

SPECIFICATION FOR SUPPLY OF TUNGSTEN POWDER FOR MANUFACTURE OF TUNGSTEN NOSE COMPONENT

Specification No: HEPF/Nose/W powder/01
Rev: 0.0, dated: - 09/09/2022



ISSUED BY

HIGH ENERGY PROJECTILE FACTORY
A UNIT OF MUNITIONS INDIA LIMITED
GOVERNMENT OF INDIA ENTERPRISE
MINISTRY OF DEFENCE
TRICHY

RECORD OF AMENDMENTS

Amendment	Sub-heading to Which amendment Pertains	Authority	Incorporated by name and rank in block letters	Initials
REFERENCE				

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TUNGSTEN NOSE COMPONENT

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1. FOREWARD

This specification has been prepared by High Energy Projectile Factory, Trichy.

The information contained in this specification is not to be communicated either directly or indirectly to any agency, organization or any person without taking prior approval from HEPF, Trichy.

This specification is the property of High Energy Projectile Factory, Ministry of defense and must be returned to the General Manager, High Energy Projectile Factory, Trichy on demand.

Copies of this specification can be obtained from the General Manager, High Energy Projectile Factory, Trichy.

2. SCOPE AND DEFINITION

This specification relates to Procurement, Quality Control of Tungsten powder (W) for manufacturing of Nose Component.

For the purpose of this specification the following expressions shall have the meaning as under.

- a) **Quality Control Authority** shall mean the General Manager, High Energy Projectile Factory, A Unit of Munitions India Limited, Government Of India Enterprise, Ministry of Defense, Trichy -620 025.
- b) **The Manufacturer** shall mean the person or persons, firm or firms, company or companies who have contracted to manufacture and supply the Tungsten powder for which this specification applies.
- c) **The Quality Control Officer** which means the Quality Control Officer nominated by the General Manager, High Energy Projectile Factory for undertaking the quality Assurance of the Tungsten powder
- d) **Apparent Density** It is the weight of a unit volume of loose powder expressed in grams per cubic centimeter. This characteristic defines the actual volume occupied by a mass of loose powder.
- e) **Performance Conformity Test** This test is carried out to evaluate Density, UTS and % Elongation of sample prepared by compaction & sintering of Tungsten powder in specified proportion.
- f) **Average Particle Size** Expressed in Microns, when tested as per the specification.

3. General Requirement

Manufacturer shall provide the following details along with the bulk supply of Tungsten powder:

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- 3.1 Test certificates for various tests carried out by the manufacturer for the powder supplied.
- 3.2 Marking - Each container of powder shall have subscribed over it the batch /lot number, total no of containers comprising the batch / lot, date of manufacture and name of manufacturer.
- 3.3 Packing - The material should be filled in double polythene film bags and shall be packed in weather tight sealed and reinforced steel drums having lifting rings provided at sides & top. The drum shall be packed in sea worthy crates, which should be sturdy to withstand any possible damage to drums during transit & handling. Each drum shall be super scribed with manufacturing lot no, purchase order number and the date of final sealing. In case the polythene film bags are found in open or ruptured condition inside the drum, the powder will not be accepted. Such rejected material should be replaced by the supplier at no cost basis.
- 3.4 Shelf life certificate for the Tungsten powder supplied by the firm shall be submitted along with supply

4. Quality Control

- 4.1 Selection of Tungsten powder samples: On receiving the bulk supply of Tungsten powder at HEPF, 12 kg powder from each homogenous batch/lot is taken for conducting the tests at HEPF laboratory or any other laboratory as per the discretion of HEPF. Three representative samples of appropriate weight, each from a different container, covering each homogenous batch/lot of powder received shall be drawn by the Quality Control Officer/Representative of Quality Control Officer for the purpose of verifying physical and chemical requirements stipulated in this specification. Powder samples drawn from the containers shall be sealed in air tight polythene container and the batch / lot no with associated details marked on it.
- 4.2 The powder shall be tested for the following properties:
 - a) Chemical composition
Samples as drawn above shall be subjected to chemical analysis by adopting standard methods for compliance with the requirements of this specification stipulated in clause 5.1
 - b) Physical Properties
Each sample as drawn above shall be tested for Apparent Density as per ASTM Designation B-417 -82 and average Particle size as per ASTM Designation B - 330-82 for compliance with the requirement of this specification stipulated in clause 5.2

Particle size distribution data shall be obtained from the supplier for reference only.

