



MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN **ANCHOR CAPSTAN**

STANDARD QAP NO. DGQA/DQA(WP)/ANCHOR CAPSTAN/16/2022/REV 0
14 FEB 22

Total Nos. of Pages :- 24

ISSUING AUTHORITY

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
6TH FLOOR, 'B' BLOCK, DEFENCE OFFICE COMPLEX
NETAJI NAGAR PO, NEW DELHI – 110 023

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RECORD OF AMENDMENTS

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MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN FOR ANCHOR CAPSTAN



**STANDARD QAP NO.
DGQA/DQA(WP)/ANCHOR CAPSTAN/16/2022/REV 0
14 FEB 2022**

(SN Alamanda)
Rear Admiral
ADGQA (WP)

Promulgated by:-

**DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
6TH FLOOR, 'B' BLOCK, DEFENCE OFFICE COMPLEX
SAROJINI NAGAR PO, NEW DELHI – 110 023**

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CONDITION OF RELEASE

1. This standard QAP has been prepared for use of the Indian Navy and of its contractors to follow the specified Quality Assurance procedure during the execution of the contracts. No alteration is to be made to this Standard QAP except by the issue of authorised amendment by DQA (WP).
2. It is to be applied as required in the Quality Assurance procedures covering manufacture of Anchor Capstan for IN Ships.
3. The website <http://www.dgqa defence.gov.in> may also be referred for other QA requirements.
4. The Standard QAP has been prepared on the basis of decisions made in consultations with leading manufacturers of Anchor Capstan, representatives of professional directorates and inspection agencies. Any user of this Standard QAP either within DGQA / Indian Navy or in industry may propose an amendment to it with valid justification. Proposals not applicable to particular contract can be sent directly to DQA (WP), New Delhi, and those directly applicable to a particular contract are to be dealt with using contract procedures.
5. DQA(WP) reserves the right to amend or modify the contents of this Standard QAP without consulting or informing any holder of this document.
6. When this Standard QAP is incorporated into contracts, users are responsible for their correct application and for complying with contractual and other statutory requirements. Compliance with Standard QAP does not of itself confer immunity from legal obligations.
7. Enquiries in connection to these requirements may be made from:

Directorate of Quality Assurance (Warship Projects)
Ministry of Defence
6th Floor, 'B' Block,
Defence Office Complex
Sarojini Nagar P.O.
New Delhi – 110 023

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LIST OF ANNEXURES

<u>Ser.</u>	<u>Annexure No.</u>	<u>Topic</u>
1.	Annexure – I	DQA(N) Policy No. 66301/POLICY/DQA(N)/SG dated 14 Nov 17 regarding inspection of imported items
2.	Annexure – II	DQA(N) Policy No. 12575//POLICY/DGQA/WP-TC dated 12 Oct 20 regarding Qualification of NDT Personnel through ASNT
3.	Annexure – III	DQA(WP) Policy letter 12575/POLICY/DGQA/WP-TC dated 28 Sep 20 regarding Guidelines for approval of SQAPs/QAPs.
4.	Annexure – IV	DQA(WP) Policy letter 12575/POLICY/DGQA/WP-TC dated 14 Jun 21 regarding use of approved QAP for replenishment order.
5.	Annexure – V	DQA(WP) Policy letter 29814/MISC/DGQA/WP-TC dated 24 Feb 21 regarding SOP for Remote Inspection.

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STANDARDS INVOKED

<u>S. No.</u>	<u>Specification No.</u>	<u>Description</u>
1.	IS 7937:2012(Ref 2017)	Shipbuilding-Sea-going Vessels –Windlasses and Anchor Capstan
2.	BR 3021,Vol I & II	Shock Manual
3.	EED-Q-071(R 4)	Motors and Starters for Naval Ships
4.	MIL-STD-461E	Control of Electromagnetic Interference Characteristics of sub systems & equipment
5.	NES 514 and DGS/EED/VI/1535/R6	Requirement for Cable Glands
6.	DEFSTAN 02-636(NES 636)	Requirement for AC & DC starting & Control Gear
7.	NCD 3901	Guideline Technical Specifications Electrically Operated Anchor Capstan
8.	IS 2062	Specification for Structure Steel
9.	NES 723	Tally Diagram Plates

Note: - The Standards given are indicative only. The specifications / standards and parameters given in the SOTR / Technical Specification (TSP) / MoM of TNC / Approved drawings will be final and binding.

