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**155MM/45CAL ELECTRONICALLY UPGRADED  
GUN SYSTEM**

**“DHANUSH”**

**QUALITY ASSURANCE PLAN/ACCEPTANCE TEST  
PROCEDURE**

**OF**

**EJECTOR PROJECTILE(MODIFIED)  
DRG.NO.GCF/50/39423**

**GUN CARRIAGE FACTORY**

**A GOVT. OF INDIA ENTERPRISES, MINISTRY OF  
DEFENCE**

**(A UNIT OF ADVANCED WEAPONS AND EQUIPMENT  
INDIA LTD)**

**QAP/ATP**

This quality assurance plan is a general guide to meet the quality requirements of product. It consists of applicable procedures (describing production processes, inspection & testing instructions), applicable workmanship standards, the measurement tolerances applicable, the description of material standards and so forth. It also mentions the list of documents, test certificates that will be submitted by firm to GCF along with finished component.

**1. Nomenclature & Drawing No. :**

EJECTOR PROJECTILE(MODIFIED) TO DRG.NO.GCF/50/39423

**2. Dimension & Tolerance :**

As per relevant IS/BS/BIS standard etc. mention in drawing of item/component. In case of assembly or subassembly drawings the type of fit should be follow as per relevant drawings. Angular or linear attachment or fitting at any location should be as per drawings.

**3. Material & Heat Treatment Condition:**

Material For DET No. 1&2 : - IS: 5517-1978, 40Ni6Cr4Mo3 , LRS 63.

Material For DET No. 4 : - IS: 738-1994, DESIGNATION 63400, T6.

**3.1 Test/Checks and Acceptance criteria for Material.**

SL. NO	TEST/CHECK	PARAMETER	ACCEPTANCE/AS PER APPLICABLE SPECIFICATION
1	Chemical composition	Composition	As per Standard
2	Mechanical properties	Tensile Strength	As per Standard
		Yield Stress	As per Standard
		% Elongation	As per Standard
		Hardness	As per Standard
		Impact strength	As per Standard
		Load Test	As per Standard
3	Physical Property	Density, Specific gravity ,Volume change ,Adhesion to &corrosion of metal, Resistance to low temperature ,e.t.c	As per standard
4	Macroscopic & Microscopic Property of structure	Different Phases ,Grain boundaries, Grain Structure	As per Standard
5	Load Test	Static & Dynamic Load, Tensile load, Compressive Load	As per Standard
6	Environmental impact test	Corrosion test, Oil /grease resistance, Water Resistance test, etc.	As per Standard
7	Electrical properties	Insulation test, conductivity test, etc as applicable	As per standard

**Note** – The raw material required for manufacture of the store in the form of ingot, round, square, sheet, plate, bars, tubes, coil, wire etc shall be procured as far as possible in bulk from reputed manufacturer so that entire quantity manufactured should meet the quality standards. Materials used for manufacturing shall be initially tested for chemical composition, mechanical properties & for other properties before undertaking of manufacture of component/Items etc. The heat treatment of raw material or component should be done as per standard or specifications mentioned in drawings. NDT techniques as recommended in standard & specification to be followed.

In case of rubber, polymeric, composite material /items/ components all relevant test as per specification given in drawing to be done in NABL/Govt. Lab.

**3.2** Manufacturer has to supply one test piece from bulk of material used for manufacturing along with item/component etc supplied to GCF for testing as per specification. (Factory may check chemical/ mechanical and other properties whenever required)

**4. Method of manufacture \*:**

**4.1** Manufacturer has to use the specified method of manufacturing of component/item/assembly/subassembly to ensure the quality of item/components. If manufacturer is using another method other than specified, then prior permission from GCF end is required.

**4.2** Item/component made by casting/machining/forging /welding etc should meet the dimension, tolerances, surface finish, surface treatment etc as specified in drawing. If there is any ambiguity in relation to drawing of items/components/specification, then he has to consult the GCF factory before mass production of item/component.

**4.3** Manufacturer has to specify the method of manufacturing of items/components/assembly/subassembly like Casting/Forging/Machining/Welding etc other operations used so that final outcome has specified chemical and mechanical properties. During and after machining, all dimensions and surface finish should be maintained as per specified drawing/standards.

**4.4** All operation's like Sand Blasting, Induction Hardening, Protective coating's/paints, Bending etc. should be done as per specification / standards given in drawing. Firm has to provide their report accordingly from NABL/ Govt. testing Lab & from their Quality Control departments.