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c) Performance conformity Test:

- (i) With the powder remaining after physical & chemical testing as per clause 4.2(a) & 4.2(b), one blank shall be compacted, sintered, heat-treated by mixing with other approved powders as per approved manufacturing procedure (DMRL/WAS/16) for carrying out Performance Conformity test to check the compliance as per clause no 5.3. Three test pieces shall be machined as per sketch no K NOS 125 1 001, K NOS 125 1 002 & K NOS 125 1 003. (enclosed as Annexure-1,2 & 3)
- (ii) If one, out of 3 test pieces fails, 2 more test pieces shall be machined from the original left over blank and tested. The lot shall be cleared, if results are Satisfactory in retesting for both the test pieces.
- (iii) If more than one test pieces fail in PCT, a second set of test pieces shall be prepared from a new blank and all the 3 test pieces should pass for the lot to be accepted.

4.3 Powder supplied, if found acceptable as per clause 4.2(a), 4.2(b) & 4.2(c) shall be accepted.

5 Acceptance Criteria

5.1 Chemical composition:

Tungsten powder shall conform to the following composition.

W%	Ca ppm max	Al ppm max	Mg ppm max	K+Na ppm max	Cu ppm max	Mn ppm max	Sn ppm max	As ppm max	Sb ppm max	Ti ppm max	Bi ppm max
min	max	max	max	max	max	max	max	max	max	max	max
99.9	40	20	15	30	20	15	20	10	-	-	10

Si ppm max	C ppm max	S ppm max	O ppm max	Na ppm max	P ppm max	Cr ppm max	Pb ppm max	Zn ppm max	Ag ppm max	Total specified impurities
40	40	10	750	-	10	-	-	-	-	Not to exceed 0.10%

