



STANDARD QUALITY ASSURANCE PLAN

SQAP NO.
DGQA/DQA(WP)/WHITE METAL JOURNAL BEARING/18/2019/REV-0

SQAP

FOR

WHITE METAL JOURNAL BEARING

ISSUING AUTHORITY

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA), 'H' BLOCK, NEW DELHI - 110 011



MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN

WHITE METAL JOURNAL BEARING

A Journal Bearing, is a fluid lubricated cylinder, and is used to support a shaft and prevent metal to metal contact through hydrodynamic lubrication.

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Total Nos. of Pages:15

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**DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
DGQA, 'H' BLOCK, NEW DELHI - 110 011**

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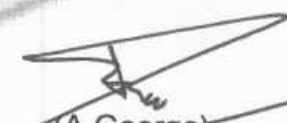
MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN (SQAP) **WHITE METAL JOURNAL BEARING**



SQAP NO.

DGQA/DQA(WP)/WHITE METAL JOURNAL BEARING/18/2019/REV-0


(A George)
Rear Admiral
ADGQA (WP)
30 Aug 19

Promulgated by

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
'H' BLOCK, NIRMANBHAWAN PO
NEW DELHI - 110 011

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CONDITIONS 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 White Metal Journal Bearings for IN Ships.
3. The website <http://www.dggadefence.gov.in> may also be referred for other QA requirements.
4. The Standard QAP has been prepared on the basis of decisions made in collegiate meeting held at DQA (WP) with the manufacturer of White Metal Journal Bearings for Indian Navy and representative of IHQ-MoD(N)/DME/DSP/DND. 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 its 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 PROJECT)
MINISTRY OF DEFENCE (DGQA)
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NEW DELHI - 110 011

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STANDARDS INVOKED

1. Standards invoked as on date: -

S.No	STANDARDS	DESCRIPTION
(a)	Approved drawing	Dimensions and Deviation for non-tolerance.
(b)	BS EN 10228-1:1999	NDT of Steel forgings- Part 1: MPI
(c)	DIN 912	Socket Head Cap Screw
(d)	DIN 913	Screw
(e)	DIN - 7978	Internal treaded taper pin.
(f)	IS 2004 CI 1	Forging for Bearing shell.
(g)	IS : 2269 P12.9	Hex Socket Head Cap Screw.
(h)	IS : 4218 Part - IV	Thread Tolerance.
(j)	ISO 4386/1 CL-2B	UT for determining Bond defect between bearing material and backing for bond thickness greater than 0.5 mm
(k)	ISO 4386-2	Destructive testing of Bond for Bearing Metal layer thickness greater than or equal to 2.0 mm.
(m)	ISO 4386-3	DP for determining bond defect and discontinuities in the sliding surface of bearing.
(n)	IS 14962-2: 2001	Thread Tapping.
(p)	PT No. 2011 c(2) of NES 305 issue 3.	DP test of White metal portion.
(q)	TegotenexS V – 841/1 CI– 738, Tegostar 738, Therm-89	White Metal Tegotenex, Tegostar.

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SPECIFIC REQUIREMENTS

1. Testing of physical and chemical properties is to be done by NABL accredited lab. If the firm has NABL accredited lab the same can be used.
2. UT is to be carried out in proof machined condition post HT.
3. Non-Destructive Testing is to be carried out by ISNT/ ASNT level II or III qualified technician.
4. Make of the Items should be as per approved PIL/Detailed Bill of Material (DBOM) or Naval approved sources.
5. In case of bought out items, physical verification / functional test of item may be undertaken during assembly of the equipment to avoid repetition.
6. Imported items will be accepted against following import documents:
 - (a) Copy of one among Bill of Lading/Shipping Bill/ Airway Bill.
 - (b) Invoice by OEM or Country of Origin certificate of the equipment with packing list.
 - (c) Bill of Entry for Warehousing.
 - (d) The certificate of Conformity (CoC) indicating governing specifications and values to which the items are tested along with Original Equipment Manufacturer (OEM) test certificates/ test reports/ Catalogue/ Data sheet.
 - (e) Guarantee/ Warrantee certificate from the supplier/ OEM as per supply order.

