、平稳可靠、无异常。 Dynamic test should be under condition of crane carrying out with 1.1 times the rated load and each mechanism should act flexibly, smoothly and no abnormal phenomena.