5.2 Physical Properties:

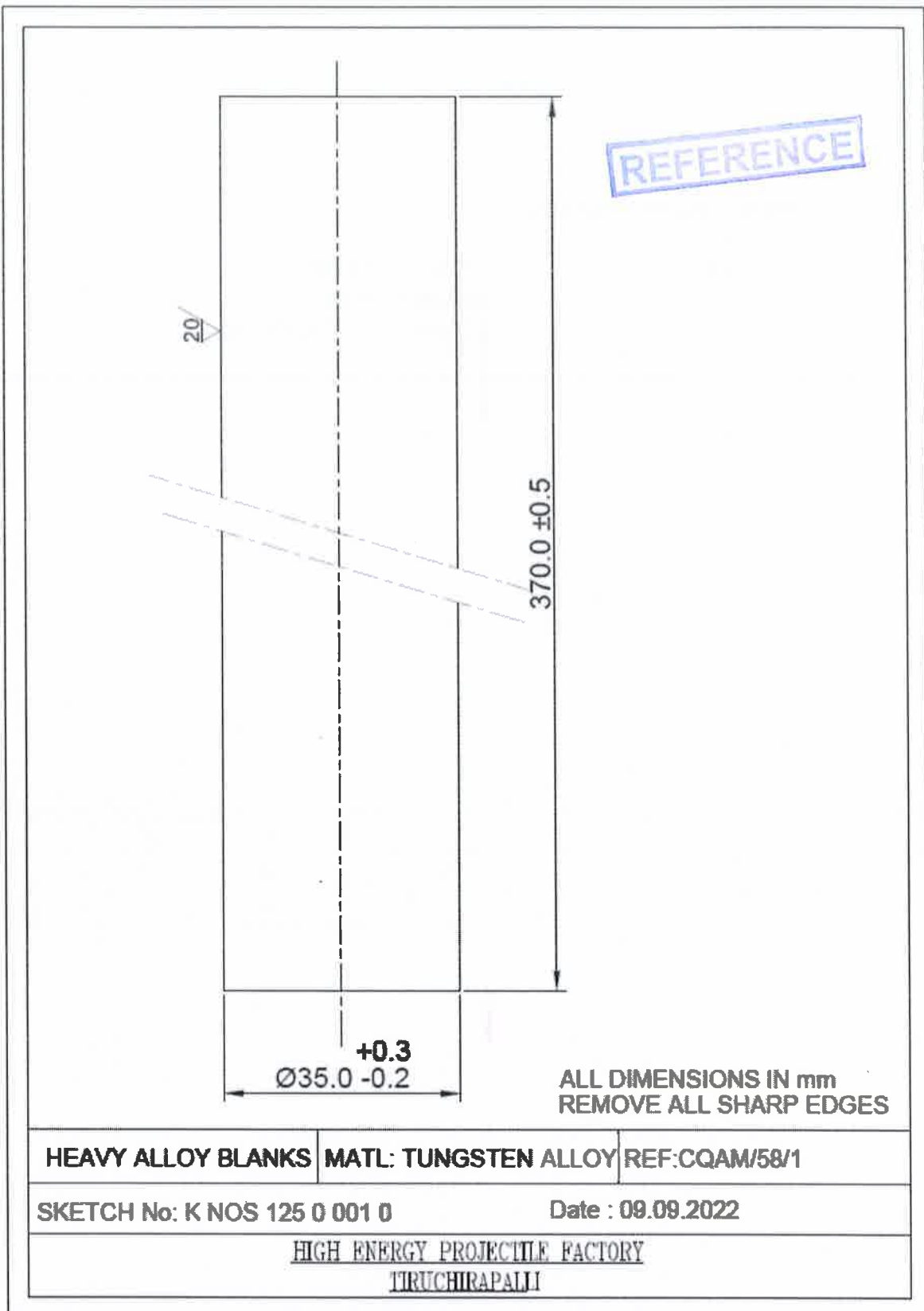
Apparent Density	3.9 - 4.3 gm/cc
Average Particle Size	3.0 - 5.0 Microns FSS

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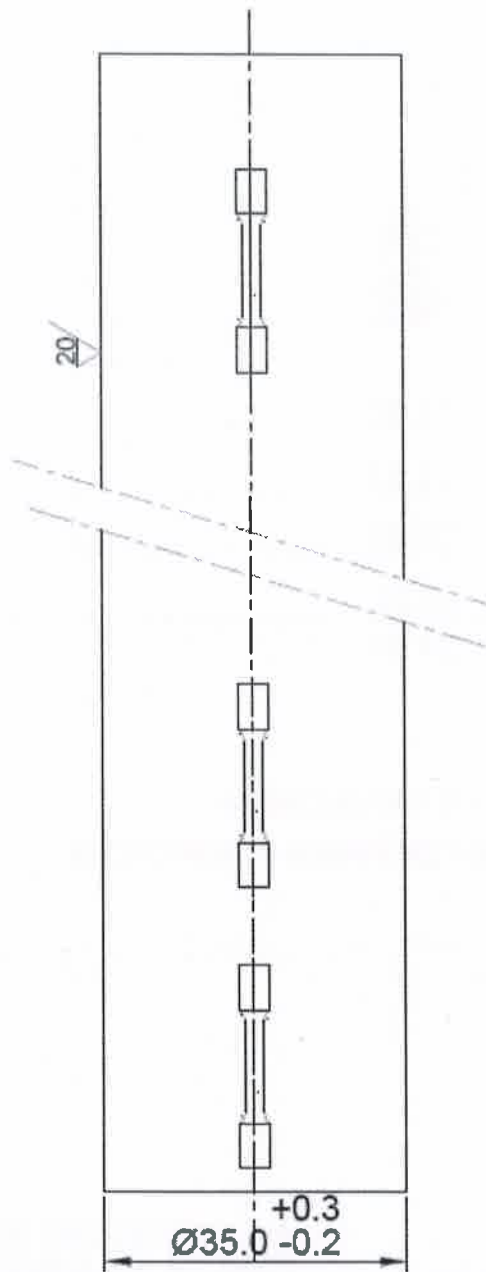
5.3 Performance conformity Test