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SPECIFIC REQUIREMENTS

1. Testing of physical, chemical properties and specific tests (wherever mentioned) has to be done by NABL accredited lab (including firm's NABL accredited lab).
2. If casting is being poured without integral test bar, then the pouring is to be witnessed by Inspector. No repair of casting whatsoever is to be undertaken without approval by QAE.
3. All castings are to be subjected to RT and / or UT, as applicable, to qualify the same in accordance with the approved class of casting, unless otherwise specified in P.O. & SOTR / TSP. The extent of RT will be as per the approved drawing. The class of casting is to be invariably mentioned in the drawing / DBOM
4. All forgings are to undergo UT for soundness and integrity checks.
5. Motors are to be procured only from IHQ, MoD (N) approved vendors.
6. Make of the outsourced Items should be as per approved PIL/Detailed Bill of Material (DBOM) or Naval approved sources
7. Imported items will be inspected i.a.w DQA(N) Policy No. 66301/Policy/DQA(N)/SG dated 14 Nov 17 (Annexure-I), as amended from time to time. Normally, following documents are inspected: -
 - (a) Bill of Lading / Shipping Bill / Airway bill.
 - (b) Invoice by OEM or Country of Origin Certificate with Packing List
 - (c) Bill of entry to warehousing
 - (d) OEM confirmation Certificate
 - (e) Firm's Guarantee Certificate as per PO
8. All NDT to be performed in accordance with DQA(WP) Policy No. 12575/Policy/DGQA/WP-TC dated 12 Oct 20 (Annexure-II) and subsequent amendments as applicable.
9. All NDT procedures are to be approved by ASNT (ACCP) / ISNT Level III qualified NDT personnel based on standards and acceptance criteria specified in SOTR / TSP / Applicable Standards.
10. Type Test, EMI/EMC test and ETT will be done at Government/PSU test centers or NABL accredited labs.
11. If Type Testing, EMI/EMC and ETT have already been done in earlier projects on identical units, it will not be done again & the original reports of earlier tested units will have to be provided for review of Inspection Agency.
12. Guidelines for approval of SQAPs/QAPs, DQA(WP) policy letter 12575/POLICY/DGQA/WP-TC dated 28 Sep 20 (Annexure-III) is relevant.
13. For replenishment order, DQA(WP) policy letter 12575/POLICY/DGQA/WP-TC dated 14 Jun 21 (Annexure- IV) is relevant.

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14. Post promulgation of this SQAP. The manufacturer shall be required to submit confirmation to concerned QA Agency and OPA towards acceptance of SQAP either in totality or with some design specific inclusions and/or exclusions, if any, along with the following details.

- (a) Equipment name.
- (b) Equipment technical details (as applicable).
- (c) Purchase Order reference.
- (d) Sub/Sub-Sub Orders reference (as applicable).
- (e) Name of Main Indenter/ Ordering Authority.
- (f) Name of end user, if available.
- (g) Name of firm / manufacturer.
- (h) SOTRs reference, if available.
- (j) Yard No./ Name of ship where to be fitted (if available)/ End user.
- (k) References of relevant drawings.
- (l) QAP No. & Date (as indicated by the firm).
- (m) Contractual delivery date.
- (n) Inspection Authority.
- (p) Inspection Agency.
- (q) Quantity (as applicable).
- (r) Inclusions, if any.
- (s) Exclusions, if any.

15. The SQAP along with the proposed inclusions/ exclusions approved by DQA(WP) shall be deemed as the approved QAP for the particular PO.

16. SOP for Remote Inspection, DQA(WP) policy letter 29814/MISC/DGQA/WP-TC dated 24 Feb 21 (Annexure- V) is relevant.

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ABBREVIATIONS

ABN	Air Borne Noise
ACCP	ASNT Central Certificate Program
ASME	American Society of Mechanical Engineers
ASNT	American Society of Non-destructive Testing
ATP	Approved Test Procedure
CHP	Customer Hold Point
CoC	Certificate of Conformance
COTS	Commercial-off-the-shelf
DBOM	Detailed Bill of Material
DFT	Dry Film Thickness
DI	Dimensional Inspection
DPT	Dye Penetrant Test
EMC	Electro Magnetic Conduction
EMI	Electro Magnetic Induction
ESS	Environment Stress Screening
ETT	Environmental Type Testing
FATs	Factory Acceptance Trials
GA	General Arrangement
HT	Heat Treatment
I-Note	Inspection Note
IFATs	Integrated Factory Acceptance Trials
IR	Inspection Report by Vendor
ITC	Inspection and Test Certificate
ISNT	Indian Society of Non-destructive Testing
MO	Material Organisation
MoM	Minutes of Meeting
MPT	Magnetic Particle Test
MTC	Manufacture Test Certificate
NABL	National Accreditation Board for Testing and Calibration Laboratories
NDE	Non Destructive Evaluation
NDT	Non-destructive Testing
NSTL	Naval Science and Technological Laboratory
OEM	Original Equipment Manufacturer
OPA	Order Placing Authority
P	Perform by
PIL	Parts Identification List
PO	Purchase Order
PQR	Procedure Qualification Record
QA	Quality Assurance
QAE	Quality Assurance Establishment
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan

