



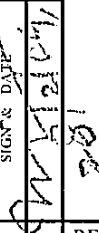



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SUPERSEDES INVENTORY NO.	<p>1.0 SCOPE</p> <p>This specification covers the broad guide lines on design and manufacture of lifting beams. The lifting beam assembly consists of beam of box structure or other suitable structure, slings, hooks, stand for its assembly and other connected parts.</p> <p>2.0 PURPOSE</p> <p>The lifting beam is required for lifting and transportation of Rotors at shop or at site during assembly, erection, and maintenance.</p> <p>3.0 DESIGNATION</p> <p>Lifting beams are to be designed as per rated lifting capacity of the beams based on the maximum weight to be lifted along with appropriate safety margins.</p> <p>4.0 Vendor is fully responsible for making lifting beam functional at site. Incase lifting beam is dispatched to site in disassembled condition; vendor shall be responsible for assembly of lifting beam at site.</p> <p>5.0 APPLICABLE CODE</p> <p>The design, manufacture and testing of the Lifting Beam shall comply with the various requirements of following standards</p> <p>DIN 15018 part I, II & III, DIN 15003</p> <p>IS:5, IS: 800, IS:807, IS:808, IS:1964, IS:2062, IS:2074, IS:2365, IS:2932, IS:3177, IS:3658, IS:3815, IS:3938, IS:5749, IS:8791, IS:11732</p> <p>Important: Lifting beam shall meet all statutory safety requirements like Factories Act 1948 and UP Factories Rules 1950 etc. Vendor shall submit certificates of Proof Load Testing for Lifting Hooks/Bollards, Slings/Links used in place of slings and assembled Lifting Beam from competent authority as specified in Factories Act 1948</p>				
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SUPERSEDES INVENTORY NO	6.0 DESIGN REQUIREMENT			
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	<p>6.1 Lifting bollards / hooks shall be arranged symmetrically about the centre of gravity of the lifting beam, with the loading arrangement to be in all positions, including extreme positions. Each lifting bollard/hook shall have at least 60% load rating of lifting beam.</p> <p>6.2 The solid links/D-Shackle if used in place of slings for suspending Lifting Beam from EOT crane shall be suitable for Ramshorn Hook(As per IS 5749) of EOT of the following capacities.</p> <p>Lifting Beam of 550 kN – Solid link suitable for EOT 160 Tonnes. Lifting Beam of 650 kN – Solid link suitable for EOT 160 Tonnes. Lifting Beam of 1000 kN – Solid link suitable for EOT 160 Tonnes. ② Lifting Beam of 1200 kN – Solid link suitable for EOT 160 Tonnes</p> <p>6.3 The overall height of the beam shall be kept as low as possible.</p> <p>6.4 The loading arrangement on hooks should be able to provide 300 mm height adjustment.</p> <p>6.5 The height adjustment device should be of low friction design, so that one person can operate it with ease. This should also take into account the weight of attached transport sling weighing up to 150 Kg.</p> <p>6.6 The adjustable threads of device for providing vertical movement of the hook shall be secured against being unscrewed to extreme position. The number of load bearing threads shall be designed for maximum load case, required factor of safety and an impact factor of 1.25.</p> <p>6.7 All enclosed spaces in the lifting beam shall be provided with drainage holes of adequate size. ② 2 1200 kN</p> <p>6.8 The lifting beams of 550 kN, 650 kN and 1000 kN shall be provided with approximately 500 mm wide removable working platform on both longitudinal sides so that Hooks do not touch the ground.</p> <p>6.9 The mechanical design of the lifting bollards, which are designed for attachment of two endless slings, must be such that the slings can be easily detached.</p> <p>6.10 The sling lifting bollards shall be arranged at a suitable distance between them so that the slings can be inserted without need of any part to be dismantled. Structural design shall be suitable for a maximum apex angle of 120° at the main hook(Applicable for beam designed with slings in place of links).</p>			
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SUPERSEDES INVENTORY NO.	6.11 The lifting device shall be designed to withstand most severe combination of different loads which may occur simultaneously during the working. The acceptable stresses in various members shall in accordance with DIN 15018.				
Designation of drawing	6.12 The lifting device shall be designed for hoisting class H1 of DIN 15018. Risk class "Average" shall be used for corrosion.				
6.13 Complete lifting beam and its components shall be designed in line with standards/codes referred in clause 5.0. Manufacturing drawings for all the parts and sub-assemblies shall be worked in accordance with technical requirements specified. Strength calculations for all the load carrying members shall be worked out and submitted in form of a document for approval along with drawings for approval as per clause 7.0.					
7.0 PRE-APPROVAL DOCUMENTS					
Five copies of the pre-approval documents shall be submitted for approval. These documents shall include:					
<ul style="list-style-type: none"> Overall General Arrangement Drawings (OGA) and Assembly drawings with part list. Strength calculations. Quality plans. Welding procedure specifications and Procedure qualification record duly approved by third party e.g. Lloyds etc. 					