- i) Density - 17.12 + 0.12 gm / cc
 - ii) UTS - 850 MPa (min)
 - iii) % El - 20 min (GL = 11.35mm)
-

ANNEXURE -1



ANNEXURE -2



ALL DIMENSIONS IN mm
REMOVE ALL SHARP EDGES

LOCATION OF TEST SPECIMENS
FOR PRACTICE SHOT NOSE

MATL:
TUNGSTEN
ALLOY

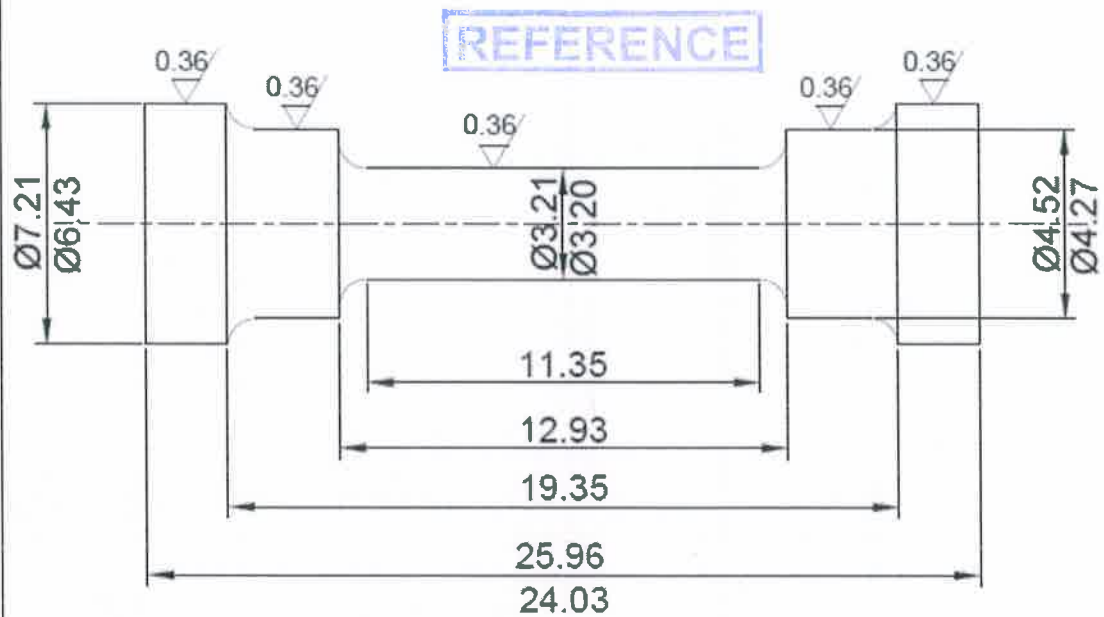
REF: CQAM/58/2

SKETCH No: K NOS 125 0 002 0

Date : 09.09.2022

HIGH ENERGY PROJECTILE FACTORY
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ANNEXURE -3



TURNING FINISH UP TO 1.25 MICRONS

USE EMERY GRIT 220 FOR FINISH 0.36 MICRONS

ALL DIMENSIONS IN mm
REMOVE ALL SHARP EDGES

ROUND TENSILE TEST PIECE	MATL: TUNGSTEN ALLOY	REF:CQAM/58/3
SKETCH No: K NOS 125 0 003 0		Date : 09.09.2022
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