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ABBREVIATIONS

R	Review by
RT	Radiography Testing
SBN	Structure Borne Noise
SOTR	Statement of Technical Requirement
SQAP	Standard Quality Assurance Plan
STC	Supplier Test Certificate
TC	Test Certificate
TEC	Technical Evaluation Committee
TNC	Technical Negotiation Committee
TSP	Technical Specification Particulars
TT	Type Test
UT	Ultrasonic Testing
VI	Visual Inspection
W	Witness by QA Rep.
WPQ	Welder Performance Qualification
WPS	Welding Procedure Specification

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SCOPE

Scope of Quality Assurance. The scope of Quality Assurance will cover witness and review of all manufacturing activities during all stages viz. raw material stage inspection including, bought out items, in-process stage inspection and final inspection stage. The scope also covers the review and witness of Type Test of equipment, wherever applicable.

This Standard Quality Assurance Plan contains comprehensive list of inspections and/or trials that is to be applicable for quality assurance of the equipment. In addition, quality assurance of equipment will also be governed by specific conditions laid down in SOTRs and 'Approved Drawings'. The inspections/ trials must be contemporary to latest technology/ techniques available in the industry at the time of placement of orders

The following quality assurance activities will be carried out during the quality assurance of equipment:

- (a) Visual Inspection.
- (b) Dimensional Inspection.
- (c) Witness of Pouring in absence of integral test bar.
- (d) Review of Lab Test Certificates.
- (e) Witness of in-house Lab Testing, if applicable.
- (f) Witness of Non-destructive testing viz. UT, DPT & MPT
- (g) Review of RT films and reports.
- (h) Review of Heat Treatment Charts
- (j) Review of ETT, EMI/EMC and ESS reports, in addition to Pre and Post ETT Post inspection, as applicable.
- (k) Functional Checks as per approved ATP
- (l) Review of draft documentation and witness/ stamping of final documentation, as applicable.
- (m) Issue of CHP clearance.
- (n) Issue of I-Note/ Form-IV or Dispatch Clearance as applicable.

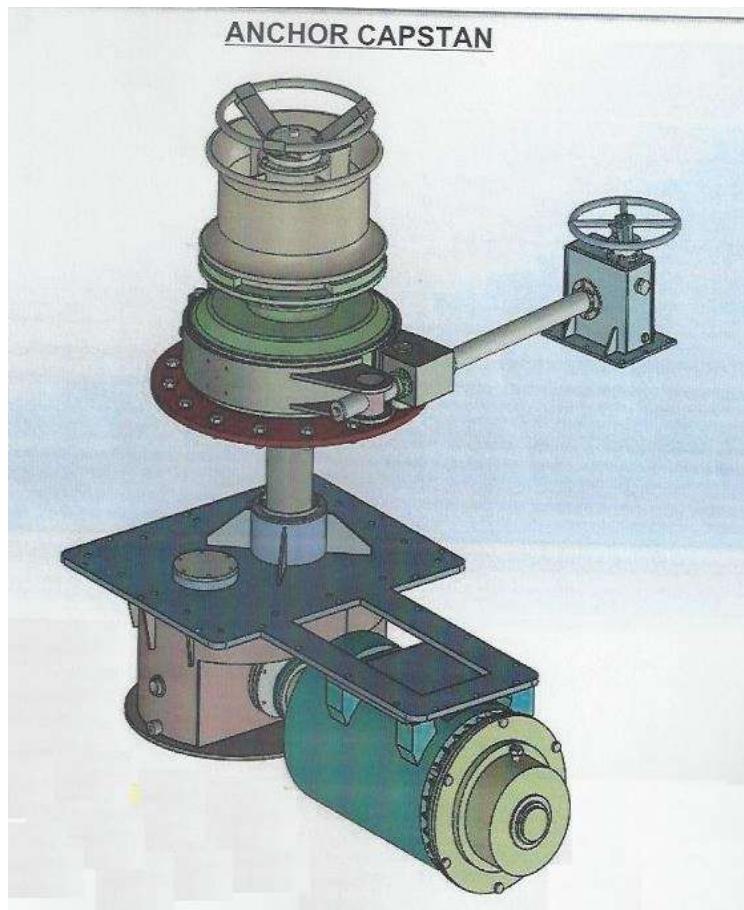
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SYSTEM DESCRIPTION

An anchor capstan is a machine that restrains and manipulates the anchor chain on a ship, as required, allowing the anchor to be raised and lowered by means of chain cable. A notched wheel engages the link of the chain.

