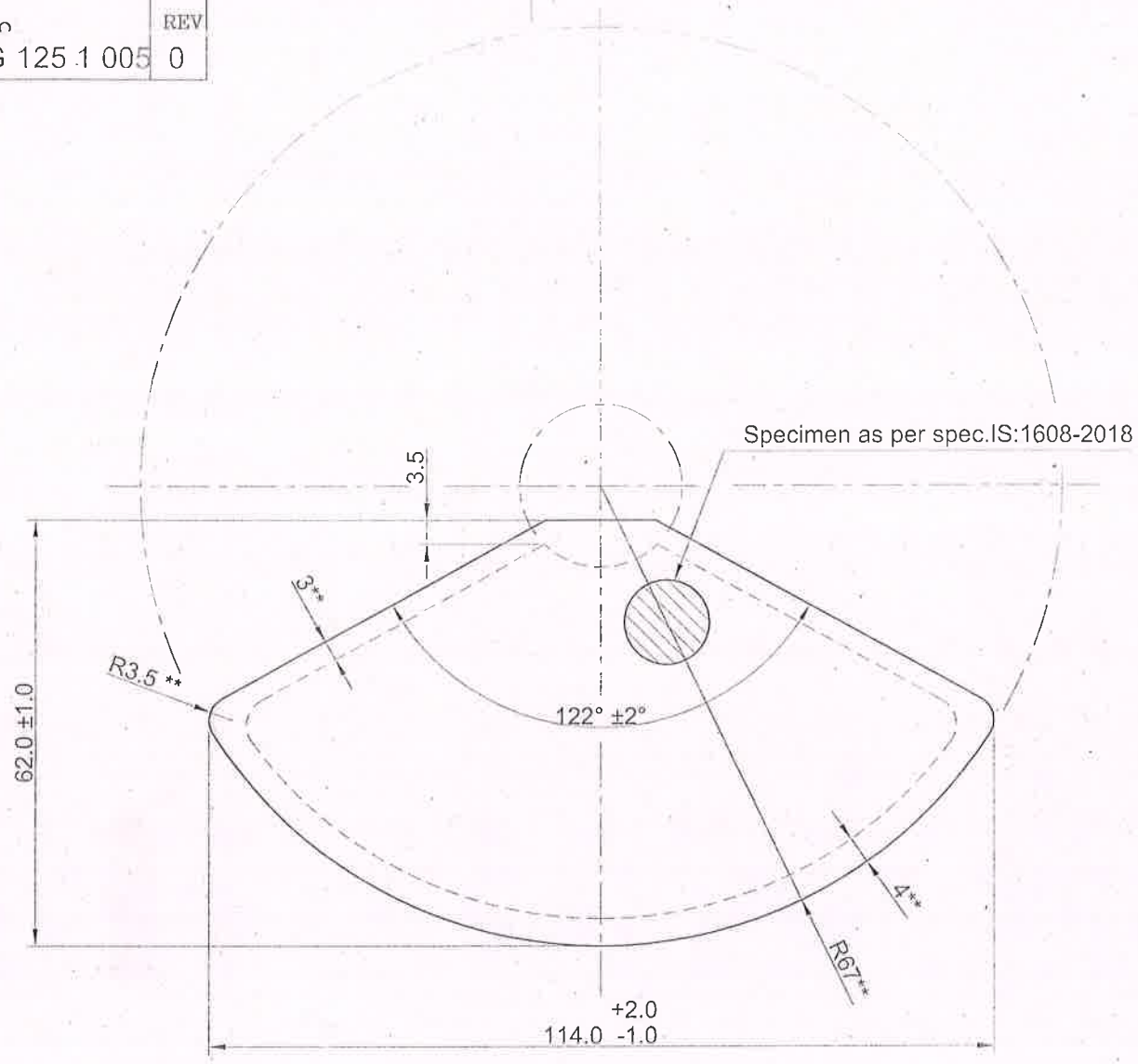
DRG No	REV
O DRG 125 1 005	0



Note:

1. **Dimensions are provided for reference.
2. Dashed line indicates outline of the finished product.
3. Other specifications of supply are as per GOST 8617-81 and TU 1-2-486-86.