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ABBREVIATIONS USED IN SQAP

ABN/SBN	Air borne Noise/ Structure borne Noise
ASNT	American Society for Nondestructive Testing
ATP	Acceptance Test Procedure
BOM	Bill of Material
CHP	Customer Hold Point
CoC	Certificate of Conformance
DBOM	Detailed Bill of Material
DPT	Dye Penetrant Test
HT	Heat Treatment
IR	Inspection Report
ISNT	Indian Society for Nondestructive Testing
MPI	Magnetic Particle Inspection
NABL	National Accreditation Board For Testing And Calibration Laboratories
NDT	Nondestructive Testing
PAC	Proprietary Article Certificate
PIL	Parts Identification List
PO	Purchase Order
QA	Quality Assurance
QAD	Quality Assurance Document
RT	Radiographic Testing
SOTR	Statement of Technical Requirements
STC	Supplier's Test Certificate
TC	Test Certificate
TNC	Technical Negotiation Committee
TSP	Technical Specification
UT	Ultrasonic Testing

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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 including, bought-out items, In-process Stage and Final Stage.

The scope also covers the review and witness of Type test of equipment, wherever applicable. The Standardized 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, if applicable as per SQAP: -

- (a) Visual Inspection.
- (b) Dimensional Inspection.
- (c) Review of Lab Test Certificates.
- (d) Witness of in-house Lab Testing, if applicable.
- (e) Witness of Non-destructive Testing viz. UT, DPT&MPI.
- (f) Review of UT, DPT, MPI and reports.
- (g) Review of Heat Treatment Charts.
- (h) Review of Macrostructure/microstructure photograph & reports.
- (j) Review of Draft documentation and witness/Stamping of final documentation, as applicable
- (k) Issue of CHP clearance.
- (l) Issue of Dispatch Clearance as applicable.

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STANDARD QUALITY ASSURANCE PLAN

Part – I: General Information

1. The following generic information must 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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Part – II: Technical Inspections / Trials(As per Appendix "A").

1. This part of SQAP will generally consist of following sections as given below: -
 - (a) **Section – I:** Drawings/Documents/Type Test Requirements.
 - (b) **Section – II:** Raw Material Inspection.
 - (c) **Section – III:** In-process Inspection.
 - (d) **Section – IV:** Final Inspection.
 - (e) **Section – V:** Preservation and packing.

2. The technical section would normally be in a tabulated format with following columns: -
 - (a) Sl. No.
 - (b) Component details
 - (c) Characteristics / Type of Checks – **list of all applicable checks for that family of equipment.**
 - (d) Quantum of check – Sample/100% etc.
 - (e) Class of check – critical/major/minor etc.
 - (f) Reference Documents / Acceptance standards – for each check as applicable.
 - (g) Format/ Type of Record – CHP/Firm's QA Report etc.
 - (h) Remarks (Inspection details i.e. P – Perform, W – Witness, V/R – Verification / Review, CHP – Customer Hold Point etc.

3. Any additional information as 'Note' may also be included in each section for amplification of requisite tests/trials.

STANDARD QUALITY ASSURANCE PLAN FOR WHITE METAL JOURNAL BEARING

SI No	MATERIAL/ COMPONENT AS PER SOTR/ DRG NO/ QUALITY ACTIVITY	CHARACTERISTIC/ TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE CRITERIA	FORMAT OF RECORD	AGENCIES			REMARKS
							P	R	W	
1.0	SECTION - I : DRAWINGS/DOCUMENTS/TYPE TEST REQUIREMENTS									
1.1	Drawings & Documents	Approved GA drawings along with Detailed Bill of Material (DBOM) & Documents	100%	PO & TSP/ SOTR & TNC Minutes	PO & TSP/ SOTR & TNC Minutes	List of approved drawings	1	2	Drawings & Data, duly approved by Competent authority, to be verified. Drawings should contain all necessary details as per TSP/SOTR/ PO. CHP	
2.0	SECTION - II : RAW MATERIAL INSPECTION									
2.1.	Steel Forgings (Shell / Casing / Ring of Bearing)									
2.1.1	Steel Forgings (Shell / Casing / Ring of Bearing)	Visual Inspection	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR	1	2		
2.1.2		Material identification & Test piece Stamping	One sample per Heat	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR	1		2 Test piece to be drawn and stamped by QAE for testing at NABL Lab.	
2.1.3		Chemical Composition	One sample per Heat	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	NABL Lab TC	1	2		
2.1.4		Heat Treatment followed by 'Stress Relieving'	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	HT Charts	1	2		
2.1.5		Mechanical Properties	One sample per Heat	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	NABL Lab TC	1	2	Three test specimens per sample for mechanical properties shall be made. Retest to be carried out on two further specimens in the event of failure of initial specimen.	

