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QUALITY ASSURANCE PLAN
TIN FOIL
FOR
OF 155 mm BMCS M91LZ & M92HZ

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RECORDS OF AMENDMENTS

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1.0 GENERAL

- 1.1 QAP has been prepared by Standard Cell, OFN on the authority of the CGM, OFN, a unit of MIL, under Ministry of Defence, Govt. of India.
- 1.2 The information contained herein is privileged and should be used by Authorized Personnel only.
- 1.3 The purpose of the QAP is to ensure the quality of TF and its raw materials, satisfy contractual agreements and meet quality standards.
- 1.4 This QAP is applicable and specific to manufacturing of TF.
- 1.5 The CGM, OFN or his authorized representative must have free access to the Suppliers/Manufacturers work premises, his processing facilities, assembly lines, Testing fields at all times during the auditing/ PDI as well as run of the contract. The supplier/manufacturer shall also make arrangements with outside agencies wherever becomes imperative to execute the Special Quality Management Tools / Tests with information to The CGM, OFN for effective and meaningful auditing as per IS/ ISO. 19011: 2018 standard.

1.6 DEFINITIONS FOR TERMS AND ACRONYMS

Ammn.	-	Ammunition
ANSI	-	American National Standards Institute
AQL	-	Acceptable Quality Level
BMCS	-	Bi Modular Charge System
CFEES	-	Centre for Fire, Explosive & Environment Safety
CGM	-	Chief General Manager
CQA(ME)	-	Controllorate of Quality Assurance (Military Explosives)
DCL	-	Defect Classification List
HZ	-	High Zone
IS	-	Indian Standard
ISO	-	International Organization for Standardization
MIL	-	Munitions India Limited
mm	-	Millimeter
NABL	-	National Accreditation Board for Testing and Calibration laboratories.
OFN	-	Ordnance Factory Nalanda
PDI	-	Pre Dispatch Inspection
QA	-	Quality Assurance
QC	-	Quality Control
QAP	-	Quality Assurance Plan
Spec.	-	Specification
RMC	-	Raw Material Clearance
Sl. No.	-	Serial Number
STEC	-	Storage and Transportation of Explosive Committee
TF	-	Tin Foil
w.r.t	-	with respect to

2.0 BRIEF DESCRIPTION OF THE PRODUCT

TF is manufactured with material consists mainly of tin in the form of foil with uniform thickness. It is used to prevent copper precipitation in barrels.

3.0 SAFETY/ SECURITY ASPECT

TF is used in the 155mm BMCS as a non Explosive component. Hence no special safety Regulation prescribed in STEC Pamphlet No. 2 is applicable to it.

4.0 TECHNICAL SPECIFICATION

TF shall be manufactured in accordance with the relevant drawings and relevant process schedule and shall meet all the technical requirements of the spec.

5.0 MARKING / IDENTIFICATION OF DETAILS

TF are to be marked / identified as per the relevant drg./spec. Any changes required shall be subject to approval of the CGM/OFN and shall not be changed without approval.

However the supplier / manufacturer shall mention lot no. in every consignment at their end w.r.t Lot Size as mentioned below at Para.9.

6.0 QUALITY**6.1 ORGANISATION**

The supplier / manufacturer shall have an appropriate organizational chart for the QC program describing the tasks in terms of QC activities, the roles and responsibilities of QC personnel performing the QC tasks to ensure that the concepts & standards applied are implemented and all testing & evaluation are done in accordance with approved plans, drg., Standards, and procedures.

6.2 FACILITIES

6.2.1 The supplier / manufacturer shall establish and maintain appropriate facilities for manufacturing of TF. The Shops used for manufacturing of TF shall be provided with all the necessary equipment/instruments, skilled personnel and appropriate environmental conditions with means of regulating temperature and relative humidity. The shops shall have a program for scheduled maintenance of all the equipment/test equipment/instruments. The shop shall maintain records of environmental conditions where required.

6.2.2 The supplier/manufacturer shall have/ arrange laboratory facilities for testing of TF. The laboratory shall be furnished with all the relevant test equipment/instruments and shall have a Program for scheduled maintenance of the test/measuring equipment/instruments. The laboratory shall have a program for calibration of its test/measuring instruments/equipment.

