



MINISTRY OF DEFENCE (DGQA)

SQAP FOR BEARING BUSH - RUDDER BUSH AND SHAFT SLEEVE/ LINERS FOR 'A'- BRACKET, 'P'- BRACKET & STERN TUBE

Standard Quality Assurance Plan covers the technical requirements for providing Quality Assurance cover to Bearing Bushes - Rudder Bushes and Shaft Sleeve / Liners for 'A'-Bracket, 'P'-Bracket & Stern Tube

**STANDARD QAP NO. DGQA/DQA (WP)/SHAFT LINERS/19/2019/REV 0
01 OCT 2019**

Total Nos. of Pages: 11

ISSUING AUTHORITY

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MINISTRY OF DEFENCE / DGQA

BEARING BUSH - RUDDER BUSH AND
SHAFT SLEEVE / LINERS FOR 'A'-
BRACKET, 'P'-BRACKET & STERN TUBE

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STANDARD QAP NO. DGQA/DQA(WP)/
BUSHES & LINERS/19/2019/ REV-0

REV. NO.


0

DATE

01 OCT 19

RECORD OF AMENDMENTS

Sl. No.	Date of Amendment	Amendments	Authority	Remarks

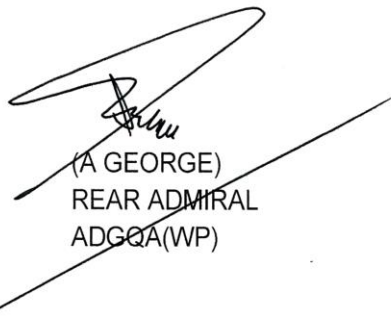
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MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN FOR BEARING BUSH - RUDDER BUSH AND SHAFT SLEEVE / LINERS FOR 'A'- BRACKET, 'P'- BRACKET & STERN TUBE




**STANDARD QAP NO.
DGQA/DQA(WP)/SHAFT LINERS/19/2019/REV
01 OCT 2019**


(A GEORGE)
REAR ADMIRAL
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Promulgated by:-


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CONDITIONS OF RELEASE


1. This Standard Quality Assurance Plan (SQAP) has been formulated for reference of the Order Placement Agencies, Inspection Authority, Inspection Agencies and the Industry. No alteration is to be made to this SQAP except by the issue of authorised amendment by DQA (WP).
2. It is to be applied, as required, for Quality Assurance during various stages of manufacture of Shaft Liners for *IN* Ships.
3. The website <http://www.dggadefence.gov.in> may also be referred for other QA requirements.
4. The SQAP of Shaft Liners has been prepared with reference to earlier approved QAPs and decisions made during the collegiate meeting held at DQA(WP) with OEM and representatives of the concerned Professional/ Production Directorate of the *IN*. Any user of this SQAP, either within DGQA/ *IN* 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 SQAP without consulting or informing any holder of this document.
6. The specifications and standards laid out in the SQAP are indicative only. The specifications / parameters and standards given in the Technical Specifications (TSP) / MoM of TNC / Approved drawings will be final and binding.
7. When this SQAP is incorporated into contracts, users are responsible for their correct application and for complying with contractual and other statutory requirements. Compliance to SQAP does not in itself confer immunity from legal obligations.
8. Enquiries in connection to these requirements may be made from:-

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
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STANDARDS INVOKED


<u>Sl.</u>	<u>Specification No.</u>	<u>Description</u>
1.	BS EN 1982:2017	Specification for Copper Alloy Ingot and Copper Alloy and High Conductivity Copper Castings
2.	Def Stan 02-830 Pt 1, ISS: 2; 10 Aug 02 Amdt 1- 05 Mar 2003 or latest version	Gun Metal Ingots & Casting (Shaft sleeve, A-Bracket, Prop. Shaft Bushes/Liners)
3.	Def Stan 02-747 Pt 1, ISS: 2, 19 Nov 2004 or latest version	Nickel, Aluminum & Bronze, Casting & Ingots
4.	Def Stan 02-833, Pt 2, ISS: 2, 09 Feb 07 or latest version	Nickel, Aluminum & Bronze Alloy (Stern tube, Bracket, Bearing, Bushes)
5.	ASTM E 310	Standard Reference Radiographs for Tin Bronze Castings
6.	ASTM E 272	Standard Reference Radiographs for High Strength Copper-Base and Nickel-Copper Alloy

Note: The standards given are indicative only and specification given in TSP / MoM of TNC / approved drawings will be applicable

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SPECIFIC REQUIREMENTS

1. All QA requirements including approval of Drawings and QAP is to be in conformance with the conditions stipulated in Quality Assurance Document **QAD-01** available at DGQA website <http://www.dgqadefence.gov.in> .
2. Testing of Chemical Composition and Mechanical / Physical properties is to be done by NABL accredited lab (including firm's NABL accredited lab).
3. If casting is being poured without integral test bar, then only pouring is to be witnessed by Inspector.
4. Radiography is to be carried out as per the approved drawing.
5. Non-Destructive Testing is to be carried out by ISNT/ ASNT level II / III qualified technician.

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ABBREVIATIONS

VI	Visual Inspection
DI	Dimensional Inspection
LTC	Lab Test Certificate
STC	Supplier Test Certificate
CC	Conformance/ Compliance Certificate
CHP	Customer Hold Point
IR	Inspection Report
NABL	National Accreditation Board for Testing and Calibration of Laboratories
R	Review
W	Witness
TC	Test Certificate
OEM	Original Equipment Manufacturer
DPT	Dye Penetrant Test
MPT	Magnetic Particle Test
UT	Ultrasonic Test
RT	Radiography test
ASNT	American Society of Nondestructive Testing
ISNT	Indian Society of Nondestructive Testing


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SCOPE

1. **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, In-process Stage and Final Stage.