An anchor capstan consists of a capstan head/ warping barrel and a cable lifter capable of being driven in both directions by an electrical motor through a slipping clutch and a gear box. The warping barrel is fitted at the upper end of the vertical shaft and moves along with it under the control of electrical drive and gear box. The cable lifter can either run freely under the control of a hand wheel operated brake or positive driving force of the warping barrel which can be engaged by means of a hand wheel at the top of the warping head.

The electric motor is controlled by the drum type controller with the help of 'T' handle. An emergency stop foot switch is also provided near 'T' handle position.



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STANDARD QUALITY ASSURANCE PLAN

Part – I: General Information

1. The following generic information must generally be indicated on each QAP as its identity:-
 - (a) Equipment Name
 - (b) Equipment Technical Details (as applicable)
 - (c) Purchase Order Reference
 - (d) Sub/Sub-Sub Orders reference (as applicable)
 - (e) Name of Main Indenter/ Ordering Authority
 - (f) Name of End User
 - (g) Name of Firm / Manufacturer
 - (h) SOTRs Reference
 - (j) Yard No./ Name of Ship where to be fitted (if available)/End User
 - (k) References of Relevant Drawings
 - (l) QAP No. & Date (as indicated by the firm)
 - (m) Contractual Delivery Date
 - (n) Inspection Authority
 - (p) Inspection Agency
 - (q) Quantity (as applicable)

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STANDARD QUALITY ASSURANCE PLAN

Part – II: Technical Inspection / Trials

Standard QAP of Anchor Capstan

Appendix "A"

STANDARD QUALITY ASSURANCE PLAN FOR ANCHOR CAPSTAN

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APPENDIX-A

Technical Inspection / Trials in form of SQAP Part II (Refers to Page No. 14)

S. NO	MATERIAL/ COMPONENT/ DRG.NO/ QUALITY ACTIVITY	CHARACTERISTIC/ TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE CRITERIA	FORMAT OF RECORD	AGENCIES		REMARKS
							FIRM	QAE	
1.00	DRAWINGS/DOCUMENTS/TYPE TEST								
1.01	GA Drawings of all Assemblies & sub assemblies along with DBOM & Binding Data	Check for availability of approved drawings and DBOM & Binding data	100%	As per PO/ SOTR/ TNC Minutes	All approved drawings along with DBOM & Binding data are available.	List of Approved Binding Drawings	P	R	CHP Approved bi data/drawing to verified
1.02	Type Test/ETT/ EMI/EMC reports*	Verification of Type Test / Qualification test reports.	100%	Purchase Order, GA drawings, Component drawings& SOTR/TNC Minutes/ JSS 55555	Equipment should have successfully undergone Type Test, EMI/EMC and ETT (as applicable)	Type Test/ Qualification Test reports	P	R	CHP Shipyard O Type / Qualification test are to be conducted if undertaken earlier test certificate held or equipment undergone change MO Orders. Test qualification undertaken only mentioned in PO *EMI/EMC mandatory for M Starter & C panel. Decision of MoD(N) is final tests.