6.3 RAW MATERIALS / INPUTS

- 6.3.1 The supplier/ manufacturer shall offer all the raw materials as required for manufacturing of TF for sampling to the CGM, OFN in the format as per Annexure 'A' on supplier's / manufacturer's letter head.
- 6.3.2 The CGM, OFN reserves the right to draw sample of raw material at firm premises for further testing or alternatively the CGM, OFN may instruct firm to draw sample on their own and submit to laboratory for testing of physical and chemical parameters as per spec. Here in both cases the supplier/ manufacturer shall submit Ordnance Factory/ DGQA/ Govt./DRDO/NABL accredited Lab test report after testing.
- 6.3.3 The laboratory test report must contain the following information-
- i. OFN supply order no. & date
 - ii. Relevant specification no. and test method
 - iii. Date of sample receipt
 - iv. Date of testing
 - v. Representing bulk Lot quantity.
- 6.3.4 After receipt of laboratory test reports of physical and chemical parameters of raw materials to be used in manufacturing of TF from Ordnance Factory/ DGQA/ Govt./DRDO/NABL accredited Lab, OFN will examine the test reports and give RMC to the supplier/manufacturer for starting production of TF. Stores shall be manufactured only after getting RMC from OFN.

6.4 INTERMEDIATE

The Supplier/Manufacturer shall carry out inspection of all intermediates to ensure that they conform to the relevant spec. / drg. / standard. Only those intermediates meeting the spec. / standard /drg. shall be used for further processing.

6.5 PROCESS

The supplier/manufacturer shall ensure that only approved processes are adopted in the manufacturing of TF. The supplier/ manufacturer shall monitor and control the processes throughout the manufacturing process and shall maintain records of all critical process parameters. These records are made available to the CGM/OFN, as and when required.

6.6 ACCEPTANCE / PERFORMANCE TESTS

The supplier/ manufacturer shall evaluate the lots of the finished TF and assure himself that the lots shall satisfy the requirements laid down in the relevant Drg./ Spec. The number of samples to be drawn and the method of sampling shall be in accordance with the relevant standard/Spec. Records of evaluations done on the lots shall be maintained and made available to the CGM, OFN as and when required.

7.0 PROCESS AUDIT

7.1 The CGM, OFN or his authorized Representative may conduct process audit in accordance with IS/ISO 19011:2018. The supplier/ manufacturer shall offer his premises to the CGM, OFN, free of cost, all reasonable / related facilities (including test equipment / gauges) for satisfying himself during process audit, that the stores are being manufactured in accordance with the governing specifications / Environment.

7.2 The CGM, OFN shall forward the audit report to the Supplier/ manufacturer for necessary corrective action. The process audit report shall indicate either conformity or non-conformity with audit criteria and whether the process is effective / efficient and identify opportunities for improvement. The overall objective of the audit is continual improvement. The Supplier / manufacturer shall identify corrective action and implement the same. A follow up audit may be planned and conducted by the CGM, OFN to assess the effectiveness of the corrective actions

8.0 QUALITY AUDIT

8.1 AUDIT METHODOLOGY AND PRINCIPLES

The CGM, OFN shall carry out Quality Audit in accordance with IS/ISO 19011:2018.

8.2 SAMPLING PLAN

8.2.1 The CGM, OFN or his authorized Representative shall inspect/ audit the bulk lot as per approved Sampling Plan ANSI/ASQ Z1.4-2003 (R 2018), Single sampling plan, Normal inspection, and General Inspection level-II or as per requirement of the CGM, OFN during PDI or receipt inspection at OFN. These samples should be thoroughly representative of the bulk.

8.3 PRE DISPATCH INSPECTION

8.3.1 Upon completion of the manufacturing of the bulk lot, the supplier/ manufacturer shall offer the bulk lot of TF to the CGM, OFN, free of cost, all reasonable / related facilities (including test equipment / gauges) for PDI along with following documents.

- a. Pre inspection and in-process inspection reports of TF as per relevant drawing and specification.
- b. Raw material consumption and balance statement as per Annexure-'C' on supplier's / manufacturer's letter head.
- c. Safety certificate and guarantee/warranty certificates for every consignment as per Annexure-'B' on supplier's / manufacturer's letter head.
- d. Any other quality related documents at the discretion of the CGM, OFN or his authorized Representative, as per general industry practice.

8.3.2 The CGM, OFN or his authorised representative shall audit the quality documents and draw samples from the bulk lot as per sampling plan, evaluate physical parameters as per approved drawing and Spec. and classify the samples as defective/non defective as per DCL based on physical inspection.