ALL DIMENSIONS ARE IN mm
REMOVE ALL SHARP EDGES

MATERIAL	REV	ALTERATIONS	DATE	LATEST REF./DC NO.:
TU 1-2-486-86 Grade V96ts1(B96u1) Condition Tempered & Artificially aged				nk '01358-3
HARDNESS				DRAWN
-----				CHECKED USER SEC
SURFACE FINISH				CHECKED QAP
				APPRD.
				DATE 06.12.24
				SCALE NTS

TITLE :

EXTRUDED PROFILE FOR DRIVING RING
(125mm FSAPDS AMK-339)

SHEET 1 OF 1

EST MASS	PRO./FINAL

HIGH ENERGY PROJECTILE FACTORY
TIRUCHIRAPALLI

DRG. NO: O DRG 125 1 005 REV 0

Raw material : Aluminum Alloy

Specification : TU 1-2-486-86 GradeV96ts1(B96U1)

Condition :Tempered & Artificially aged

Drg. No. : Profile drg. No.nk 1358-3.with length of 2400mm to 4800mm in multiples of 160mm

END USE : AMK-339 DRIVING RING.

Reference Document :Extruded profiles of aluminum alloy of grade v96ts(1) (B96 U1) Specification TU-1-2-486-86

1. TABLE-1 CHEMICAL COMPOSITION

The chemical composition of the material shall be :-

	Elements	%
1	Copper	2.00 - 2.6
2	Magnesium	2.30 - 2.8
3	Manganese	0.30 - 0.60
4	Zinc	8.00 - 8.80
5	Zirconium	0.10 - 0.16
6	Ferrum	0.30 max.
7	Silicium	0.20 max.
8	Chrome	0.05 max.
9	Titanium	0.05 max.
10	Other elements	0.05 max. each Cumulatively 0.10 max.

2. TABLE –2 MECHANICAL AND OTHER INSPECTION PARAMETERS AFTER EXTRUSION .

	Properties	Description		Samples
1	Yield stress in N/sq.mm (kgf/sq.mm)	608 (62)	min	As per para 7
2	% of elongation	5%	min	
3	Microscopic inspection	As per para 08		
5	Macroscopic inspection	As per para 09		
6	Electrical Conductivity test	As per para 10		
7	Residual internal stress determination	As per para 11		

3. Contraction ratio to be indicated along with percentage of elongation, percentage of elongation below 5 % is admissible if the contraction ratio on the same specimen is 10% minimum.

4. The profiles are to be supplied in tempered and artificially aged condition (T 1).

5. **BATCHING PROCEDURE.**

The profiles shall be for forwarded in batches. A batch shall consist of profiles:

i. Manufactured from ingots of the same cast, tempered in the same melting charge and also aged in the same melting charge.

ii. The batch weight is not limited.

iii. A sequence number is assigned to each profile in the batch.

6. **MECHANICAL PROPERTIES.**

i. The mechanical characteristics tests shall be conducted by a destructive inspection method as per IS 1608-2018. To test the mechanical characteristics by a destructive inspection method a specimen shall be cut out from each tested bar from the outlet end in the longitudinal direction.

ii. 10 % of profiles in a batch but not less than two profiles are submitted to mechanical characteristics testing. At the beginning of profile production or upon any changes of their production process, each profile from the first five casts is subject to mechanical characteristics testing. In case of satisfactory results, transition to testing of 10 % profiles in a batch is made.

iii. In case of unacceptable test results, repeated tests are conducted on a double number of specimens cut out of the same blanks on which the unacceptable test results were obtained.

iv. In case of unacceptable results of the repeated tests, the batch is rejected. Single-piece sorting is permissible in case of 100 % testing of mechanical characteristics by the manufacturer.