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<u>S. NO</u>	<u>MATERIAL/ COMPONENT/ DRG.NO/ QUALITY ACTIVITY</u>	<u>CHARACTERISTIC/ TYPE OF CHECK</u>	<u>QUANTUM OF CHECK</u>	<u>REFERENCE DOCUMENTS</u>	<u>ACCEPTANCE CRITERIA</u>	<u>FORMAT OF RECORD</u>	<u>AGENCIES</u>		<u>REMARKS</u>																			
							<u>FIRM</u>	<u>QAE</u>																				
2.00	RAW MATERIALS INSPECTION/ IDENTIFICATION																											
2.01	Plates/Sheets/sections for <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">(i) Motor Base Frame, (ii) Gear Boxes, (iii) Top Cover of Gear Boxes, etc</td> <td style="width: 20%; padding: 5px;">(i) Chemical, Physical</td> <td style="width: 10%; padding: 5px;">01 sample per heat/ thickness</td> <td style="width: 10%; padding: 5px;">As per approved drawing</td> <td style="width: 10%; padding: 5px;">Approved Drawing</td> <td style="width: 10%; padding: 5px;">NABL TC</td> <td style="width: 5%; padding: 5px; text-align: center;">P</td> <td style="width: 5%; padding: 5px; text-align: center;">R</td> <td style="width: 10%; padding: 5px; text-align: center;">CHP</td> </tr> <tr> <td></td> <td style="padding: 5px;">(ii) UT (for Plates)</td> <td style="padding: 5px;">100%</td> <td style="padding: 5px;">As per approved drawing</td> <td style="padding: 5px;">Approved Drawing</td> <td style="padding: 5px;">NDE Report / IR</td> <td style="padding: 5px; text-align: center;">P</td> <td style="padding: 5px; text-align: center;">W</td> <td style="padding: 5px;">Sample to be drawn in presence of QA Rep and Report to be reviewed. UT to be witnessed by QA Reps.</td> </tr> </table>									(i) Motor Base Frame, (ii) Gear Boxes, (iii) Top Cover of Gear Boxes, etc	(i) Chemical, Physical	01 sample per heat/ thickness	As per approved drawing	Approved Drawing	NABL TC	P	R	CHP		(ii) UT (for Plates)	100%	As per approved drawing	Approved Drawing	NDE Report / IR	P	W	Sample to be drawn in presence of QA Rep and Report to be reviewed. UT to be witnessed by QA Reps.	
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2.02	Forged Bars/ Blanks/ Round Bars <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">(i) Shafts/ Pinions, (ii) Brake Spindle for Band Brake, (iii) Coupling / Coupling Clutch, (iv) Gears</td> <td style="width: 20%; padding: 5px;">(i) Chemical, Physical</td> <td style="width: 10%; padding: 5px;">01 sample / heat</td> <td style="width: 10%; padding: 5px;">As per approved drawing</td> <td style="width: 10%; padding: 5px;">Approved Drawing</td> <td style="width: 10%; padding: 5px;">NABL TC</td> <td style="width: 5%; padding: 5px; text-align: center;">P</td> <td style="width: 5%; padding: 5px; text-align: center;">R</td> <td style="width: 10%; padding: 5px; text-align: center;">CHP</td> </tr> <tr> <td></td> <td style="padding: 5px;">(ii) UT</td> <td style="padding: 5px;">100%</td> <td style="padding: 5px;">As per approved drawing</td> <td style="padding: 5px;">Approved Drawing</td> <td style="padding: 5px;">NDE Report / IR</td> <td style="padding: 5px; text-align: center;">P</td> <td style="padding: 5px; text-align: center;">W</td> <td style="padding: 5px;">Sample to be drawn in presence of QA Rep and tested at NABL lab. UT to be performed by ISNT/ ASNT level II/III. UT to be witnessed by QA Reps. Heat treatment charts & report review by QA agency for all forged components. If no reference standard for UT is specified in the approved drawings then NES 729 Part-V to be referred.</td> </tr> </table>										(i) Shafts/ Pinions, (ii) Brake Spindle for Band Brake, (iii) Coupling / Coupling Clutch, (iv) Gears	(i) Chemical, Physical	01 sample / heat	As per approved drawing	Approved Drawing	NABL TC	P	R	CHP		(ii) UT	100%	As per approved drawing	Approved Drawing	NDE Report / IR	P	W	Sample to be drawn in presence of QA Rep and tested at NABL lab. UT to be performed by ISNT/ ASNT level II/III. UT to be witnessed by QA Reps. Heat treatment charts & report review by QA agency for all forged components. If no reference standard for UT is specified in the approved drawings then NES 729 Part-V to be referred.
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2.03	Castings <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">(i) Worm Wheel (ii) Cable Lifter (Gypsy) (iii) Capstan Barrel/ Warping Head</td> <td style="width: 20%; padding: 5px;">(i) Chemical, Physical</td> <td style="width: 10%; padding: 5px;">01 sample / heat</td> <td style="width: 10%; padding: 5px;">As per approved drawing</td> <td style="width: 10%; padding: 5px;">Approved Drawing</td> <td style="width: 10%; padding: 5px;">NABL TC</td> <td style="width: 5%; padding: 5px; text-align: center;">P</td> <td style="width: 5%; padding: 5px; text-align: center;">R</td> <td style="width: 10%; padding: 5px; text-align: center;">CHP</td> </tr> <tr> <td></td> <td style="padding: 5px;">(ii) UT/RT</td> <td style="padding: 5px;">100%</td> <td style="padding: 5px;">As per approved drawing</td> <td style="padding: 5px;">Approved Drawing</td> <td style="padding: 5px;">NDE Report / IR</td> <td style="padding: 5px; text-align: center;">P</td> <td style="padding: 5px; text-align: center;">W</td> <td style="padding: 5px;">Test sample may be casted separately from same heat. Sample will be tested at NABL Lab. UT to be witnessed by QA Reps. HT charts & report review by QA agency for all castings. For RT, NDE report along with radiographic film to be submitted for review.</td> </tr> </table>										(i) Worm Wheel (ii) Cable Lifter (Gypsy) (iii) Capstan Barrel/ Warping Head	(i) Chemical, Physical	01 sample / heat	As per approved drawing	Approved Drawing	NABL TC	P	R	CHP		(ii) UT/RT	100%	As per approved drawing	Approved Drawing	NDE Report / IR	P	W	Test sample may be casted separately from same heat. Sample will be tested at NABL Lab. UT to be witnessed by QA Reps. HT charts & report review by QA agency for all castings. For RT, NDE report along with radiographic film to be submitted for review.
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	(ii) UT/RT	100%	As per approved drawing	Approved Drawing	NDE Report / IR	P	W	Test sample may be casted separately from same heat. Sample will be tested at NABL Lab. UT to be witnessed by QA Reps. HT charts & report review by QA agency for all castings. For RT, NDE report along with radiographic film to be submitted for review.																				