**5.0 Inspection:** Following methodology is to be followed for inspection.

**5.1 Mode of Inspection & Sample Size/Selection:**

**5.1.1 At Firm Premises:** A team from GCF end will be deputed for Inspection of material/components/items at firm premises. Sample from bulk quantity will be selected by the team and will be send for inspection at NABL/GOVT laboratory for testing's as per specification. The bulk quantity before dispatch will be sealed and sign by the team and Firm representative. The manufacturer will also provide 100% pre inspection report of

item /components/material along with the lot of material supplied As per OFB input material inspection SOP.

**5.1.2 At Receipt End:** Inspection at GCF end will be done by Material inspection department as per sampling plan specified in IS standard 2500 part-II, 1965. Selected sample from bulk will be tested in GCF laboratory or any other NABL/GOVT lab to ensure the quality as applicable. Firm has to provide sample of raw material used for manufacturing along with each lot supplied. As per AWEIL input material inspection SOP.

**5.2 Visual Inspection**

S.NO.	DETAILS OF FEATURE	ACCEPTANCE CRITERIA
A	All Sharp Edges & Burrs	To be rounded off/chamfered and burrs to be removed
B	Chattering Marks on Thread	If applicable, Not allowed on thread
C	Tool Marks and Scratches	Not allowed
D	Surface finish.	Rust /pit marks not allowed and coating & plating is to be applied as per standard in drg.

The visual condition of item supplied by vendor should be in acceptable condition and free from corrosion, rust and other environmental impact. The item /component surface or subsurface supplied should be free from pits, cracks, flaws and other defects which may affect its functionality in future.

**5.3 Dimensional Inspection:**

All dimensions (critical, major & minor in nature) & geometrical features of drawings are to be covered in check sheet and should be duly inspected by concerned quality control section. Components, having dimensions as per drawing, should only be accepted by inspectorate. No deviation in dimension or in geometrical feature is permitted. Latest and calibrated measuring instrument with high accuracy as possible to be used for measurement. If computerized measuring machine like coordinate measuring machine etc are used for measurement their details along with tolerance and least count to be provided along with the report or mentioned in report.

**6. Other Test on Semi-finished/finished Component.**

**6.1** Details of tests /check on Semi-finished/ finished items and acceptance criteria:

S No.	TEST / CHECK	SAMPLE SIZE	ACCEPTANCE CRITERIA
A	Hardness Test (In process Inspection)	100%	If applicable, Hardness Within Specified hardness Range as per Standard.
B	Surface Treatment /Coatings	100%	As per standard
C	Environmental /Corrosion test	As applicable	If applicable as per standard specified

D	Ultrasonic Test	Area marked in Drawing	If applicable as per standard specified
E	Radiographic Test	Area marked in Drawing	If applicable as per standard specified

6.2 It is to be ensured by vendor that item/component /material supplied having homogeneous chemical/mechanical/physical properties and having uniform surface coating/ treatment /hardness throughout the cross section as mentioned in relevant drawing/standard or specification.

**7. List of Documents:**

**(To be submitted by firm along with finished component during factory end inspection)**

Pre inspection report of material/component/item as per specification and standard mentioned in drawing.

- (1) Certificate of conformity by supplier if applicable.
- (2) Vendor should submit dimensional report of material/item/component along with details of instrument and their tolerances as applicable as per Para 4.3 (sample 100%)
- (3) In material test report Heat treatment process and condition should be clearly mentioned and as per specification mentioned in drawing,
- (4) Material Chemical/Mechanical/Physical/ Microstructure/Load test report as per relevant standard and specification mentioned in drawings of supply order from authorized GOVT/NABL /DGQA Laboratory.
- (5) Vendor should ensure at least 90% reliability of item/component.
- (6) Guarantee/ Warranty certificate as per relevant supply order.
- (7) Life testing/Reliability report for items like bearings etc. as applicable for items which are specially designed or developed for GCF factory.

**8. Important Note:**

- (1) Final authority of acceptance is based on the Fit for Trial (FFT) report of item/material/component.
- (2) Use rust preventative after integration, location specified as per drawings specification; if applicable.
- (3) If any query arises pertaining to dimensions, standards (viz. mechanical properties, chemical composition, Heat treatment etc.) or any other aspects which are mentioned in QAP but the same is mismatched with actual drawings/standards, then the firm should intimate GCF with details explanation. The commencement of bulk production only be initiated after the proper clarification received from GCF Jabalpur.

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**Approved By  
Quality Controlling Officer**



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