7. **MICROSCOPIC INSPECTION.**

The microscopic structure is inspected on the specimens cut out at the outlet end. To test the section microscopic structure subject to hardening one section shall be

selected for burning from each heat in a thermal treatment melting charge. The microscopic structure of hardened sections shall not have burning marks.

8. MACROSCOPIC INSPECTION.

i. 10 % of profiles in a batch but not less than two profiles are submitted to macroscopic structure inspection. The macroscopic structure inspection is conducted on templates cut out at the pull-down end of the profile.

ii. The macroscopic structure of sections shall be tested on the transverse macro template cut out from the shrinkage end of a tested bar. If the tested bar has a shrinkage cavity (in case other macroscopic structure requirements have been complied with) it shall be removed completely and the other batch sections shall be cut to a length equal to that of tested section cut end.

iii. The macroscopic structure of sections is allowed to have nonmetallic impurities in the form of dots not larger than 0.5 mm or line marks not more than 3 mm long, if their number does not exceed 5 pieces — for sections above 50 sq.cm, coarse-grain zone around the periphery, if its depth does not exceed 5 mm.

iv. The macroscopic structure of sections shall not have cracks, micro porosity and sink marks.

9. ELECTRICAL CONDUCTIVITY TEST

Electrical conductivity test to be carried out for each rod tested for Tensile test on 15mm section as shown in Annexure – A, fig1. Data to be furnished for each rod tested for tensile test. Electrical conductivity should be 30.0 to 36.0% IACS.

10. RESIDUAL INTERNAL STRESS DETERMINATION

Absence of residual internal stress should be checked on minimum 3 rods in each heat by cutting of slices having approximately 15 mm thickness. Each slice shall be cut through as shown in Annexure – A of fig. 2 up to 31mm. The width of the slot "t" is the width of the sawing tool. If spring back of material is attained, causing the sawing tool not to move freely, then the test is considered to have failed and material rejected or otherwise accepted.

11. GEOMETRIC INSPECTION.

i. Angle of twist around the direct axis for 1m of any section portion shall not exceed 2° with the base surface width above 50 mm to 200 mm.

ii. The sections shall be straight. Longitudinal smooth straightness error relative to any surface on any portion of 1m shall not exceed 4 mm.

iii. Smooth waviness with a wave height of 2mm maximum is allowed on the sections. A number of such wavy areas shall not be more than one for 1m of section length.

iv. Each section shall be inspected for the external surface condition and geometrical dimensions.

12. DIEMENSIONAL INSPECTION.

i. Dimensional inspection to be carried out as per prescribed drg. dimension given.

ii. The reference dimensions mentioned in the drawing are not mandatory to be measured.

13. MARKING.

i. The sections shall be bound in bunches to which labels shall be attached with alloy grade, cast number, material condition, strength type, batch number, batch weight along with manufacturer's quality control department stamp.

ii. The sections not bunched shall have the following punched or painted: the manufacturer's trademark, aluminum alloy grade, material condition, batch number and the manufacturer's quality control department stamp.

iii. The stamp is applied on the outlet end at the distance of 50 mm maximum from the section end face.

iv. The sections from which specimens for the mechanical tests were selected shall have additional marking with a serial number in it.

v. If the profile is cut in sections, an additional marking of letter "U" ("Y") (pull-down end) shall be applied on the butt end of the blank directly adjacent to the pull-down end of the profile