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							<u>FIRM</u>	<u>QAE</u>	
2.04 Input Raw materials for Misc components (As per Detailed Bill of Material)									
	Coupling, Keys, Seal Cover, Covers, Spacer, Retainer Ring (in halves), Shifter Fork, Shifter Block, Pin, Chain Stopper and allied parts, if any, Foundation Bolt, Deck Stool, Deck Head	Chemical & Physical	1sample/ size/lot	Approved Drawing	Approved Drawing & PO	NABL TC	P	R	CHP Sample to be drawn in presence of QA Rep. Firm to offer Raw Materials for sealing the sample for testing.
	Lever Plate, Locking Plate, Bearing Housing, Thrust Washer, Distance Piece, Retainer Plate, Chain Reliever, Nut (Shifter Warping Head), Lock Plate Nut, Shifter Wheel, Handle, Band Drum, Hinge Pin, Nut, Lock, Cover Housing, Hand Wheel, Wheel Bar, Lock Pin, Housing Cap, Push Knob, Push Rod, Gland Nut, Securing Tag, Mounting Frame, Pedestal, Roller, Roller Pin, Lifting Hand, Bush Bearing, etc.	Chemical	-	Approved Drawing	Approved Drawing & PO	STC/ OEM TC/OEM CoC	P	R	Number of components/ items may vary from design to design. Actual components as per approved DBOM/ drawings.
2.05 Electrical Items									
	Motor	As per latest approved SQAP for AC Motor				FORM IV / I- Note	P	R	Separate QAP or Inclusion/Exclusion to be submitted
	Control Panel & Starter	As per latest approved latest SQAP for Control Panel & Starter							

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							<u>FIRM</u>	<u>QAE</u>	
2.06	COTS Items								
	As per Detailed Bill of Material (DBOM) [Bolts(Steel), Washers, Oil Cap, Drain Plug, Packing (Permanite), Oil Seal, Spring Washer, Nut, Grease Nipple, Ferodo Lining, CSK Screw, Grub Screw, Air Breather cum Filler , 'O' Ring, Spring, Slipping Clutch Assembly, Worm Gear box, Planetary Gear Box, etc.]	VI & DI	Random	Approved Drawing/ DBOM	Approved Drawing & PO	STC/ OEM TC/OEM CoC	P	R	No of components/ items may vary from design to design. Actual components as per approved DBOM/ drawings. OEM CoC can be acceptable for packing
	Oil Level Gauge, Chain	VI	Random	Approved Drawing/ DBOM	Approved Drawing & PO	STC/ OEM TC/OEM CoC	P	R	
	Bearings	Make & Model	100%	Approved Drawing/ DBOM	Approved Drawing	STC/CoC	P	R	
2.07	Bought Out Item								
	Shock Mounts	As per latest SQAP				FORM IV / I- Note	P	R	
2.08	Lubrication & Oil								
	Gear Oil	Brand & Grade	100%	DBOM	Approved DBOM & PO	CoC	P	R	Check for Lot No & Batch No
	Grease								

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							<u>FIRM</u>	<u>QAE</u>							
3.00	IN PROCESS INSPECTION														
3.01	Fabrication / Welding/ Forging/ Casting/ Heat Treatment														
	Welding														
	Motor Base Frame	Before fabrication of assemblies - Welder Qualification Record	100%	Approved drawing	ASME IX	WPS/PQR/ WPQ	P	R	DPT will be witnessed by QA Reps						
	Gear Boxes	After fabrication of assemblies – Check for abnormal distortion & allowances for machining	100%	Approved drawing	Check for abnormal distortions & allowances for machining	IR	P	R							
	Top Cover														
	Side Cover	After welding/ Before machining	100%	Approved drawing	Check for cracks on welds of critical joint by DPT	NDE Report / IR	P	W							
	Bearing Housing and other welded components/ parts				Review of stress relieving Charts	IR	P	R							
					Surface Profile after shot blasting	IR	P	R							
3.02	Machining														
	Components/ items to be machined														
	Gear Boxes	VI, DI	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R	-						
	Shafts, Gears & Worm Wheel	VI, DI	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR/MTC	P	R							
	Warping Head	VI, DI	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R							
		UT	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	NDE Report / IR	P	W							
	Lock Plate Nut	VI & DI, Thread Conformity	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R	UT to be done either by NABL or ASNT level II/III certified inspector. Unmachined areas, as accessible, will be DP tested. NDT will be witnessed by QA Reps						