SI No	MATERIAL/ COMPONENT AS PER SOTR/ DRG NO/ QUALITY ACTIVITY	CHARACTERISTIC/ TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE CRITERIA	FORMAT OF RECORD	AGENCIES			REMARKS
							P	R	W	
2.2	Bearing Metal									
2.2.1	Bearing Metal	Material Identification & Verification of Documents	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	STC	2			
2.2.2		Chemical Composition	One sample per Lot / Batch	Approved Drawing / TSP	Approved Drawing / TSP / SOTR	NABL Lab TC	1	2		Test piece to be drawn and stamped by QAE for testing at NABL Lab.
2.2.3		Mechanical Testing	One sample per Lot / Batch	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	NABL Lab TC	1	2		
2.2.4		Hardness Test	One sample per Lot / Batch	Design value of Bearing Material	Approved Drawing / TSP / SOTR	IR	1		2	
3.0	SECTION - III : IN PROCESS INSPECTION									
3.1.1	Proof Machined Shell / Casing / Ring (Pre Babbitting Stage)	Visual Inspection	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR	1	2		
3.1.2		Dimensions (ID/OD/Length)	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR	1	2		
3.1.3		DPT / MPI (For Surface defect)	100%	Approved Drawing / TSP / SOTR /	Conformity to Specification & Approved Drawing	NDT Report	1	2		Testing to be Done by ISNT/ASNT Level II/III Qualified Technician.
3.1.4		UT in proof machined condition (For Internal Defects)	100%	Approved Drawing / TSP / SOTR /	Approved Drawing / TSP / SOTR	NDT Report	1	2		Testing to be Done by ISNT/ASNT Level II/III Qualified Technician.
3.1.5		Dehydrogenation of Bearing Ring	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR & HT Chart	1	2		

SI No	MATERIAL/ COMPONENT AS PER SOTR/ DRG NO/ QUALITY ACTIVITY	CHARACTERISTIC/ TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE CRITERIA	FORMAT OF RECORD	AGENCIES			REMARKS
							P	R	W	
3.2.1	Proof Machined Shell / Casing / Ring (Post Babbiting Stage)	Process Record of Babbit Lining	100%	OEM Technical Specification	OEM Technical Specification	Process Record Sheet	1	2		
3.2.2		Visual Inspection	100%	Approved Drawing / TSP / SOTR	Conformity to Specification & Approved Drawing	IR	1	2		
3.2.3		DPT for Bearing Surface and Edge	100%	Approved Drawing / TSP / SOTR	Conformity to Specification & Approved Drawing	NDT Report	1	2		Testing to be Done by ISNT/ASNT Level II/III Qualified Technician in accordance with ISO 4386-3
3.2.4		UT (for bond Quality)	100%	Approved Drawing / TSP / SOTR	Conformity to Specification & Approved Drawing	NDT Report	1	2		Testing to be Done by ISNT/ASNT Level II/III Qualified Technician in accordance with ISO 4386-1
4.0	SECTION - IV : FINAL INSPECTION									
4.1	Finished Bearing	Visual Checks &	100%	Approved	Approved	IR	1		2	
4.2		Absolute bond strength test	01 Sample per PO, if Ordered Qty < 100,	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	NABL TC	1		2	If more than one size of bearings manufactured, then bearings approximately close to the
4.3		Dimensions	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR	1		2	Refer Note (5)
4.4		DPT for Bearing Surface and Edge	100%	Approved Drawing / TSP / SOTR	Conformity to Specification & Approved Drawing	NDT Report	1		2	Testing to be Done by ISNT/ASNT Level II/III Qualified Technician in accordance with ISO 4386-3

SI No	MATERIAL/ COMPONENT AS PER SOTR/ DRG NO/ QUALITY ACTIVITY	CHARACTERISTIC/ TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE CRITERIA	FORMAT OF RECORD	AGENCIES			REMARKS
							P	R	W	
4.5	Finished Bearing	UT (For Bond quality)	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	NDT Report	1		2	Testing to be Done by ISNT/ASNT Level II/III Qualified Technician in accordance with ISO 4386-1
4.6		Identification & Marking	100%	Approved Drawing / TSP / SOTR	Approved Drawing / TSP / SOTR	IR	1		2	
5	SECTION - V : PRESERVATION & PACKING									
5.1	Finished Bearing	Preservation & Packing	100%	PO & TSP/ SOTR & TNC Minutes	PO & TSP/ SOTR & TNC Minutes	IR	1	2		

Note :-

- (1) Drawings should be made and approved as per chapter 3 of QAD 01 R01.
 (2) Latest Technical specifications to be followed in all cases or as specified by user.
 (3) Packing material should not contain environment hazardous material prohibited by law/ regulation.
 (4) Imported material will be accepted as per instructions given in DQA(N) Letter No. 66301/ Policy/ DQA(N)/ SG dated 14 Nov 17.
 (5) Critical dimensions to be checked, preferably using 3D CMM (coordinate measuring machine).

Legends: 1 - Manufacturer, 2 - QA Agency, P - Perform, R - Review, W - Witness.