2. The 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 Purchase Order, 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.

3. The following quality assurance activities will be carried out during the Quality Assurance of Equipment:-
 - (a) Visual Inspection.
 - (b) Dimensional Inspection.
 - (c) Review of Lab Test Certificates/ Supplier Test Certificates/ Compliance Certificates/ Import documents.
 - (d) Witness of in-house Lab Testing, if applicable.
 - (e) Witness of Non-destructive Testing viz. UT, DPT & MPT.
 - (f) Review of Heat Treatment Charts.
 - (g) Issue of CHP clearance.
 - (h) Issue of Dispatch Clearance or Issue of Form-IV, as applicable.

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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 per PO)

Part - II:

Standard QAP of Shaft liner	Appendix "A"
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SQAP FOR BEARING BUSH - RUDDER BUSH AND SHAFT SLEEVE / LINERS FOR 'A'- BRACKET, 'P'-BRACKET & STERN TUBE

Sl. No	Material/ Component / Drg.No/ Quality Activity	Qty. as per P.O.	Characteristics / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Format of Record	Action by QAE	Remarks
1.0.0	DRAWINGS/ DOCUMENT VERIFICATION								
1.1.0	Drawings and Documents		(i) Check for availability of approved drawings	100%	PO & SOTR/ TNC Minutes	All approved drawings are available	List of approved drawings	R	
			(ii) Verification of manufacturing drawings	100%		Manufacturing drawings bear complete data; The data is sufficient for production and stage inspections	List of approved drawings	R	Manufacturing drawings will be examined and referred to at the OEM premises and stamped on completion of inspections
2.0.0	RAW MATERIAL INSPECTION								
2.1.0	Raw Material Analysis (Bath Sample Analysis)		Spectro / Wet Analysis	One Sample / Heat	SOTR / TSP, TNC Minutes, Approved Drawings, Manufacturing Drawing/ Material Specification	Conformity to specifications	LTC / Mil Certificate	R	
2.2.0	Bearing Bush Includes (i) Shaft Sleeve/ Shaft Liner- A/P bracket (ii) Shaft Sleeve / Shaft Liner -Stern Tube (iii)Rudder Bush (Centrifugal Casting)		Pouring with integral Test bar	100%	SOTR / TSP, TNC Minutes, Approved Drawings, Manufacturing Drawings / Relevant Material Specification (Phosphor Bronze to BS 1400 Gr PB3C/ Gr. PB4/ Gr1 / Any other material specified in approved drawing)	Casting to be as per specifications laid in reference documents	IR	R	If casting is without integral test bar, pouring to be witnessed by QAO
			Material Identification & Stamping	100%		Conformity to specifications	IR	W	
			Chemical Composition and Mechanical Properties	One Sample/ Lot/ Heat		Properties to meet the laid down specifications	NABL LTC	R	
3.0.0	IN-PROCESS INSPECTION								
3.1.0	Bearing Bush Includes (i) Shaft Sleeve/ Shaft Liner- A/P bracket		VI & DI	100%	SOTR / TSP, TNC Minutes, Approved Drawings, Manufacturing Drawing/	Confirm to approved drawings	IR	R	
			DPT	100%		Surface defects	NDE	CHP for	Testing to be do

Sl. No	Material/ Component / Drg.No/ Quality Activity	Qty. as per P.O.	Characteristics / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Format of Record	Action by QAE	Remarks
	(ii) Shaft Sleeve / Shaft Liner -Stern Tube (iii)Rudder Bush (Proof Machined / Machined)					within permissible limits specified in applicable standard	Report	W	done by ISNT/ ASNT level II or III qualified technician
			Pressure Test / Hydro Test at 03 Kg / cm ² for 20 minutes	100%	SOTR / TSP, TNC Minutes, Approved Drawings, Manufacturing Drawing	Casting to withstand the specified hydro pressure	IR	CHP for W	
			RT	100%	Acceptance Criteria for Copper base & Nickle Copper Alloy castings as per ASTM E 272 and for Tin-Bronze casting as per ASTM E310	Acceptance level: (a) All Type of Shrinkage- Level-II (b) Gas Porosity and all type of inclusion- Level II (c) Cracks, Hot Tears and Inserts- Not acceptable	NDE Report & RT films	CHP for R	Testing to be do done by ISNT/ ASNT level II or III qualified technician
4.0.0	<u>FINAL INSPECTION</u>								
4.1.0	Bearing Bush (Finished) Includes (i) Shaft Sleeve/ Shaft Liner- A/P bracket (ii) Shaft Sleeve / Shaft Liner -Stern Tube (iii)Rudder Bush		VI &DI	100%	SOTR / TSP, TNC Minutes, Approved Drawings, Manufacturing Drawing/ PO	Confirm to approved drawings	IR	CHP for W	
4.2.0	Packing, Preservation and Marking		VI	100%		Preserved, Marked and Packed as per specifications	IR	W	

Note:-

1. Equipment & accessories supplied should conform to specifications.
2. Material Testing to be done at NABL accredited laboratories.
3. NDT procedure to be approved by ASNT / ISNT Level III qualified person based on standards and acceptance criteria specified in SOTR / TSP and performed by ASNT / ISNT Level II / Level III qualified person. RT films to be stored and preserved for 05 years from date of supply of item.
4. The QAP does not apply to items not in the scope of supply of the firm.
5. The column 'Quantity as per P.O has been left blank which has to be filled by the firm as per P.O while submitting QAP for approval.