Approval of the above documents by the purchaser will in no way absolve the supplier and his subcontractor of their responsibility of sound design & manufacture for required rated load conditions. Commencement of manufacture shall start after the approval of pre-approval documents by the purchaser. No change without prior approval of the purchaser will be made once documents are submitted for approval. This information may be forwarded to customer and authorized inspection agency within the scope of the order.					
8.0 FUNCTIONAL DESIGN					
8.1 Functional Design Calculation & Mechanical Design					
The following codes, standards and guidelines shall be applied for functional design calculations and mechanical design as far as applicable-					
<ul style="list-style-type: none"> This plant standard. DIN 15018 and further cross-referred DIN. Material as per IS : 2062, IS: 1964, for structural steel IS: 808 rolled steel beam, Channel and angle section etc. Grades, size and IS Number of the steel section to be used shall be clearly indicated on the manufacturing drawings. Relevant National/International Standard on the subject. 					
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SUPERSEDES INVENTORY NO.	• All statutory obligations like Factories Act 1948 and UP Factories Rules 1950 for accident prevention, applicable regulation at the time of design/ manufacturing				
इस पर लिखें विलेन की संख्या	8.2 Testing and Inspection Requirements				
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	8.2.2 Quality Plan for all major equipment/components/assemblies shall be submitted by supplier for approval as per the requirements of this specification in the BHEL format. Copies of all the test procedures acceptance norms and reference documents shall be furnished along with Quality Plans. In finalized QP, customer hold points shall be identified and communicated to supplier.				
	8.2.3 The purchaser shall be notified in writing for witnessing of tests and inspections identified as customer hold points (CHP) in the QP, three weeks in advance of the actual date of inspection/test. Quality Plan format shall be sent along with annexure- Q along with enquiry to supplier and approved QP shall form a part of purchase order.				
	8.2.4 The purchaser's representative shall be given full access to the shop in which equipment is being manufactured or tested and all test records shall be made available to him. Final inspection shall be carried out by the Purchaser's representative before the dispatch of the equipment. Final routine and type test shall be carried out in the presence of the purchaser's representative. Purchaser's representative may be qualified as purchaser's representative or or any other inspection agency as appointed by purchaser.				
	8.2.5 Q.A. document package including copies of records / certificates for all tests/ inspection carried out as per the quality plan / technical specification / drawings / data sheets shall be sent to purchaser along with the dispatch of the equipment. Q.A. documentation shall be submitted to Purchaser for approval prior to dispatch of equipment.				
	All the sub-vendors for agreed list of bought-out items including all raw materials/ semi-finished / finished component / shall be subject to the approval of BHEL.				
लाल/काली, खाली; बिना किसी भी प्रकार के अंकन के, इस दस्तावेज़ को प्रेषित किया जाना चाहिए।	8.2.6 Q.A. package shall include the following - <ul style="list-style-type: none"> • Approved Welding Procedure Specification and Procedure Qualification Record. • Welder's Qualification record. • Records of all N.D.T. • Records of all tests/checks as per Quality Plan/drawing/specifications 				
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SUPERSEDES INVENTORY NO INVENTOR'S SIGN & DATE		<ul style="list-style-type: none"> Records of heat-treatment. Records of repairs, if any. Records of deviations/concessions, if any and their approval from purchaser. Mechanical Tests. 			
The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		<p>8.2.7 All tests / checks during various stages of manufacturer shall be carried out as per agreed quality plan / drawings specification requirements and shall be binding on supplier. However, in the event of any deficiency observed in any part or equipment, purchaser reserves the right to extend the scope of inspection / testing if found necessary.</p> <p>8.2.8 In case inspection /tests are performed by the supplier he shall demonstrate that he has qualified staff and necessary inspection/ test equipment for the purpose.</p> <p>8.2.9 In case the supplier intends to delegate the inspection and testing to some other agency then prior approval from the purchaser shall be required.</p> <p>8.2.10 All inspection / tests listed shall be scheduled during the course of manufacture in such a way that flaws are detected on first opportunity well in time and remedial measures can be taken without jeopardizing the delivery dates.</p> <p>8.2.11 Each certification shall include material specification, grade of steel, manufacturer's marking batch no., specimen no. etc.</p> <p>8.2.12 The test/checks envisaged by the purchaser to be carried out (listed below) are minimum requirement and are in addition to tests / checks carried out by supplier as per their internal practice , however, tests and inspection requirements shall be finalized in detail at the time of quality plan finalization.</p> <ul style="list-style-type: none"> Material test for chemical and mechanical properties of all items. All materials shall be properly identified and material test certificates shall have correlation with the material identification. In the absence of test certificates/their correlation with the material, check tests for chemical and mechanical properties shall be carried out. Ultrasonic testing of hook before and after load testing shall be carried out as per IS:8791. Acceptance norms shall be as per IS:8791, Class-A. 100 % D.P.T. of lifting bollard / hook after proof load test. Dye Penetration Test shall be carried out as per IS:3658 and acceptance norms shall be as per IS:11732, Level-1. Proof load test of hook/bollard as per IS 5749 / IS 3814. A certificate issued by competent authority should be submitted. 			