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							<u>FIRM</u>	<u>QAE</u>	
	Brake Spindle	VI & DI, Thread Conformity	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R	
	Foundation Bolt	VI & DI, Thread Conformity	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R	
	As per Detailed Bill of Material(DBOM): Keys, Top Covers, Seal Cover, Oil Seals, Covers, Deck Stool, Deck Head, Spacers, Couplings, Coupling Clutch, Retainer Rings, Shifter Fork, Shifter Block, Pins, Lever Plate, Locking Plate (Coupling), Bearing Housing, Thrust Washers, Distance Piece, Retainer Plate, Chain Reliever, Nut (Shifter Warping Head), Shifter Wheel, Handle, Band Drum, Lock Ring, Washer, Hand Wheel, Wheel Bar, Housing Cap, Push Knob, Push Rod, Gland Nut, Spring, Securing Tag, Bush, Packing, Mounting Frame, Pedestal, Roller, Roller Pin, Lifting Hand, Chain Stopper and allied parts, etc.,.	VI & DI	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R	
	Cable Lifter	VI & DI	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	R	
		Profile of Snug	100%	Approved drawings	Approved Drawings, SOTR,TSP & PO	IR	P	W	Profile verification will be done during Internal FAT

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							<u>FIRM</u>	<u>QAE</u>	
3.03 In Process Inspection – Sub Assembly Level Inspection									
Gear Box Assembly	Over all Dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	W	CHP OEM to certify the run out/ alignment reading recorded is within limit Drain oil completely and check for foreign particles.	
	Tooth contact by Blue impression test								
	Back Lash								
	Run out/ Alignment checks								
	Oil Tightness								
Band Brake	Overall dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	R		
	Check for operation & oil tightness (as applicable)								
Emergency Foot switch	Overall dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	R		
	Functional Test								
Chain stopper	Over all Dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	R		
Slipping Clutch	Over all Dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	R		
Electro Magnetic Brake	VI / DI	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	W		
Cable Lifter	Over all Dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	W		
Warping Head	Over all Dimension	100%	PO/SOTR/ Approved Drg	Approved Drawings & SOTR	IR	P	W		
4.00 Final Assembly									
Final Assembly of Anchor Capstan		Visual Inspection to check completeness of assembly and overall dimension.	100%	Approved Drawing	Conformity to approved Drawings	IR	P	W	

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							<u>FIRM</u>	<u>QAE</u>																													
5.00	Functional/ Performance Tests/ Pre-requisites for FATs																																				
5.01	<p>Following documents to be submitted prior conduct of FAT</p> <p>(a) Consolidated document of all inspection & test reports- Compiled document to be submitted.</p> <p>(b) SOTR & QAP compliance matrix - Complied document to be submitted.</p> <p>(c) Availability of Type test certificates:</p> <p style="margin-left: 20px;">(i) Motor</p> <p style="margin-left: 20px;">(ii) Panels</p> <p>(d) Cable Lifter: Profile of snug witness can be done during Internal FAT also</p>																																				
5.02	<p>Performance Check:</p> <p>In each direction for every speed with intermittent cooling period</p> <p>Performance/ Operation of Electromagnetic Brake, Band Brake, Emergency Foot Switch, Slipping Clutch, Cable Lifter, Warping Barrel</p>	<table border="1"> <tr> <td>No Load Run</td> <td>100%</td> <td>Approved FAT/Approved Drawings</td> <td>SOTR, FAT, ATP, PO & Approved Drawings</td> <td>IR</td> <td>P</td> <td>W</td> </tr> <tr> <td>Load Trials</td> <td>100%</td> <td>Approved FAT/Approved Drawings</td> <td>SOTR, FAT, ATP, PO & Approved Drawings</td> <td>IR</td> <td>P</td> <td>W</td> </tr> <tr> <td>Overload Trials</td> <td>100%</td> <td>Approved FAT/Approved Drawings</td> <td>SOTR, FAT, ATP, PO & Approved Drawings</td> <td>IR</td> <td>P</td> <td>W</td> </tr> <tr> <td>Noise</td> <td>100%</td> <td>Approved FAT/Approved Drawings</td> <td>SOTR, FAT, ATP, PO & Approved Drawings</td> <td>IR</td> <td>P</td> <td>W</td> </tr> </table>	No Load Run	100%	Approved FAT/Approved Drawings	SOTR, FAT, ATP, PO & Approved Drawings	IR	P	W	Load Trials	100%	Approved FAT/Approved Drawings	SOTR, FAT, ATP, PO & Approved Drawings	IR	P	W	Overload Trials	100%	Approved FAT/Approved Drawings	SOTR, FAT, ATP, PO & Approved Drawings	IR	P	W	Noise	100%	Approved FAT/Approved Drawings	SOTR, FAT, ATP, PO & Approved Drawings	IR	P	W							CHP
No Load Run	100%	Approved FAT/Approved Drawings	SOTR, FAT, ATP, PO & Approved Drawings	IR	P	W																															
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							<u>FIRM</u>	<u>QAE</u>	
6.00 <u>TYPE TESTING</u>									
6.01	Shock Test	Shock Analysis	01/ Model	SOTR/NSS-II/ BR3021/ Applicable Std	NSS-II as per BR 3021 & PO/SOTR	NSTL Test Report/ NSTL Approved Test Report	P	R	Shock calculation report to be submitted to IHQ MOD(N) post approval of NSTL or any nominated agency by IHQ MoD(N)
6.02	Noise Test	ABN & SBN	01/ Model	SOTR/ Applicable Std	ABN & SBN meeting the limits specified in SOTR /Approved Drawing	ABN & SBN Report	P	R	
6.03	Functional Test	Functional Test	01/ Model	SOTR/ Applicable Std / ATP	Functional Test to be Satisfactory	Inspection Report(IR)	P	W	Functional Test applicable for Prototype Equipment only
7.00 <u>FINAL INSPECTION</u>									
7.01	Factory Acceptance Trial	Tests as per approved FAT	100%	SOTR, FAT, ATP, Purchase Order & Appd Drgs	Performance Test To be satisfactory	Inspection Report(IR)	P	W	CHP FATs to be conducted as per IHQ MOD(N) approved FATs protocol.
7.02	Submission of as-built binding drawings	Verification	100%	Appd. Drgs./ Concessions & Deviations	As built drawings are approved and complete	As Built Drawing	P	R	
7.03	Liquidation of all observations during FAT, if any	Defect Rectification	100%	Approved Drawing, SOTR & FAT document	All Defects liquidated	Inspection Report(IR)	P	R	
7.04	Weight Recording	Weight measurement	100 %	Approved Drawing, PO, SOTR	To be within specified limits as per Approved Drawing, PO & SOTR	Weight Certificate	P	W	CHP Annexure-V be referred for Remote Mode Inspection
7.05	Painting, Preservation, Packing and Marking	Visual Inspection	100%	Approved Drawing, SOTR, OEM Preservation Plan	Conforms to Approved Packing Procedure / TSP / Approved Drawing	Inspection Report(IR)	P	W	CHP DFT to be checked by QAE Reps.
7.06	Submission of Form IV (I&T Certificate)	Correctness	100%	As per PO & SOTR	As per PO & SOTR	Form IV	P	Issue Form IV	