02/12/24

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Annexure-A

Electrical conductivity test specimen

Fig-1

Residual stress determination sample

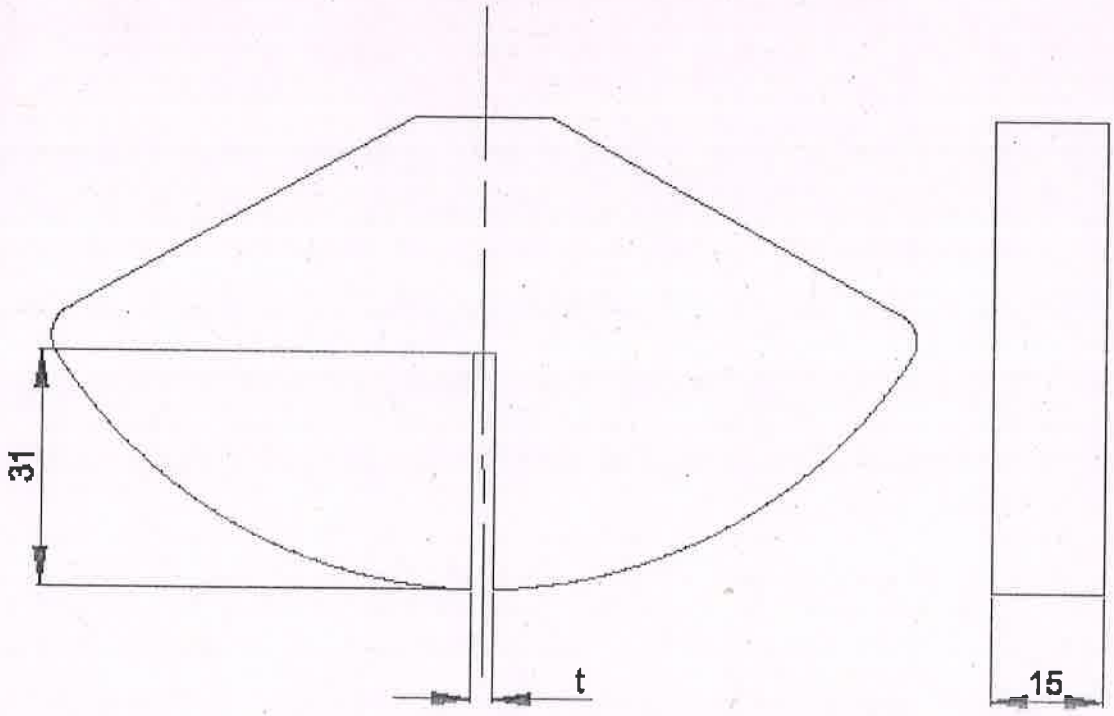

Fig- 2

MONITORING INSTRUCTION FOR INSPECTION	Issue No. 01 Rev. No. 00
	Date of Issue 06.12.2024
EXTRUDED AL.PROFILE FOR AMK-339 DRIVING RING	HEPF/QA/SC/AMK/010

Rev No.	Amendment	Date

DRAWING No. : O DRG 125 1 005 0

SPECIFICATION : HEPF/QA/AMK/SPEC/002

END USE : 125mm AMK-339 Driving Ring.

TABLE A: RAW MATERIAL INSPECTION CHECKS AT FIRMS PREMISES BY THE FIRM.

SL. NO.	CHARACTERISTICS	SPECIFICATION / REQUIREMENT	SAMPLE SIZE
1	Workmanship (visual)	The material shall be uniform and free from defects such as rust, scale, burrs, and any other harmful defects.	100 %
2	Chemical test	As per table 1 in HEPF/QA/AMK/SPEC/002	One sample per heat

1. The firm has to offer the raw material for inspection and clearance by forwarding the following documents to HEPF
   a. Raw Material purchase details, like quantity, number of rods and heat number against each batch of material.
   b. The firm will submit the characteristics tests certificates as per Table-A
2. HEPF shall verify all the documents as mentioned above If results are satisfactory, HEPF shall accord clearance for the extrusion operation. Firm shall proceed the operation after the receipt of clearance from HEPF.