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SUPERSEDES INVENTORY NO.	<ul style="list-style-type: none"> 100 % RT/UT of all welds in tension zone of lifting beam and of welds taking the load at both ends of lifting beam shall be carried out as per ASME section-V acceptance norms shall be as per ASME section VIII. All other welds shall be subjected to 10 % RT/UT. All filled corner welds and welds not tested by RT/ UT shall be subjected to 100 % MPI / D.P.T. examination (in accessible areas only). All welding procedures and welders shall be qualified as per ASME section IX. Qualification shall be witnessed by purchaser's representative/third party Inspection agency. 				
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p>8.3 Stage Inspection - Stage inspection/supervision shall take place during course of manufacturing. Any deviation from the test/inspection, envisaged in the quality plans shall require the consent of the Purchaser.</p> <p>All test and examination listed shall be binding for stage inspection.</p> <p>The supplier shall be responsible for the execution and commissioning of the inspection/test listed in the test and examination plans.</p> <p>8.4 A pre-dispatch inspection will be carried out for all material/component/equipment/ assemblies at the end of all shop tests at the supplier's works to check for -</p> <ul style="list-style-type: none"> Verification of completeness and acceptance of all previous tests, inspections & checks performed and satisfactory documentation of the same. Check for workmanship appearance and cleanliness. Check for identification, painting, preservation and packing. <p>8.5 Acceptance Testing: Each lifting beam shall be subjected to functional test as per loading specified. In particular the freedom of movement of moving parts, adherence to the tolerance and also to the clearances necessary for proper functioning shall be demonstrated by the supplier.</p> <p>8.5.1 Functional / load testing shall be carried out prior to dispatch unless otherwise agreed upon. This testing shall be done in presence of purchaser or his representative. Assembly and Load Testing shall be the sole responsibility of the supplier. Supplier has to do load testing at his works. A certificate of satisfactory performance, should be signed by both parties in a suitable Performa. Supplier owns full responsibility to make it fully operative at site.</p> <p>8.5.2 In case slings are used in the lifting beam, then each sling leg shall be proof load tested to twice the permissible working load (maximum safe working load + dead weight of lifting beam) prior to use. In case solid links etc are used in place of slings Proof Load testing shall be at 1.5 times (safe working load+ dead weight of the lifting beam). A certificate issued by competent authority shall be furnished.</p> <p>8.5.3 8.5.3 Proof load testing shall be carried out at 1.5 times the safe working load for 30 minutes. After the proof load test all items shall be checked dimensionally to detect any permanent set</p>				
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SUPERSEDES INVENTORY NO.	or other defect. After proof load test all weld seam shall be examined by 100% MPI/DPT (only on accessible area). A certificate issued by competent authority for Proof Load Testing shall be furnished.			
Deflection test shall be carried out at safe working load. Deflection shall be noted after holding the load for 10 minutes, deflection should not exceed 1/900 of the span.	8.5.4			
Identification Marking: - The lifting beam shall be permanently labeled with beams own weight, permissible safe working load at the individual suspension point with the letters of sufficient size (approximately 100 mm).	8.6			
A name plate will either be fixed or captive engraving made on Lifting Beam bearing the manufacturer's name/identification marking, order number & year of manufacture. Beam size giving length and width shall be put at a suitable location so that component can be unmistakably identified at a later date. Functional test stamping shall be affixed at the points along with other information specified above. A proper place preferably at the centre of beam should be marked.				
9.0 PRESERVATION / PAINTING				
The parts shall be properly conserved by applying suitable rust preventers for long storage in open humid environment. The lifting beam shall be given protective coating of one coat of red oxide zinc chromate primer (IS: 2074) and four finishing coats of dark admiralty grey shade no.632 (unless other wise specified) (IS: 5, IS: 2932). Prior to application of primer the surface shall be suitably prepared for painting. Final paint thickness shall not be less than 80 microns (unless otherwise specified). All bright finished parts to be given long lasting corrosion preventive coat. The moving parts shall be treated with long lasting lubricants. For lubrication required at future date, manufacturer will furnish specification and supplier's address of the recommended lubricant.				
In case of any special working condition purchaser shall clearly specify the condition to supplier for giving proper anti-corrosion treatment.				
10.0 PACKING DISPATCH INSTRUCTION				
Supplier should send a copy of packing list and shipping documents well in advance before actual shipment.				
Another copy of actual packing list/drawing/shipping documents should be sent along with consignment properly packed in a polythene cover. The parts shall be packed so that adequate protection is accorded against mechanical damage and corrosion.				
11.0 COMMISSIONING				
Unless otherwise specified, assembly and commissioning of the lifting beam and warrantee of its satisfactory performance at the place of delivery shall be responsibility of the supplier.				
Assembly can be done at BHEL works with prior permission purchaser. However, full responsibility of assembly, commissioning and testing lies with the supplier. The supplier at his cost and risk shall arrange any assembly tools and commissioning spare required for this purpose. Supplier at his cost and risk shall also carry out all statutory tests.				
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