STANDARD QUALITY ASSURANCE PLAN FOR ANCHOR CAPSTAN

IMPORTANT NOTE:-

1. For Motor and Control Panel the Type Test, EMI/EMC and Environmental test are to be conducted in accordance with EED-Q-071-(R4) after QA agencies clearance and sealing of equipment. If Type Testing, EMI/EMC and ETT have already been done in earlier projects on same item, it will not be repeated again. The reports of earlier tested units will be submitted for review of Inspection Agency. In case of any difficulty/discrepancy in carrying out the above, matter be referred to IHQ MoD(N)/DEE within 10 days of receipt of approved QAP under intimation to HQ DQA(WP).
2. **COTS:** COTS items to be accepted on the basis of Certificate of Conformance (CoC) with following conditions:-
 - (a) CoC must indicate governing specifications and values to which the item has been tested. The certificate must include copies of tests reports.
 - (b) In case of manufacturer's certificate under relevant quality standards (like ISO, OHSAS etc), the pre published data sheet or company quality policy bringing out the details of test carried out on specific items may be accepted.
3. **Bought out items:** Bought out items are those which are in the regular production range of the manufacturing firm/ sub vendor and manufactured on placement of specific order by main firm and production is covered by main firm's quality control program.
4. All NDT procedures are to be approved by ASNT (ACCP) / ISNT Level III qualified NDT personnel based on standards and acceptance criteria specified in SOTR / TSP / Applicable Standards.
5. RT&UT are to be carried out by ASNT (ACCP) Level-II/III or ISNT Level-II/III qualified NDT personnel. Interpretation/sentencing of RT and UT reports are to be carried out by ASNT (ACCP) Level-III or ISNT Level-III NDT personnel only.
6. MPT & DPT are to be carried out by certified ASNT (ACCP/SNT-TC-1A) Level-II/III or ISNT Level-II/III NDT personnel. Interpretation/sentencing of MPT and DPT reports are to be carried out by ASNT (ACCP) Level-III or ISNT Level-III NDT personnel only.
7. No of components/ items (under misc components/ Bought out/ COTS items) may vary from design to design. This list is indicative only. Actual components/ items would be as per approved DBOM/ drawings.
8. Witness of inspections can be done in remote mode, wherever feasible. The modalities of remote inspection are to be worked out jointly by the firm and QAO.