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- 8.3.3 The CGM, OFN or his authorised representative shall draw samples, wherever required, for testing of physical and chemical parameters as per spec. at Ordnance Factory/ DGQA/ Govt./DRDO/NABL accredited Lab.
- 8.3.4 Upon successful completion of PDI and satisfactory laboratory test results of TF, the bulk lot shall be recommended for Dispatch Clearance. Lots not meeting the criteria for acceptance requirement during PDI or unsatisfactory laboratory test results the lot shall be **REJECTED**.
- 8.3.5 The CGM, OFN in his discretion may exempt the PDI and allow consignment to dispatch without PDI. In that case the lot will be accepted/ rejected based on receipt inspection of the bulk lot at OFN.
- 8.4 **RECEIPT INSPECTION**
- 8.4.1 Upon receipt of the bulk lot at OFN, QC team of OFN shall audit the quality documents and draw samples from the bulk lot as per sampling plan, evaluate physical parameters as per approved Drg. and Spec. and classify the samples as defective/non defective as per DCL based on physical inspection. The supplier/ manufacturer shall submit following documents along with consignment-
- Pre inspection and in-process inspection reports of TF as per relevant Drg. and Spec.
 - Raw material consumption and balance statement as per Annexure-'C' on supplier's/manufacturer's letter head.
 - Safety certificate and guarantee/warranty certificates for every consignment as per Annexure-'B' on supplier's / manufacturer's letter head.
 - Any other quality related documents at the discretion of the CGM, OFN or his authorized Representative, as per general industry practice.
- 8.4.2 Additional samples may also be drawn from the bulk lot by OFN QC team for testing of physical as well as chemical parameters at Ordnance Factory/ DGQA/ Govt./DRDO/NABL accredited Lab. Sample shall also be sent to user section for user trial.
- 8.4.3 In case where PDI has been done, the scope of receipt inspection will be in the purview of the CGM, OFN.
- 8.4.4 Upon successful completion of receipt inspection, auditing of quality documents provided by the supplier / manufacturer, satisfactory laboratory test results and user trial report, the bulk lot shall be sentenced as **ACCEPTED**. Lots not meeting the criteria for acceptance requirement or unsatisfactory laboratory test results or adverse user trial report, the lot shall be sentenced as **REJECTED**.

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9.0 ATTRIBUTE INSPECTION PLAN INDEXED BY AQL- ANSI/ASQ Z1.4-2003Normal inspection- Single Sampling Plan- General Inspection level II^a

	155mm BMCS M91LZ	155mm BMCS M92HZ
Lot Size	56 Kg or multiple of 56 Kg	108 Kg or multiple of 108 Kg
Sample Size	As per Sampling Plan no. ANSI/ASQ Z1.4-2003 (R 2018)	

DCL	AQL%		Accept	Reject
	BMCS M91	BMCS M92	As per Sampling Plan no. ANSI/ASQ Z1.4-2003 (R 2018)	
Critical	0.065	0.04		
Major	0.65	0.65		
Minor	1.50	1.50		

9.1 LIST OF DEFECT:

Sl.	Inspection Parameter	Specified Limit	Nature of defect	DCL
01	Physical Dimension & Weight of TF	As per Drg.	Dimension & weight beyond specified limit.	Major
02	External Defect on TF	---	Tear, scratch, cut, pin hole, unwanted spot	Minor
03	Thickness	Uniform	Non uniform thickness	Major

10.0 PROCEDURE FOR DISPOSAL OF NON-CONFORMING AMMUNITION MATERIALS

TF not meeting the standard/specifications during bulk receipt inspection at OFN shall be sentenced as '**REJECTED**' and intimated to the supplier/ manufacturer for collection from OFN Store. Further action will be taken as per procedure laid down in Supply Order.

11.0 LIST OF DRAWINGS

Sl.	Assembly/ Component	Nomenclature	OFN Drawing No.
1.	---	Tin Foil	BMCS-M91-M92-TF-01

12.0 SPECIFICATIONS OF TIN FOIL:

Specification No.OFN/SPEC/BMCS/M91/M92/TF/00

Sl. No.	Description	Unit	SPEC. LIMIT	Test Method
1.0	Tin as Sn, %	%*	97 Minimum	SLM1406
2.0	Thickness,	µm	45-55	As per Drg. No.BMCS-M91-M92-TF-01
3.0	Mass/m ²	g/m ²	340-440	
4.0	Length	mm	465±1	
5.0	Width	mm	50±1	

* All percentages are expressed as mass per mass.

12.1 SPECIFICATION OF RAW MATERIAL OF TIN FOIL:

Specification No.OFN/SPEC/RAWMAT/M91/M92/TF/00

Sl. No.	Description	Unit	SPEC. LIMIT
1.0	DIMENSIONS		
1.1	Tin as Sn, %	%	97 Minimum

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Annexure-A

Raw Materials offered for sampling and Inspection:
Product Name:

Sl. No.	Nomenclature of Item/ Store	Drg. No./ Part No.	Raw Material Name	Specification No.	Offered Qty

Authorized signatory

Guarantee/ Warranty CertificateAnnexure-B

We hereby declare that the product..... quantitysupplied by our company M/s..... vide Challan No..... Dated..... as per S. O. No.....Dated..... are meeting all requirements laid down in the relevant specification.