TABLE B. INSPECTION / OPERATION TO BE CARRIED OUT AFTER EXTRUSION BY THE FIRM

SL. NO.	CHARACTERISTICS	SPECIFICATION / REQUIREMENT	SAMPLE SIZE
1	Workmanship (visual)	The material shall be uniform and free from defects such as rust, scale, burrs, and any other harmful defects.	100 %
2	Length	2400mm min. ; 4800mm max. in multiples of 160mm	100%
3	Mechanical tests	As per table 2 . in HEPF/QA/AMK/SPEC/002 in para 7	As per spec. IS:2500
4	Micro inspection	As per table 2 . HEPF/QA/AMK/SPEC/002. in para 8	
5	Macro inspection	As per table 2 in HEPF/QA/AMK/SPEC/002 in para 9	
6	Electrical conductivity test	As per table 2 in HEPF/QA/AMK/SPEC/002 in para 10	3 samples per heat
7	Residual internal stress determination	As per spec. HEPF/QA/AMK/SPEC/002 in para 11	
7a	Geometric Inspection	As per spec. HEPF/QA/AMK/SPEC/002 in para 12	100%
8	Dimensional inspection	As per spec. HEPF/QA/AMK/SPEC/002 in para 13	100%
9	Marking	As per spec. HEPF/QA/AMK/SPEC/002 in para 14	100%
10	Packing	Suitably packed to avoid transit damages and securely tied with metal / plastic tag. Packing slip should specify HEPF supply order no. Quantity in nos.	100%

TABLE C. INSPECTION CHECKS TO BE CARRIED OUT ON RECEIPT AT HEPF

SL. NO.	CHARACTERISTICS	SPECIFICATION / REQUIREMENT	SAMPLE SIZE
1	Workmanship (visual)	The extruded profile shall be uniform and free from defects such as cracks, folds, laps, seems, porosity, inclusions, stringers, die marks under fill, overheating, quench cracks etc..	100 %
2	Dimensions	As per drawing.	As per IS:2500
3	Length	As per row 2 of table B.	100%
4	Verification of documents	As per Table – A & B.	100%
5	Packing	Suitably packed to avoid transit damages and securely tied with metal / plastic tag. Packing slip should specify HEPF supply order no. Quantity in nos. and producer's name or code.	100%

3. HEPF shall verify all the documents, in addition to above inspection checks pertaining to table A& B and may select the sample at random from the bulk for testing of any parameter as specified in Table – A&B, either in whole or in part, at its discretion.

QUALIFICATION CRITERIA FOR A NEW SUPPLIER / VENDOR

4. Firm has to supply a minimum of 50 nos. of extruded profiles with the length of 2400mm from a single heat. After on receipt inspection at HEPF as per table-A & B, the extruded profiles will be subjected to machinability trial and further Type Testing trial.

   a. For type test evaluation, ammunition will be assembled with driving ring manufactured from the supplied lot of 50 Nos. of extruded profiles This ammunition will be subjected to dynamic proof.

   b. If the type test results are satisfactory and meeting the qualifying criteria, then only the 50.nos of extruded profiles will be accepted and Vendor/Supplier will be given clearance for bulk supply.

Rev No.	Amendment	Date

TABLE D: VERIFICATION OF INSPECTION DOCUMENTS

FOLLOWING INSPECTION DOCUMENTS MUST BE ENCLOSED WITH EACH SUPPLY.

1	The raw material details, like heat number, quantity purchased and number of bars etc.
2	Test certificates for characteristics mentioned in table A & B from NABL accredited or Govt. Approved laboratory as applicable.
3	Packing slip details.
4	In addition to the above, soft copies of all the certificates mentioned shall be sent to following e-mail id's. happqa@ord.gov.in, mmhapp@ord.gov.in.
Note	1.In case of any differences, Specification & drawing shall prevail. 2.explicit deviation(s) if any such as typographical error, values, numeric, other parameter, etc. is / are found in monitoring instruction of the above stores, the relevant standard conforming to the concerned specification shall be referred to confirm the parameter.

24/01/25
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