We hereby undertake to replace whole and/ or part consignment as the case may be in the event of it is not meeting the requirements/ standards laid down in the supply order. This Guarantee/ Warranty Certificate is valid tillmonths from date of receipt at O. F. Nalanda.

Quality Control Manager

Managing Director/General Manager
or his authorized Signatory

Supplier's Stamp

Annexure-CRaw Material Consumption Report

S.O. No..... Date.....
 Product Name.....

Supplied Qty.....

Sl. No.	Raw Material	Accepted Qty	Ref. Document of QC, OFN	Last Consignment balance Qty. (Total)	Present Consignment Consumed Qty.	Present Consignment (balance) Qty
A	B	C	D	E	F	G

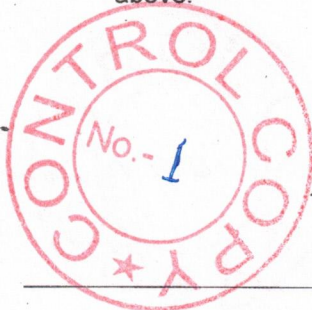
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Tin Foil for 155 mm BMCS M91 LZ and M92 HZ

- 1.0 This Monitoring Instruction (MI) shall be applicable invariably as Addendum of Quality Assurance Plan (QAP) no. OFN/QAP/BMCS/M91/M92/TF/00, Rev.00, dated 10.04.2024. MI shall be strictly followed/complied by all the interested parties.
- 2.0 Supplier/ manufacturers on receipt of Supply Order (SO) should invariably check the correctness of the SO in respect of item description, drawing no., specification, delivery period, place of inspection, inspection authority and quality clauses.
- 3.0 Supplier/ manufacturer shall offer all the raw materials as required for manufacturing of Tin Foil for sampling to the CGM, OFN in the format as per Annexure 'A' of QAP, mentioned in Para 1.0 above, on supplier's / manufacturer's letter head. Supplier/Manufacturer may offer raw materials for entire Supply Order qty. at their own risk and cost.
- 4.0 For Inspection and acceptance of raw materials, clause no. 6.3.2, 6.3.3, 6.3.4 of QAP, mentioned in Para 1.0 above shall be applicable.
- 5.0 **Source Development Open Tender Enquiry (SDOTE) Cases:**
- 5.1 **Advance Sample Qty.: 0.5 kg**
- Advance samples shall be manufactured from the approved/cleared raw material and submitted to OFN along with pre-inspection report, raw material consumption report etc. for inspection (Physical and chemical inspection as well as user/ fitment trial).
 - The inspection and acceptance of advance samples shall be done as per provisions of QAP, mentioned in para 1.0 above.
 - After satisfactory inspection report (Physical and chemical inspection as well as user/ fitment trial), supplier/manufacturer shall be accorded clearance to manufacture a Pilot Lot and offer the same for the inspection.
 - In case of rejection of advance samples, supplier/ manufacturer may submit subsequent advance samples free of cost for the inspection. Advance samples shall be in exclusion to the Supply Order Qty.
- 5.2 **Pilot Lot: Lot Size: 108 kg**
- 5.2.1 Upon getting clearance from OFN to manufacture a Pilot Lot, the supplier/ manufacturer shall manufacture and offer a pilot Lot for inspection along with following documents/reports :
- Pre inspection and in-process inspection reports of Tin Foil as per relevant Drawing and Spec.
 - Raw material consumption and balance statement as per Annexure-'C' of QAP, mentioned in para 1.0 above on supplier's/manufacturer's letter head.
 - Safety certificate and guarantee/warranty certificates for every consignment as per Annexure-'B' of QAP, mentioned in para 1.0 above on supplier's / manufacturer's letter head.
- 5.2.2 Inspection and acceptance/rejection thereof, of Pilot Lot shall be done as per provision of QAP mentioned in para 1.0 above.
- 5.3 **Bulk Production Clearance (BPC):**
- After acceptance of the pilot lot, BPC will be accorded to the supplier/manufacturer. For subsequent supplies, QAP, mentioned in para 1.0 above shall be the guiding document.
- 6.0 **Open Tender Enquiry (OTE) / Limited Tender Enquiry (LTE) / Option Clause (OC) Cases:**

Inspection and acceptance/rejection thereof, shall be done as per provision of QAP mentioned in para 1.0 above.



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